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DEPARTMENT OF TRANSPORTATION

PENNDOT RESEARCH

PENNDOT

HEAVY AXLE STUDY: IMPACT OF HIGHER RAIL CAR WEIGHT LIMITS ON SHORT-LINE RAILROADS

University-Based Research, Education, and Technology Transfer Program
AGREEMENT NO. 359704, WORK ORDER 27

VOLUME II: FINAL REPORT

January 2002

By J. A. Laman, C. Leighty, G. L. Gittings, E. Erdogmus and T. E. Boothby

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16. Abstract

The current Class I railroad trend is beginning to require that short-line railroads accept heavy-axle cars beyond the previous standard 263,000-lb gross car weight. Given the nature of the short-line railroad infrastructure in Pennsylvania, these heavier cars are expected to be met by under-capacity of both track structures and bridge structures. The economics of short-line railroads are such that it is important that Class I railroads be able to meet this new demand; therefore, the present study has been undertaken to begin the statewide assessment of the short-line railroad ability to support heavier loads.
In the economic interest of the Commonwealth of Pennsylvania, the PENNDOT Bureau of Rail Freight, Ports, and Waterways funded the present study to estimate the cost for a statewide upgrade of the short-line infrastructure to accommodate the 315,000-lb and 286,000-lb gross car weights.
This project investigated the infrastructure of short-line railroads to safely support 315,000-lb and 286,000-lb gross car weights through a bridge statistical sampling scheme and a track survey.

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VOL. II: FINAL REPORT APPENDICES

Prepared for

Commonwealth of Pennsylvania
Department of Transportation

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APPENDIX A

GENERAL BRIDGE AND SHORTLINE

DATA

Appendix A-1: Bridge Database

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Adrian-B&P	1.1	St	SST		0	0	12	0			$48,000.00			
Agway-A&E	25.28	St	DPG		0	0	16	0			$94,400.00			
Agway-A&E	25.47	St	DPG		0	0	16	0			$94,400.00			
Antlers RT	213.86	St	TTR	OP	1908	7	1128	1	Susquehanna River	10/12/1997			JRA	No
Ant-LV	179.44	St	TPG	BA	1901	1	94	2	Wmspt Ind				JRA	Yes
Avis-LV	0.12	St	SST	OP	1967	1	10	1	Nickles Run	4/5/1997		New Wye-	JRA	
Avis-LV	1.78	St	DPG	OP	1904	4	407	1	Pine Creek	4/5/1997			JRA	Yes
Avis-LV	1.98	St	TPG	OP	1901	1	40	1	Hwy #2	4/4/1997			JRA	Yes
Avis-LV	168.67	Mas	MAR	BA	1882	1	15	1	Lawshe Run	4/4/1997		Also Hwy	JRA	Yes
Avis-LV	169.68	Mas	MAR	BA	1900	1	16	1	Larry Creek	4/4/1997			JRA	No
Avis-LV	170.65	Mas	MAR	BA	1882	1	8	1	Stream	4/3/1997			JRA	No
Avis-LV	171.3	St	TPG	BA	1937	1	101	1	Rt. 220	4/3/1997			JRA	Yes
Avis-LV	171.46	Mas	MAR	BA	1901	2	82	1	Larry Creek	4/2/1997			JRA	Yes
Avis-LV	172.78	Con	CAR	BA	1913	1	10	1	Stream	4/2/1997			JRA	Yes
Avis-LV	174.48	St	SST	OP	1925	1	25	1	Pine Run	4/2/1997		28 Ties 198	JRA	Yes
Avis-LV	175.62	Mas	MAR	BA	1900	1	10	1	Stream	4/2/1997			JRA	No
Avis-LV	177.2	Mas	MAR	BA	1883	1	19	1	Stream	4/2/1997			JRA	No
Bell-NBER	30.95	Con	CSB	BA		1	14	1	Moose Run	12/1/1998			JRA	Yes
Bell-NBER	31.08	St	TPG	OP	1916	2	115	1	Bald Eagle Crk	4/15/1997			JRA	Yes
Bell-NBER	33.1	Con	CSB	BA	1917	2	40	2	Buffalo Run	4/15/1997			JRA	Yes
Bell-NBER	33.79	St	TPG	OP	1920	4	203	1	Spring Crk	4/25/1999		2@45, 1@5	JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Bell-NBER	34.05	St	TPG	OP	1909	1	66	1	Spring Crk	4/25/1999			JRA	Yes
Bell-NBER	35.6	Mas	MAR	BA		1	9	1	Driveway	4/15/1997			JRA	No
Bell-NBER	36.9	St	DPG	OP	1912	1	27	1	Logan Run	4/15/1997			JRA	Yes
Bell-NBER	37.3	St	DPG	OP		1	12	1	Stream	4/15/1997			JRA	Yes
Bell-NBER	37.69	St	SST	OP		1	10	1	Stream	4/15/1997			JRA	No
Belt-R&S	0.481	St	TTR		1910	0	161	0			$1,110,900.00			
Belt-R&S	0.53	St	TPG		1909	0	74	0			$510,840.00			
Belt-R&S	1.061	St	TPG		1962	0	162	0			$1,119,744.00			
Belt-R&S	1.77	St	TPG		1909	0	130	0			$898,560.00			
Belt-R&S	2.42	St	TPG		1954	0	130	0			$943,488.00			
Belt-R&S	2.86	St	TPG		1909	0	75.5	0			$483,200.00			
Belt-R&S	2.96	St	TTR		1910	0	144	0			$1,221,300.00			
Belt-R&S	3.03	St	TPG		1909	0	60	0			$384,000.00			
Belt-R&S	4.23	St	TPG		1929	0	48	0			$307,200.00			
Brock-P&S	0.47	St	SST		0	0	44	0			$184,800.00			
Brock-P&S	0.48	St	SST		0	0	57.5	0			$241,500.00			
Brock-P&S	0.49	St	SST		0	0	57.5	0			$241,500.00			
Butler-B&P	283.79	St	DPG		1955	0	24	0			$141,600.00			
Butler-B&P	284.13	St	DPG		1955	0	22	0			$129,800.00			
Butler-B&P	285.1	St	TPG		0	0	65	0			$416,000.00			
Butler-B&P	285.2	Tim	TST		1996	0	13	0			$54,600.00			
Butler-B&P	404	St	DPG		0	0	80	0			$472,000.00			
Butler-B&P	405	St	DPG		0	0	50	0			$295,000.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Butler-B&P	406	Mas	MAR		0	0	10	0			$178,438.00			
Butler-B&P	407	St	DPG		0	0	160	0			$1,008,000.00			
Butler-B&P	408	St	DPG		0	0	20	0			$118,000.00			
Butler-B&P	408.4	St	TPG		0	0	100	0			$937,440.00			
Butler-B&P	409	St	DPG		1948	0	100	0			$944,000.00			
Butler-B&P	410	St	DPG		1953	0	114.5	0			$1,080,880.00			
Butler-B&P	412	Tim	TST		1943	0	47	0			$300,800.00			
Butler-B&P	413	Tim	TST		1949	0	13	0			$54,600.00			
Butler-B&P	414	Tim	TST		1940	0	15	0			$63,000.00			
Butler-B&P	604	St	TPG		0	0	150	0			$1,008,000.00			
Butler-B&P	605	St	DPG		0	0	120	0			$793,800.00			
Butler-B&P	606	St	DPG		0	0	25	0			$147,500.00			
Butler-B&P	606.1	St	DPG		0	0	100	0			$324,000.00			
Butler-B&P	607	St	DPG		0	0	100	0			$625,400.00			
Butler-B&P	608	St	DPG		0	0	220	0			$1,510,740.00			
C&M-RJ	17.67	St	TPG		0	2	155	0			$0.00			
C&M-RJ	18.26	St	DPG		0	17	661	0			$0.00			
C&M-RJ	18.27	St	DTR		0	2	200	0			$0.00			
C&M-RJ	18.47	St	TTR		0	1	180	0			$0.00			
C&M-RJ	18.52	St	TPG		0	1	74	0			$0.00			
C&M-RJ	18.57	St	TTR		0	1	155	0			$0.00			
C&M-RJ	18.63	Con	CSB		0	1	6	0			$0.00			
C&M-RJ	18.65	St	TPG		0	1	74	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
C&M-RJ	19.04	St	TPG		0	1	44	0			$0.00			
Carbondale-LC	0.1	Steel	ngle Tressl		0	0	0	0			$0.00			
Carbondale-LC	177	Steel	I Beams		0	0	0	0			$0.00			
Carbondale-LC	178.3	teel Girde	I Beams		0	0	0	0			$0.00			
Carbondale-LC	179.1	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	179.3	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	179.4	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	179.5	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	181.7	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	183.3	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	184.4	Steel	ngle I Beam		0	0	0	0			$0.00			
Carbondale-LC	186	Steel	ngle I Beam		0	0	0	0			$0.00			
Carbondale-LC	188	Steel	le Span Tre		0	0	0	0			$0.00			
Carbondale-LC	188.3	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	188.51	Steel	ual I Beam		0	0	0	0			$0.00			
Carbondale-LC	190	Steel	I Beams		0	0	0	0			$0.00			
Carbondale-LC	190.5	Steel	le Span Tre		0	0	0	0			$0.00			
Carbondale-LC	190.6	ncrete/Dec			0	0	0	0			$0.00			
Carbondale-LC	191	ncrete/Dec			0	0	0	0			$0.00			
Carbondale-LC	193.8	Steel	I Beams		0	0	0	0			$0.00			
Carbondale-LC	194.32	Steel	I Beams		0	0	0	0			$0.00			
Carbon-SV	0.08	St	SST	OP	1923	4	82	1	Shamokin Creek	12/2/1998		3 24" Ibms	JRA	No
Carbon-SV	0.18	St	SST	OP	1923	2	38	1	Carbon Run	12/2/1998		3 24" Ibms	JRA	No

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
CherryTree-RJ	19.61	St	DPG		0	4	372	0			$0.00			
CherryTree-RJ	21.291	St	TPG		0	1	30	0			$0.00			
CherryTree-RJ	21.67	Mas	MAR		0	1	10	0			$0.00			
CherryTree-RJ	21.7	Mas	MAR		0	1	30	0			$0.00			
CherryTree-RJ	21.73	St	TPG		0	1	30	0			$0.00			
CherryTree-RJ	21.96	St	DPG		0	13	563	0			$0.00			
CherryTree-RJ	22.88	St	DPG		0	5	379	0			$0.00			
CherryTree-RJ	26.54	St	TTR		0	1	155	0			$0.00			
CherryTree-RJ	29.84	St	DPG		0	1	31	0			$0.00			
CherryTree-RJ	31.05	Con	CAR		0	1	10	0			$0.00			
CherryTree-RJ	31.99	St	DPG		0	1	28	0			$0.00			
CherryTree-RJ	33.77	St	TPG		0	1	36	0			$0.00			
CherryTree-RJ	35.46	St	SST		0	1	12	0			$0.00			
CherryTree-RJ	36.04	St	DPG		0	1	45	0			$0.00			
CherryTree-RJ	37.691	St	DPG		0	1	24	0			$0.00			
CherryTree-RJ	39.391	St	SST		0	1	18	0			$0.00			
CherryTree-RJ	43.77	St	SST		0	1	24	0			$0.00			
CherryTree-RJ	43.9	Mas	MAR		0	2	32	0			$0.00			
CherryTree-RJ	47.62	Con	CAR		0	1	8	0			$0.00			
CherryTree-RJ	49.48	St	SST		0	1	25	0			$0.00			
CherryTree-RJ	49.5	St	DPG		0	1	40	0			$0.00			
CherryTree-RJ	49.58	St	SST		0	1	17	0			$0.00			
CherryTree-RJ	50.46	St	DPG		0	2	100	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
CherryTree-RJ	50.61	St	DPG		0	2	120	0			$0.00			
CherryTree-RJ	52.33	St	DPG		0	2	110	0			$0.00			
CherryTree-RJ	52.49	St	SST		0	1	24	0			$0.00			
Clairton-W&LE	0.181	Con	CAR			1	10	0			$0.00			
Clairton-W&LE	0.4	St	TTR		0	1	137.5	0			$0.00			
Clairton-W&LE	0.41	St	DPG		0	8	264	0			$0.00			
Clairton-W&LE	0.421	St	DPG		0	1	65	0			$0.00			
Clairton-W&LE	0.59	St	DPG		0	1	30	0			$0.00			
Clairton-W&LE	2.31	Con	CAR		0	1	6	0			$0.00			
Clairton-W&LE	4.41	Con	CAR		0	1	10	0			$0.00			
Connellsville-W&LE	0.010676	St	DPG		1930	1	60	0			$0.00			
Connellsville-W&LE	0.09	St	DPG		1930	1	58.5	0	Youghipgheny River		$0.00			
Connellsville-W&LE	0.1011	St	DPG		1930	1	30	0			$0.00			
Connellsville-W&LE	0.118	St	DPG		1930	1	120	0			$0.00			
Connellsville-W&LE	0.14085	St	TTR		1930	1	262	0			$0.00			
Connellsville-W&LE	0.19047	St	DPG		1930	1	120	0			$0.00			
Connellsville-W&LE	0.2132	St	DPG		1930	7	30	0			$0.00			
Connellsville-W&LE	0.23024	St	DPG		1930	6	60	0			$0.00			
Connellsville-W&LE	0.2984	St	DPG		1930	1	50	0			$0.00			
Connellsville-W&LE	0.3078	St	TTR		1930	1	168	0			$0.00			
Connellsville-W&LE	0.3397	St	DPG		1930	1	60	0			$0.00			
Connellsville-W&LE	0.9	St	DPG		1930	1	54	0			$0.00			
Connellsville-W&LE	2.3	Con	CBX		1930	1	8	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	4.531	Con	CBX		1930	1	6	0			$0.00			
Connellsville-W&LE	4.86	St	DPG		1930	1	30	0			$0.00			
Connellsville-W&LE	4.866	St	DPG		1930	1	70	0			$0.00			
Connellsville-W&LE	4.878	St	DPG		1930	1	30	0			$0.00			
Connellsville-W&LE	4.885	St	DPG		1930	1	70	0			$0.00			
Connellsville-W&LE	4.897	St	DPG		1930	1	30	0			$0.00			
Connellsville-W&LE	4.9035	St	DPG		1930	2	93	0			$0.00			
Connellsville-W&LE	4.9388	St	DPG		1930	1	100	0			$0.00			
Connellsville-W&LE	5.43	St	DPG		1930	1	64	0			$0.00			
Connellsville-W&LE	6.26	St	DPG		1930	1	75.66	0			$0.00			
Connellsville-W&LE	6.274	St	DPG		1930	1	29.5	0			$0.00			
Connellsville-W&LE	6.73	St	DPG		1930	1	91.5	0			$0.00			
Connellsville-W&LE	6.747	St	DPG		1930	2	90	0			$0.00			
Connellsville-W&LE	6.78	St	DPG		1930	1	91.5	0			$0.00			
Connellsville-W&LE	6.9	Con	CBX			1	5	0			$0.00			
Connellsville-W&LE	8.3	Con	CBX		0	1	8	0			$0.00			
Connellsville-W&LE	8.51	St	TTR		1930	1	130	0			$0.00			
Connellsville-W&LE	8.53	St	DPG		1930	1	29.33	0			$0.00			
Connellsville-W&LE	8.98	St	DPG		1930	2	85	0			$0.00			
Connellsville-W&LE	9.012	St	DPG		1930	1	120	0			$0.00			
Connellsville-W&LE	9.58	St	DPG		1930	3	90	0			$0.00			
Connellsville-W&LE	10.251	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	10.265	St	DPG		1930	1	40	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	10.273	St	DTR		1930	1	160	0			$0.00			
Connellsville-W&LE	10.303	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	10.318	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	10.326	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	12.52	St	DPG		1930	1	54.5	0			$0.00			
Connellsville-W&LE	12.53	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	12.543	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	12.558	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	12.569	St	DPG		1930	1	100	0			$0.00			
Connellsville-W&LE	12.588	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	12.598	St	DPG		1930	1	100	0			$0.00			
Connellsville-W&LE	12.617	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	12.6278	St	DPG		1930	1	100	0			$0.00			
Connellsville-W&LE	12.646	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	12.657	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	12.672	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	12.683	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	12.698	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	12.705	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	12.721	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	12.728	St	DPG		1930	1	79.5	0			$0.00			
Connellsville-W&LE	13.97	St	DPG		1930	2	80	0			$0.00			
Connellsville-W&LE	14	St	DPG		1930	1	50	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	14.01	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	14.025	St	DPG		1930	1	50	0			$0.00			
Connellsville-W&LE	14.034	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	14.05	St	DPG		1930	1	50	0			$0.00			
Connellsville-W&LE	14.059	St	DPG		1930	1	122	0			$0.00			
Connellsville-W&LE	14.082	St	DPG		1930	2	230	0			$0.00			
Connellsville-W&LE	14.126	St	DTR		1930	1	370	0			$0.00			
Connellsville-W&LE	14.196	St	DPG		1930	1	230	0			$0.00			
Connellsville-W&LE	14.239	St	DPG		1930	2	80	0			$0.00			
Connellsville-W&LE	14.46	St	SST		1948	1	25.67	0			$0.00			
Connellsville-W&LE	14.465	St	SST		1948	1	45	0			$0.00			
Connellsville-W&LE	14.473	St	SST		1948	1	32	0			$0.00			
Connellsville-W&LE	14.478	St	SST		1948	1	23.5	0			$0.00			
Connellsville-W&LE	15.35	St	DPG		1930	1	80.67	0			$0.00			
Connellsville-W&LE	15.365	St	DPG		1930	2	68	0			$0.00			
Connellsville-W&LE	15.48	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	15.49	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	15.506	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	15.516	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	15.539	St	DPG		1930	1	.120	0			$0.00			
Connellsville-W&LE	15.549	St	DPG		1930	1	55	0			$0.00			
Connellsville-W&LE	15.579	St	DPG		1930	2	80	0			$0.00			
Connellsville-W&LE	15.595	St	DPG		1930	1	55	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	15.73	St	SST		1930	1	36.5	0			$0.00			
Connellsville-W&LE	17.01	St	SST		1930	1	56	0			$0.00			
Connellsville-W&LE	17.1	Con	CBX		1930	1	10	0			$0.00			
Connellsville-W&LE	18.08	St	DPG		1930	1	52.5	0			$0.00			
Connellsville-W&LE	18.091	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	18.098	St	DPG		1930	1	57.5	0			$0.00			
Connellsville-W&LE	20.7	Con	CBX		1930	1	8	0			$0.00			
Connellsville-W&LE	20.82	St	DPG		1930	2	44	0			$0.00			
Connellsville-W&LE	20.828	St	DPG		1930	1	52	0			$0.00			
Connellsville-W&LE	21.21	Con	CBX		1930	1	8	0			$0.00			
Connellsville-W&LE	21.34	St	SST		1930	1	33.5	0			$0.00			
Connellsville-W&LE	21.68	St	DPG		1930	4	240	0			$0.00			
Connellsville-W&LE	21.681	St	DPG		1930	1	70	0			$0.00			
Connellsville-W&LE	21.682	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	23.01	St	DTR		1930	1	50	0			$0.00			
Connellsville-W&LE	23.02	St	DPG		1930	3	240	0			$0.00			
Connellsville-W&LE	23.03	St	DPG		1930	2	80	0			$0.00			
Connellsville-W&LE	23.04	St	DPG		1930	2	120	0			$0.00			
Connellsville-W&LE	23.05	St	DPG		1930	1	130	0			$0.00			
Connellsville-W&LE	23.061	St	DTR		1930	1	290	0			$0.00			
Connellsville-W&LE	23.07	St	DTR		1930	1	200	0			$0.00			
Connellsville-W&LE	23.08	St	DTR		1930	1	450	0			$0.00			
Connellsville-W&LE	23.09	St	DTR		1930	2	380	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	23.1	St	DTR		1930	1	350	0			$0.00			
Connellsville-W&LE	23.11	St	DTR		1930	3	480	0			$0.00			
Connellsville-W&LE	23.991	St	DPG		1930	2	120	0			$0.00			
Connellsville-W&LE	24	St	DPG		1930	3	240	0			$0.00			
Connellsville-W&LE	24.011	St	DPG		1930	2	80	0			$0.00			
Connellsville-W&LE	24.801	St	DPG		1930	1	40	0			$0.00			
Connellsville-W&LE	24.81	St	DPG		1930	2	120	0			$0.00			
Connellsville-W&LE	24.821	St	DPG		1930	2	60	0			$0.00			
Connellsville-W&LE	24.83	St	DPG		1930	1	80	0			$0.00			
Connellsville-W&LE	25.22	St	SST		1930	1	50.67	0			$0.00			
Connellsville-W&LE	25.23	St	SST		1930	1	46.67	0			$0.00			
Connellsville-W&LE	25.24	St	SST		1930	1	44.67	0			$0.00			
Connellsville-W&LE	25.4	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	25.88	St	DPG		1929	2	110	0			$0.00			
Connellsville-W&LE	25.89	St	DPG		1929	2	80	0			$0.00			
Connellsville-W&LE	25.9	St	DPG		1929	1	100	0			$0.00			
Connellsville-W&LE	25.91	St	DPG		1929	1	70	0			$0.00			
Connellsville-W&LE	26.2	St	DPG		1929	5	400	0			$0.00			
Connellsville-W&LE	26.21	St	DPG		1929	6	240	0			$0.00			
Connellsville-W&LE	26.22	St	DPG		1929	1	100	0			$0.00			
Connellsville-W&LE	26.23	St	DPG		1929	2	120	0			$0.00			
Connellsville-W&LE	26.66	St	DPG		0	4	320	0			$0.00			
Connellsville-W&LE	26.67	St	DPG		0	3	120	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	26.68	St	DPG		0	1	110	0			$0.00			
Connellsville-W&LE	27.051	St	DPG		1929	3	240	0			$0.00			
Connellsville-W&LE	27.06	St	DPG		1929	4	180	0			$0.00			
Connellsville-W&LE	27.071	St	DPG		1929	3	300	0			$0.00			
Connellsville-W&LE	27.5	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	27.7	Con	PIP		1929	1	6	0			$0.00			
Connellsville-W&LE	27.79	St	TPG		1929	1	44.17	0			$0.00			
Connellsville-W&LE	27.81	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	28	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	28.9	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	29.7	Con	CBX		1929	1	5	0			$0.00			
Connellsville-W&LE	30.12	St	DPG		1929	1	87.5	0			$0.00			
Connellsville-W&LE	30.13	St	DPG		1929	7	280	0			$0.00			
Connellsville-W&LE	30.14	St	DPG		1929	7	560	0			$0.00			
Connellsville-W&LE	30.15	St	DPG		1929	4	220	0			$0.00			
Connellsville-W&LE	30.16	St	DPG		1929	1	122	0			$0.00			
Connellsville-W&LE	30.17	St	DPG		1929	3	270	0			$0.00			
Connellsville-W&LE	30.18	St	DPG		1929	1	67.5	0			$0.00			
Connellsville-W&LE	31.67	Con	CBX		1929	1	8	0			$0.00			
Connellsville-W&LE	31.71	Con	CAR		1929	1	25	0			$0.00			
Connellsville-W&LE	32.261	St	SST		1929	1	45.74	0			$0.00			
Connellsville-W&LE	32.27	St	SST		1929	1	50	0			$0.00			
Connellsville-W&LE	32.28	St	SST		1929	1	54.26	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	32.4	St	DPG		1929	2	160	0			$0.00			
Connellsville-W&LE	32.41	St	DPG		1929	2	80	0			$0.00			
Connellsville-W&LE	32.42	St	DTR		1929	1	140	0			$0.00			
Connellsville-W&LE	33.36	St	DPG		1929	2	200	0			$0.00			
Connellsville-W&LE	33.37	Con	CAR		1929	1	74	0			$0.00			
Connellsville-W&LE	33.67	St	DPG		1929	1	70	0			$0.00			
Connellsville-W&LE	33.68	St	DPG		1929	7	210	0			$0.00			
Connellsville-W&LE	33.69	St	DPG		1929	1	80	0			$0.00			
Connellsville-W&LE	33.701	St	DPG		1929	6	330	0			$0.00			
Connellsville-W&LE	33.71	St	DPG		1929	5	591.65	0			$0.00			
Connellsville-W&LE	33.721	St	DPG		1929	7	420	0			$0.00			
Connellsville-W&LE	33.73	St	DPG		1929	1	88.35	0			$0.00			
Connellsville-W&LE	35.29	St	DTR		1929	1	160	0			$0.00			
Connellsville-W&LE	35.3	St	DTR		1929	1	65	0			$0.00			
Connellsville-W&LE	35.31	St	DPG		1929	2	80	0			$0.00			
Connellsville-W&LE	35.32	St	DPG		1929	3	180	0			$0.00			
Connellsville-W&LE	36.92	St	DPG		1929	1	72	0			$0.00			
Connellsville-W&LE	37.27	St	DTR		1929	1	200	0			$0.00			
Connellsville-W&LE	37.31	Con	CBX		1929	1	6	0			$0.00			
Connellsville-W&LE	37.85	Con	CAR		1929	1	25	0			$0.00			
Connellsville-W&LE	39.16	Con	CAR		1929	1	25	0			$0.00			
Connellsville-W&LE	39.38	St	DPG		1929	6	480	0			$0.00			
Connellsville-W&LE	39.39	St	DPG		1929	5	200	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	39.4	St	DPG		1929	1	65	0			$0.00			
Connellsville-W&LE	39.671	Con	CAR		1928	1	25	0			$0.00			
Connellsville-W&LE	39.86	St	SST		1931	1	21.33	0			$0.00			
Connellsville-W&LE	40.23	St	SST		1931	1	21.33	0			$0.00			
Connellsville-W&LE	41.32	Con	CAR		1902	1	18	0			$0.00			
Connellsville-W&LE	41.77	Con	CAR		1902	1	16	0			$0.00			
Connellsville-W&LE	42.09	Con	CAR		1902	1	20	0			$0.00			
Connellsville-W&LE	42.1	Con	CAR		1902	1	6	0			$0.00			
Connellsville-W&LE	42.631	St	TPG		1939	1	76	0			$0.00			
Connellsville-W&LE	42.64	St	DPG		1939	1	32	0			$0.00			
Connellsville-W&LE	43.28	Con	CSB		1950	1	18	0			$0.00			
Connellsville-W&LE	43.75	St	DPG		1939	1	94.84	0			$0.00			
Connellsville-W&LE	44.21	St	DPG		1902	1	43.5	0			$0.00			
Connellsville-W&LE	45.36	Con	CAR		1907	1	6	0			$0.00			
Connellsville-W&LE	45.38	Con	CAR		0	1	24	0			$0.00			
Connellsville-W&LE	46.57	St	DPG		1931	1	37.67	0			$0.00			
Connellsville-W&LE	46.87	St	SST		1931	1	24.33	0			$0.00			
Connellsville-W&LE	47.14	St	SST		1931	1	18	0			$0.00			
Connellsville-W&LE	47.49	St	DPG		1910	3	135	0			$0.00			
Connellsville-W&LE	47.5	St	DPG		1910	3	90	0			$0.00			
Connellsville-W&LE	47.51	St	DPG		1910	6	420	0			$0.00			
Connellsville-W&LE	47.52	St	DPG		1910	1	38.75	0			$0.00			
Connellsville-W&LE	47.53	St	DPG		1910	1	32.67	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	47.54	St	DPG		1910	1	67.08	0			$0.00			
Connellsville-W&LE	47.55	St	DPG		1910	1	52	0			$0.00			
Connellsville-W&LE	47.56	St	DPG		1910	1	34	0			$0.00			
Connellsville-W&LE	48.07	Con	CAR		0	1	40	0			$0.00			
Connellsville-W&LE	48.08	Con	CBX			1	6	0			$0.00			
Connellsville-W&LE	48.42	Con	CAR		0	1	16	0			$0.00			
Connellsville-W&LE	48.62	Con	CAR		0	1	21	0			$0.00			
Connellsville-W&LE	48.63	Con	CAR		0	1	6	0			$0.00			
Connellsville-W&LE	48.7	Con	CAR		0	1	10	0			$0.00			
Connellsville-W&LE	48.93	Con	CAR		0	1	24	0			$0.00			
Connellsville-W&LE	49.11	Con	CAR		0	1	6	0			$0.00			
Connellsville-W&LE	49.43	Con	CAR		0	1	33	0			$0.00			
Connellsville-W&LE	50.15	St	TPG		0	1	160	0			$0.00			
Connellsville-W&LE	50.36	St	DPG		1902	1	31.67	0			$0.00			
Connellsville-W&LE	50.75	St	SST		0	7	154	0			$0.00			
Connellsville-W&LE	50.78	St	DPG		1932	1	86.25	0			$0.00			
Connellsville-W&LE	50.79	St	DPG		1932	1	68.83	0			$0.00			
Connellsville-W&LE	50.8	St	DPG		1932	2	130	0			$0.00			
Connellsville-W&LE	51.71	St	TPG		1932	1	73.25	0			$0.00			
Connellsville-W&LE	51.72	St	DPG		1932	1	45.5	0			$0.00			
Connellsville-W&LE	51.73	St	DPG		1932	1	43.42	0			$0.00			
Connellsville-W&LE	51.74	St	DPG		1932	1	64.33	0			$0.00			
Connellsville-W&LE	51.75	St	DPG		1932	1	68.75	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	52.16	St	SST		1902	1	26	0			$0.00			
Connellsville-W&LE	52.71	St	DPG		1932	1	50	0			$0.00			
Connellsville-W&LE	52.81	St	DPG		1932	3	150.75	0			$0.00			
Connellsville-W&LE	53.31	St	DPG		0	2	78.84	0			$0.00			
Connellsville-W&LE	53.32	St	DPG		0	1	97.5	0			$0.00			
Connellsville-W&LE	53.33	St	DPG		0	1	95	0			$0.00			
Connellsville-W&LE	53.34	St	DPG		0	2	60	0			$0.00			
Connellsville-W&LE	53.35	St	DPG		0	1	58	0			$0.00			
Connellsville-W&LE	53.36	St	DPG		0	1	98	0			$0.00			
Connellsville-W&LE	53.91	St	TPG		1933	1	86.25	0			$0.00			
Connellsville-W&LE	53.97	Con	CAR		1903	1	12	0			$0.00			
Connellsville-W&LE	54.25	St	SST		1944	1	15	0			$0.00			
Connellsville-W&LE	56.39	St	DTR		0	2	276	0			$0.00			
Connellsville-W&LE	56.4	St	DPG		0	1	71.21	0			$0.00			
Connellsville-W&LE	56.41	St	DPG		0	1	40	0			$0.00			
Connellsville-W&LE	56.42	St	DPG		0	3	210	0			$0.00			
Connellsville-W&LE	56.43	St	DPG		0	5	150	0			$0.00			
Connellsville-W&LE	56.44	St	DPG		0	1	50.92	0			$0.00			
Connellsville-W&LE	56.98	St	DPG		0	1	123.91	0			$0.00			
Connellsville-W&LE	57.67	St	DPG		0	2	118	0			$0.00			
Connellsville-W&LE	57.68	St	DPG		0	4	120	0			$0.00			
Connellsville-W&LE	57.69	St	DPG		0	1	17.5	0			$0.00			
Connellsville-W&LE	57.7	St	DPG		0	2	116	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	58.3	Mas	MAR		0	1	40	0			$0.00			
Connellsville-W&LE	58.56	Con	CAR		0	1	12	0			$0.00			
Connellsville-W&LE	59.18	Con	CAR		0	1	30	0			$0.00			
Connellsville-W&LE	59.42	St	DPG		1902	3	165	0			$0.00			
Connellsville-W&LE	59.43	St	DPG		1902	3	90	0			$0.00			
Connellsville-W&LE	59.44	St	DPG		1902	1	44.22	0			$0.00			
Connellsville-W&LE	59.45	St	DTR		1902	1	100	0			$0.00			
Connellsville-W&LE	59.46	St	DTR		1902	1	138	0			$0.00			
Connellsville-W&LE	59.47	St	DTR		1902	1	91.33	0			$0.00			
Connellsville-W&LE	60.26	St	DTR		1903	2	240	0			$0.00			
Connellsville-W&LE	60.45	St	DPG		1902	2	39.66	0			$0.00			
Connellsville-W&LE	60.46	St	TPG		1902	1	55.83	0			$0.00			
Connellsville-W&LE	60.85	St	TPG		1902	1	35	0			$0.00			
Connellsville-W&LE	61.01	St	TTR		1902	1	150	0			$0.00			
Connellsville-W&LE	61.44	St	DPG		1902	1	60	0			$0.00			
Connellsville-W&LE	61.71	St	DPG		1902	1	50	0			$0.00			
Connellsville-W&LE	62.02	St	TTR		1902	1	142	0			$0.00			
Connellsville-W&LE	62.03	St	TTR		1902	1	166	0			$0.00			
Connellsville-W&LE	62.04	St	DPG		1902	3	90	0			$0.00			
Connellsville-W&LE	62.05	St	DPG		1902	4	268	0			$0.00			
Connellsville-W&LE	64.01	St	DPG		0	2	170	0			$0.00			
Connellsville-W&LE	64.1	Con	CAR		1903	1	4	0			$0.00			
Connellsville-W&LE	64.65	Con	CAR		1903	1	6	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	64.84	St	DPG		1902	1	26	0			$0.00			
Connellsville-W&LE	65.36	St	DPG		1902	1	23	0			$0.00			
Connellsville-W&LE	65.38	St	DPG		1902	2	151	0			$0.00			
Connellsville-W&LE	65.79	St	DPG		1902	1	38.5	0			$0.00			
Connellsville-W&LE	65.8	Con	CAR		1903	1	6	0			$0.00			
Connellsville-W&LE	66.36	St	DPG		1902	1	38.5	0			$0.00			
Connellsville-W&LE	67.47	St	DPG		1902	1	38.42	0			$0.00			
Connellsville-W&LE	67.48	Con	CAR		1903	1	6	0			$0.00			
Connellsville-W&LE	68.08	Mas	MBX		1903	1	6	0			$0.00			
Connellsville-W&LE	68.1	Con	CAR		1903	1	20	0			$0.00			
Connellsville-W&LE	68.59	St	DTR		1902	2	200	0			$0.00			
Connellsville-W&LE	68.69	St	DPG		1902	1	36.5	0			$0.00			
Connellsville-W&LE	71.48	Mas	MBX		0	1	6	0			$0.00			
Connellsville-W&LE	72.4	Mas	MBX		0	2	6	0			$0.00			
Connellsville-W&LE	73.03	St	DPG		1902	1	25.5	0			$0.00			
Connellsville-W&LE	73.7	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	74.01	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	75.35	Mas	MBX		0	1	6	0			$0.00			
Connellsville-W&LE	75.7	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	76.02	Mas	MBX		1946	1	5	0			$0.00			
Connellsville-W&LE	76.08	St	DPG		1902	1	53.42	0			$0.00			
Connellsville-W&LE	76.15	Mas	MBX		0	1	2	0			$0.00			
Connellsville-W&LE	76.38	Mas	MBX		1946	1	4	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Connellsville-W&LE	76.63	Mas	MBX		1946	1	4	0			$0.00			
Connellsville-W&LE	76.82	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	76.92	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	77.43	St	SST		1902	1	22.25	0			$0.00			
Connellsville-W&LE	77.45	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	77.58	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	77.8	Mas	MBX		0	1	4	0			$0.00			
Connellsville-W&LE	77.98	Mas	MBX		1925	1	6	0			$0.00			
Connellsville-W&LE	78.53	St	SST		1902	1	22.25	0			$0.00			
Connellsville-W&LE	79.16	St	SST		1902	1	38.42	0			$0.00			
Connellsville-W&LE	79.64	St	DPG		1902	1	38.42	0			$0.00			
Connellsville-W&LE	80.5	St	SST		1902	1	22.25	0			$0.00			
Connellsville-W&LE	80.84	St	DPG		1902	1	58.17	0			$0.00			
Connellsville-W&LE	81.3	St	SST		0	1	23.67	0			$0.00			
Connellsville-W&LE	82.61	St	TTR		1902	1	99.75	0			$0.00			
Connellsville-W&LE	82.87	St	DTR		1902	1	100	0			$0.00			
Connellsville-W&LE	84.71	St	DTR		1902	1	100	0			$0.00			
Connellsville-W&LE	85.15	St	DTR		1902	1	100	0			$0.00			
Connellsville-W&LE	85.72	St	DPG		1902	1	77.5	0			$0.00			
Connellsville-W&LE	94.92	St	DPG		1902	1	36.5	0			$0.00			
Corning.Sec.	88.86	St	SST	OP		1	11	1		11/18/1998			GROW	No
Corning-LV	182.34	St	TPG	OP	1949	3	280	1	Lycoming Creek	4/14/1997			JRA	Yes
Corning-LV	182.66	Con	CSB	BA	1925	2	10	1	Cemetary Run	4/14/1997			JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Corning-LV	182.88	St	DPG	OP	1949	1	42	1	Rose St.	4/11/1997			JRA	Yes
Corning-LV	184.27	Con	CSB	BA	1980	1	11	1	Sewer	4/11/1997		Not Visible	JRA	Yes
Corning-LV	185.03	Con	CSB	BA	1925	1	7	1	Sewer	4/11/1997		At Penn St.	JRA	Yes
Corning-LV	185.35	Con	CBX	BA	1925	1	9	1	Grafus Run	4/11/1997		Not Visible	JRA	Yes
Corning-LV	185.38	Con	CSB	BA	1955	1	10	1	Private Rd.	4/11/1997			JRA	No
Corning-LV	185.85	Con	CBX	BA	1922	2	18	1	McClure Run	4/11/1997			JRA	Yes
Corning-LV	185.87	St	DPG	OP	1903	1	16	1	McClure Run	4/10/1997			JRA	No
Corning-LV	186.18	Con	CSB	BA	1980	5	58	1	Millers Run	4/10/1997			JRA	Yes
Corning-LV	187.14	Con	CBX	BA	1980	1	13	1	Bull Run	4/10/1997			JRA	Yes
Corning-LV	188.23	St	DPG	OP	1902	2	94	1	Pond	4/10/1997			JRA	Yes
Corning-LV	188.32	St	TPG	BA	1927	6	360	1	Loyalsock Creek	4/10/1997			JRA	Yes
Corning-LV	189.65	Con	PIP	BA	1922	1	7	2	Stream	4/10/1997			JRA	No
Corning-LV	190.25	Con	CBX	BA	1941	1	12	1	Private Rd.	4/10/1997		Lycoming S	JRA	Yes
Corning-LV	190.58	Mas	MAR	BA	1880	1	11	1	Stream	4/10/1997			JRA	Yes
Corning-LV	193.43	Con	CBX	BA	1918	1	17	1	Twin Run	4/9/1997			JRA	Yes
Corning-LV	194.34	St	DPG	OP	1949	1	28	1	Stream	4/9/1997			JRA	Yes
Corning-LV	195.29	Con	PIP	BA	1922	1	10	1	Stream	4/9/1997		48" CP Gro	JRA	Yes
Corning-LV	195.84	Mas	MAR	BA	1880	1	12	1	Wolf Run	4/9/1997			JRA	Yes
Corning-LV	196.33	St	DPG	BA	1933	2	160	1	Muncy Creek	4/8/1997			JRA	Yes
Corning-LV	196.62	Con	CSB	BA	1948	1	32	1	Farm Road	4/8/1997			JRA	Yes
Corning-LV	196.97	Con	PIP	BA	1943	1	13	1	Stream	4/8/1997			JRA	Yes
Corning-LV	197.77	Con	CBX	BA	1929	1	7	1	Stream	4/8/1997			JRA	Yes
Corning-LV	197.91	Con	CSB	BA	1930	1	25	1	Dewart Rd.	4/8/1997			JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Corning-LV	198.04	St	DPG	BA	1930	18	1290	1	Susq. River	4/8/1997			JRA	Yes
Corning-LV	198.91	St	SST	OP	1972	1	33	1	Turkey Run	4/2/1997		Rebuilt afte	JRA	Yes
Corning-W&C	76.3	St	TPG	OP		1	25	1		11/17/1998			GROW	No
Corning-W&C	76.44	Con	CAR	BA		1	8	1		11/7/1998			GROW	No
Corning-W&C	78.1	Con	CAR	BA		1	8	1		11/17/1998			GROW	No
Corning-W&C	79.07	St	SST	OP		1	10	1	Rurhbaugh Crk.	11/17/1998			GROW	No
Corning-W&C	81.08	St	DPG	ST		1	23	1		11/17/1998			GROW	No
Corning-W&C	81.84	St	TPG	TT		1	40	1		11/17/1998			GROW	No
Corning-W&C	82.6	St	TPG	TT		1	27	1		11/17/1998			GROW	No
Corning-W&C	84.24	St	TPG	TT		1	24	1	Town Creek	11/18/1998			GROW	No
Corning-W&C	85.3	Con	CSB	BA		1	12	1		11/18/1998			GROW	No
Corning-W&C	85.87	St	SST	OP		1	11	1		11/18/1998			GROW	No
Corning-W&C	86.89	St	TPG	OP		3	229	1	Tioga River	11/18/1998			GROW	No
Corning-W&C	92.97	St	SST	SA		1	57	1		11/18/1998			GROW	No
Corning-W&C	93.63	St	DPG	BA		1	134	1	PA 287	11/18/1998			GROW	No
Corning-W&C	96.57	St	SST	OP		1	55	1	Ives Run Rd	11/18/1998			GROW	No
Corning-W&C	97.56	St	SST	OP		1	57	1	Johnston Crk	12/29/1998			GROW	No
Corning-W&C	99.64	St	SST	OP		7	335	1	Crooked Creek	1/9/1998			GROW	No
Corning-W&C	102.74	St	TPG	TT		1	35	1		12/29/1998			GROW	No
Corning-W&C	102.98	Con	CSB	BA		1	16	1		12/29/1998			GROW	No
Corning-W&C	103.25	St	DPG	OP		1	27	1		12/29/1998			GROW	No
Corning-W&C	104.13	Con	CSB	BA		1	16	1		12/29/1998			GROW	No
Cresson-RJ	0.72	Con	CSB		0	1	41	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Cresson-RJ	8.66	Mas	MAR		0	1	8	0			$0.00			
Cresson-RJ	10.03	Con	CSB		0	1	23	0			$0.00			
Cresson-RJ	11.31	Con	CSB		0	1	34	0			$0.00			
Cresson-RJ	12.74	St	SST		0	2	39	0			$0.00			
Cresson-RJ	15.29	Con	CSB		0	1	23	0			$0.00			
Cresson-RJ	16.151	St	DPG		0	1	65	0			$0.00			
Cresson-RJ	16.31	St	DPG		0	1	66	0			$0.00			
Cresson-RJ	17.28	St	CMP		0	1	5	0			$0.00			
Cresson-RJ	18.02	Con	CSB		0	1	22	0			$0.00			
Cresson-RJ	18.25	Con	PIP		0	1	5	0			$0.00			
Cresson-RJ	18.59	St	DPG		0	1	76	0			$0.00			
Cresson-RJ	24.7	St	DPG		0	1	24	0			$0.00			
Cresson-RJ	27.69	St	TPG		0	1	33	0			$0.00			
Cresson-RJ	28.08	St	TPG		0	2	112	0			$0.00			
Cresson-RJ	30.24	Con	CSB		0	1	14	0			$0.00			
Cresson-RJ	30.941	St	SST		0	1	13	0			$0.00			
Cresson-RJ	31.61	St	SST		0	1	19	0			$0.00			
Cresson-RJ	35.17	St	SST		0	1	11	0			$0.00			
Cresson-RJ	37.05	Con	CSB		0	1	24	0			$0.00			
Cresson-RJ	39.1	St	TTR		0	1	100	0			$0.00			
Cresson-RJ	39.11	St	DTR		0	1	100	0			$0.00			
Cresson-RJ	39.12	St	DPG		0	11	490	0			$0.00			
Cresson-RJ	42.81	Mas	MAR		0	1	9	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Cresson-RJ	44.78	St	DPG		0	3	272	0			$0.00			
Cresson-RJ	45.57	St	SST		0	3	112	0			$0.00			
Cresson-RJ	45.62	Con	CBX		0	3	36	0			$0.00			
Cresson-RJ	51.31	St	CMP		0	1	7	0			$0.00			
Cresson-RJ	55.19	St	CMP		0	1	7	0			$0.00			
Cresson-RJ	55.51	St	CMP		0	1	6	0			$0.00			
Cresson-RJ	56.74	St	CMP		0	1	8	0			$0.00			
Cresson-RJ	57.62	St	DPG		0	1	52	0			$0.00			
Cresson-RJ	58.36	St	DPG		0	4	365	0			$0.00			
Cresson-RJ	58.88	St	DPG		0	13	855	0			$0.00			
Cresson-RJ	59.98	Mas	MAR		0	1	16	0			$0.00			
Cresson-RJ	61.16	St	TPG		0	1	74	0			$0.00			
Cresson-RJ	62.81	St	TPG		0	1	74	0			$0.00			
Cresson-RJ	65.29	St	TPG		0	1	74	0			$0.00			
Cresson-RJ	65.6	St	TTR		0	3	350	0			$0.00			
Field-Oil	0.86	St	TPG			2	162	0			$0.00			
Field-Oil	0.87	St	DPG			1	20	0			$0.00			
Field-Oil	2.4	St	TPG			1	20	0			$0.00			
Grandview-A&E	0.07	Con	PIP		0	0	6	0			$51,300.00			
Grandview-A&E	0.16	St	DPG		0	0	20	0			$118,000.00			
Hillman-RJ	0.461	St	SST		0	1	18	0			$0.00			
Hillman-RJ	2.29	Mas	MAR		0	1	8	0			$0.00			
Hillman-RJ	4.69	Mas	MAR		0	1	9	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Indiana-B&P	0.01	St	DPG		0	0	160.5	0			$1,061,708.00			
Indiana-B&P	0.83	Mas	MAR		0	0	60	0			$899,160.00			
Indiana-B&P	0.91	St	TTR		0	0	103	0			$710,700.00			
Indiana-B&P	0.92	St	TPG		0	0	104	0			$665,600.00			
Irvona-RJ	4.671	St	DPG		0	1	30	0			$0.00			
Irvona-RJ	7.12	St	SST		0	1	13	0			$0.00			
Irvona-RJ	8.751	Con	CSB		0	1	24	0			$0.00			
Irvona-RJ	10.81	St	SST		0	1	19	0			$0.00			
Irvona-RJ	12.1	St	CMP		0	1	5	0			$0.00			
Irvona-RJ	12.12	Con	CSB		0	1	20	0			$0.00			
Irvona-RJ	12.7	St	CIP		0	1	5	0			$0.00			
Irvona-RJ	14.38	St	SST		0	1	23	0			$0.00			
Irvona-RJ	17.951	Con	PIP		0	3	18	0			$0.00			
Irvona-RJ	18.36	St	DPG		0	1	33	0			$0.00			
Irvona-RJ	18.88	Mas	MAR		0	1	8	0			$0.00			
Kiski Junction-KJR	0.0104	St	TPG		1898	3	740	0			$0.00			
Lewisburg-UCI	169.38	Con	CSB	BA	1918	1	34	1	Strickland Run	12/14/1998			LBC	No
Main-A&E	0.101	Con	PIP		0	0	6	0			$51,300.00			
Main-A&E	2.83	Con	CSB		0	0	75	0			$477,900.00			
Main-A&E	4.4	Con	PIP		0	0	5	0			$47,763.00			
Main-A&E	6.84	Con	PIP		0	0	6	0			$76,800.00			
Main-A&E	7.22	St	DPG		0	0	36	0			$504,392.00			
Main-A&E	7.26	Mas	MAR		0	0	20	0			$118,000.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-A&E	9.33	St	DPG		0	0	12	0			$70,800.00			
Main-A&E	9.74	Con	CSB		0	0	18	0			$114,696.00			
Main-A&E	11.41	Con	CSB		0	0	12	0			$205,004.00			
Main-A&E	14.69	Con	CSB		0	0	64	0			$426,688.00			
Main-A&E	15.71	Con	CSB		0	0	23	0			$153,341.00			
Main-A&E	17.65	Con	CSB		0	0	64	0			$426,688.00			
Main-A&E	18.23	Con	CSB		0	0	64	0			$426,688.00			
Main-A&E	18.82	Con	CSB		0	0	18	0			$144,696.00			
Main-A&E	20.9	Con	CSB		0	0	14	0			$89,208.00			
Main-A&E	22.92	Mas	MAR		0	0	8	0			$81,988.00			
Main-A&E	23.24	St	TPG		0	0	195	0			$1,410,240.00			
Main-A&E	24.72	St	TPG		0	0	92	0			$586,224.00			
Main-A&E	25.05	Con	CSB		0	0	18	0			$114,696.00			
Main-A&E	25.97	St	TPG		0	0	106	0			$766,592.00			
Main-A&E	26.35	St	TPG		1918	0	134	0			$1,356,723.00			
Main-A&E	26.78	St	DPG		0	0	64	0			$434,240.00			
Main-A&E	27.05	St	DPG		0	0	70	0			$474,950.00			
Main-A&E	27.3	Con	CSB		0	0	23	0			$146,556.00			
Main-A&E	27.98	Mas	MAR		0	0	16	0			$157,508.00			
Main-A&E	28.23	St	DPG		0	0	55	0			$366,685.00			
Main-A&E	29	St	CMP		0	0	8	0			$142,599.00			
Main-A&E	29.6	Con	PIP		0	0	6	0			$80,016.00			
Main-A&E	31.37	Con	CSB		0	0	24	0			$160,008.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-A&E	32.7	Con	CSB		0	0	16	0			$106,672.00			
Main-A&E	33.13	Con	CSB		0	0	96	0			$640,032.00			
Main-A&E	33.72	Con	CSB		0	0	16	0			$106,672.00			
Main-A&E	34.41	Con	CSB		0	0	20	0			$133,340.00			
Main-A&E	35.96	Mas	MAR		0	0	20	0			$287,300.00			
Main-A&E	38.65	Con	CSB		0	0	14	0			$93,338.00			
Main-A&E	41.14	St	TPG		0	0	106	0			$766,592.00			
Main-A&E	42.271	Con	PIP		0	0	5	0			$36,580.00			
Main-A&E	42.56	St	DPG		0	0	25	0			$147,500.00			
Main-A&E	46.09	Con	CSB		0	0	31	0			$206,677.00			
Main-A&E	46.85	Mas	MBX		0	0	5	0			$66,800.00			
Main-A&E	51.1	St	DPG		0	0	45	0			$265,500.00			
Main-A&E	53.59	St	TPG		1925	0	104	0			$752,128.00			
Main-A&E	54.86	Con	CSB		0	0	12	0			$80,004.00			
Main-A&E	55.99	Con	PIP		0	0	5	0			$32,700.00			
Main-A&E	56.28	St	DPG		0	0	23	0			$135,700.00			
Main-A&E	56.97	St	TPG		0	0	306	0			$2,271,744.00			
Main-A&E	60.09	St	TPG		0	0	213	0			$1,472,256.00			
Main-A&E	60.39	St	DPG		0	0	54	0			$318,600.00			
Main-A&E	61.36	Con	CSB		0	0	18	0			$114,696.00			
Main-A&E	62.8	Con	CSB		0	0	18	0			$114,696.00			
Main-A&E	65.9	St	TTR		0	0	465	0			$3,689,775.00			
Main-A&E	67.86	St	CMP		0	0	10	0			$150,938.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-A&E	68.91	Mas	MAR		0	0	20	0			$469,200.00			
Main-A&E	73.26	Con	PIP		0	0	5	0			$32,700.00			
Main-A&E	73.42	St	DPG		0	0	17	0			$100,300.00			
Main-A&E	75.15	St	TPG		0	0	48	0			$347,136.00			
Main-A&E	76.9	St	TPG		0	0	48	0			$347,136.00			
Main-A&E	79.56	Con	CSB		0	0	27	0			$172,044.00			
Main-A&E	82.65	St	DPG		0	0	76	0			$506,692.00			
Main-A&E	101.28	Con	CSB		0	0	40	0			$354,880.00			
Main-A&E	103.79	St	DPG		0	0	153	0			$1,108,485.00			
Main-A&E	104.85	St	DPG		0	0	24	0			$141,600.00			
Main-A&E	106.78	St	DPG		0	0	32	0			$188,800.00			
Main-A&E	107.32	St	DPG		0	0	108	0			$720,036.00			
Main-A&E	109.39	Con	CSB		0	0	28	0			$186,676.00			
Main-A&E	109.91	St	DPG		0	0	260	0			$1,719,900.00			
Main-A&E	110.82	Con	CSB		0	0	32	0			$213,344.00			
Main-A&E	112.88	Con	PIP		0	0	5	0			$32,700.00			
Main-A&E	118.86	St	DPG		0	0	108	0			$720,036.00			
Main-A&E	120.32	St	DPG		0	0	106	0			$706,702.00			
Main-A&E	126.8	Mas	MAR		0	0	16	0			$151,040.00			
Main-A&E	126.89	St	DPG		0	0	26	0			$153,400.00			
Main-A&E	134.12	Mas	MAR		0	0	20	0			$573,988.00			
Main-A&E	137.52	Con	CSB		0	0	16	0			$106,672.00			
Main-A&E	138.6	St	CMP		0	0	5	0			$35,500.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-A&E	139.5	St	DPG		0	0	106	0			$675,432.00			
Main-A&E	140.05	St	CMP		0	0	5	0			$35,449.00			
Main-A&E	142.39	St	CMP		0	0	5	0			$35,500.00			
Main-A&E	144	St	CMP		0	0	10	0			$53,536.00			
Main-A&E	144.47	Con	CBX		0	0	8	0			$47,200.00			
Main-A&E	145.65	St	CIP		0	0	6	0			$24,000.00			
Main-A&E	145.8	St	CMP		0	0	5	0			$20,000.00			
Main-A&E	147.821	St	TPG		0	0	144	0			$921,600.00			
Main-A&E	148.77	St	TPG		0	0	288	0			$2,017,152.00			
Main-A&E	148.93	Con	CBX		0	0	6	0			$59,000.00			
Main-A&S	2.101	St	DPG		1920	1	150	0	Logstown Run		$0.00			
Main-B&P	2.38	St	TPG		1915	0	96	0			$987,034.00			
Main-B&P	3.39	St	TPG		1914	0	75	0			$556,800.00			
Main-B&P	3.84	St	TOP		1916	0	6	0			$100,538.00			
Main-B&P	4.07	St	TPG		1907	0	130	0			$898,560.00			
Main-B&P	4.11	St	TPG		1915	0	60	0			$414,720.00			
Main-B&P	5.56	St	TPG		1915	0	100	0			$734,400.00			
Main-B&P	5.98	St	TPG		0	0	106	0			$778,464.00			
Main-B&P	6.42	Mas	MAR		1911	0	12	0			$159,508.00			
Main-B&P	6.63	St	TPG		1913	0	100	0			$734,400.00			
Main-B&P	7.45	St	DPG		1956	0	22	0			$136,290.00			
Main-B&P	9.02	St	TPG		1968	0	93.5	0			$686,664.00			
Main-B&P	11.03	Mas	MAR		1910	0	12	0			$312,653.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	14.78	St	TOP		1913	0	6	0			$38,232.00			
Main-B&P	14.88	St	TOP		1913	0	6	0			$38,232.00			
Main-B&P	15.2	Mas	MAR		1911	0	10	0			$111,138.00			
Main-B&P	16.66	St	TOP		0	0	8	0			$50,976.00			
Main-B&P	17.68	St	TOP		0	0	14	0			$89,208.00			
Main-B&P	17.76	St	TOP		1912	0	8	0			$152,039.00			
Main-B&P	18.72	Mas	MAR		1912	0	12	0			$249,540.00			
Main-B&P	18.97	St	TPG		1904	0	95.5	0			$649,400.00			
Main-B&P	20.98	St	TPG		1915	0	70	0			$448,000.00			
Main-B&P	21.29	St	TPG		1913	0	60	0			$433,920.00			
Main-B&P	21.92	St	DPG		1913	0	30	0			$177,000.00			
Main-B&P	22.91	St	DPG		1913	0	79	0			$466,100.00			
Main-B&P	23.32	St	TOP		1913	0	8	0			$50,976.00			
Main-B&P	23.84	St	TPG		1904	0	86	0			$550,400.00			
Main-B&P	24.38	St	TPG		1914	0	86	0			$550,400.00			
Main-B&P	24.73	Tim	TST		1929	0	22	0			$92,400.00			
Main-B&P	24.8	Tim	TST		1931	0	43	0			$180,600.00			
Main-B&P	25.61	Tim	TST		1931	0	8.25	0			$34,650.00			
Main-B&P	27.52	St	DPG		1923	0	24	0			$141,600.00			
Main-B&P	28.06	St	DPG		1923	0	40	0			$247,800.00			
Main-B&P	29.01	St	CMP		1959	0	12	0			$48,000.00			
Main-B&P	31.89	St	DPG		0	0	530	0			$9,195,152.00			
Main-B&P	31.891	St	DTR		0	2	250	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	32.96	St	DPG		1957	0	79	0			$489,405.00			
Main-B&P	33.82	Mas	MAR		1911	0	12	0			$395,449.00			
Main-B&P	34.38	St	TPG		1916	0	95.5	0			$714,340.00			
Main-B&P	34.85	St	DPG		1916	0	60.5	0			$385,506.00			
Main-B&P	35.92	Mas	MAR		1911	0	16	0			$418,751.00			
Main-B&P	36.83	Tim	TST		1945	0	5.5	0			$22,000.00			
Main-B&P	37.24	St	TOP		1925	0	6	0			$97,807.00			
Main-B&P	38.04	St	CMP		1955	0	7	0			$39,449.00			
Main-B&P	38.41	St	DPG		1925	0	24	0			$141,600.00			
Main-B&P	38.61	Tim	TST		1935	0	11	0			$46,200.00			
Main-B&P	38.83	Tim	TST		1925	0	36.5	0			$153,300.00			
Main-B&P	38.92	St	DPG		1925	0	24	0			$141,600.00			
Main-B&P	39.37	St	CMP		1955	0	7	0			$36,300.00			
Main-B&P	39.67	Mas	MAR		1910	0	12	0			$469,308.00			
Main-B&P	40.94	St	TOP		1935	0	5	0			$25,000.00			
Main-B&P	42.3	Tim	TST		1930	0	13	0			$58,800.00			
Main-B&P	45.07	St	TPG		1907	0	57	0			$393,984.00			
Main-B&P	94.61	St	TPG		1903	0	70	0			$627,200.00			
Main-B&P	95.23	St	TPG		1903	0	70	0			$627,200.00			
Main-B&P	97.25	St	TPG		1903	0	80	0			$716,800.00			
Main-B&P	97.65	St	DPG		1903	0	15.67	0			$101,952.00			
Main-B&P	98.1	St	DPG		1903	0	35	0			$206,500.00			
Main-B&P	98.42	St	DPG		1903	0	80	0			$529,200.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	98.68	St	DPG		1903	0	22	0			$136,290.00			
Main-B&P	99.59	St	DPG		1903	0	16	0			$94,400.00			
Main-B&P	103.03	St	DPG		1903	0	22	0			$129,800.00			
Main-B&P	104.5	St	TPG		1936	0	71.5	0			$687,053.00			
Main-B&P	105.4	St	SST		1914	0	152	0			$2,821,297.00			
Main-B&P	105.41	St	TTR		0	1	141.5	0			$0.00			
Main-B&P	106.37	St	DPG		1932	0	158	0			$1,592,640.00			
Main-B&P	107.4	St	TPG		1902	0	47.25	0			$457,229.00			
Main-B&P	107.51	St	DPG		1912	0	140	0			$1,566,432.00			
Main-B&P	108.12	Con	CSB		1904	0	9	0			$91,757.00			
Main-B&P	110.88	St	DPG		1912	0	32	0			$317,184.00			
Main-B&P	111.67	St	TTR		1904	2	207.5	0			$2,767,490.00			
Main-B&P	111.671	St	DPG		0	1	74	0			$2,767,490.00			
Main-B&P	112.06	Con	CSB		1906	0	17.33	0			$176,683.00			
Main-B&P	112.28	Con	CSB		1912	0	144	0			$892,080.00			
Main-B&P	112.55	Con	CSB		1906	0	12.5	0			$82,836.00			
Main-B&P	112.77	Con	CSB		1948	0	70	0			$466,690.00			
Main-B&P	113.33	Con	CSB		1905	0	17.5	0			$111,510.00			
Main-B&P	113.47	St	TTR			0	358.25	0			$4,985,678.00			
Main-B&P	113.48	St	DPG		0	0	358.25	0			$0.00			
Main-B&P	116.86	St	DPG		1912	0	25	0			$147,500.00			
Main-B&P	117.48	St	DPG		1912	0	25	0			$147,500.00			
Main-B&P	117.91	Con	CSB		1906	0	10	0			$63,720.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	119.76	St	TOP		1882	0	6	0			$41,264.00			
Main-B&P	120.33	St	CIP		1882	0	6	0			$38,559.00			
Main-B&P	120.78	St	DPG		1931	0	30	0			$389,400.00			
Main-B&P	121.68	St	TPG		1912	0	50.5	0			$488,678.00			
Main-B&P	122.31	St	TPG		1912	0	173.3	0			$1,676,989.00			
Main-B&P	122.84	St	TPG		1912	0	96	0			$987,034.00			
Main-B&P	123.01	Con	CST		1960	0	74	0			$829,445.00			
Main-B&P	123.87	St	TOP		1911	0	8	0			$176,640.00			
Main-B&P	124.54	St	SST		1912	0	20	0			$80,000.00			
Main-B&P	126.17	St	TPG		1913	0	34	0			$235,008.00			
Main-B&P	138.02	Con	CST		1911	0	33	0			$194,700.00			
Main-B&P	138.17	Con	CAR		1910	0	19	0			$424,726.00			
Main-B&P	155.61	St	TOP		1911	0	10	0			$202,038.00			
Main-B&P	157.96	St	TOP		1909	0	6	0			$36,300.00			
Main-B&P	161.05	St	TOP		1909	0	6	0			$33,266.00			
Main-B&P	167.4	St	TPG		0	0	129	0			$1,555,840.00			
Main-B&P	167.92	St	DPG		1899	0	684	0			$4,679,692.00			
Main-B&P	168.27	Mas	MAR		1898	0	10	0			$211,876.00			
Main-B&P	173.3	St	TPG		1912	0	46	0			$317,952.00			
Main-B&P	174.83	St	TPG		1913	0	28	0			$193,536.00			
Main-B&P	176.8	St	DPG		1907	0	54.5	0			$321,550.00			
Main-B&P	179.14	St	DPG		1906	0	80	0			$504,000.00			
Main-B&P	180.05	Con	CST		1906	0	7.5	0			$47,790.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	180.87	St	DPG		1906	0	228	0			$1,560,432.00			
Main-B&P	181.82	Mas	MAR		1898	0	10	0			$160,299.00			
Main-B&P	183.8	St	DPG		1908	0	240	0			$1,512,000.00			
Main-B&P	193.73	St	SST		1903	0	16	0			$151,040.00			
Main-B&P	196.21	St	DPG		1912	0	68	0			$689,553.00			
Main-B&P	199.6	St	DPG		1912	0	16	0			$94,400.00			
Main-B&P	200.16	St	DPG		1912	0	24	0			$141,600.00			
Main-B&P	201.31	St	DPG		1912	0	130	0			$920,400.00			
Main-B&P	202.01	St	TPG		1913	0	76.5	0			$740,275.00			
Main-B&P	202.34	Con	CBX		1912	0	22	0			$238,904.00			
Main-B&P	203.27	St	DPG		1902	0	27	0			$481,783.00			
Main-B&P	203.75	St	TPG		1913	0	62.5	0			$604,800.00			
Main-B&P	204.28	St	DPG		1912	0	33.5	0			$325,680.00			
Main-B&P	205.6	St	SST		1902	0	15.5	0			$158,026.00			
Main-B&P	209.47	Mas	MAR		1898	0	12	0			$249,540.00			
Main-B&P	211.47	St	DPG		1904	0	60	0			$354,000.00			
Main-B&P	211.71	St	DPG		1904	0	60	0			$354,000.00			
Main-B&P	212.02	St	TOP		1905	0	6	0			$46,124.00			
Main-B&P	213.82	St	DPG		1904	0	16	0			$94,400.00			
Main-B&P	215.53	St	SST		1904	0	16	0			$94,400.00			
Main-B&P	217.03	St	DPG		1904	0	75	0			$442,500.00			
Main-B&P	217.46	St	DPG		0	0	75	0			$472,500.00			
Main-B&P	220.67	St	DPG		1905	0	181	0			$1,265,733.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	221.38	St	DPG		1905	0	181	0			$1,254,330.00			
Main-B&P	222.35	St	SST		1905	0	26	0			$146,556.00			
Main-B&P	222.54	St	DPG		1905	0	181	0			$1,299,942.00			
Main-B&P	222.89	Con	CST		1923	0	27	0			$300,758.00			
Main-B&P	225.05	Con	CST		1909	0	64	0			$426,688.00			
Main-B&P	226.08	St	TTR		1898	0	190	0			$1,411,000.00			
Main-B&P	226.29	St	TTR		1899	0	140	0			$966,000.00			
Main-B&P	226.37	St	DPG		0	2	153	0			$4,014,765.00			
Main-B&P	226.371	St	DTR		0	1	127	0			$0.00			
Main-B&P	226.372	St	TTR		0	1	58.5	0			$0.00			
Main-B&P	226.373	St	TTR		0	1	155.5	0			$0.00			
Main-B&P	228.5	St	DPG		1923	0	34	0			$200,600.00			
Main-B&P	229.16	St	DPG		1923	0	18	0			$106,200.00			
Main-B&P	230.96	St	DPG		1923	0	30	0			$177,000.00			
Main-B&P	231.04	Mas	MAR		1898	0	12	0			$228,724.00			
Main-B&P	234.65	St	DPG		1899	0	24	0			$141,600.00			
Main-B&P	235.59	St	TPG		0	1	98.08	0			$1,414,344.00			
Main-B&P	235.591	St	DPG		0	2	114	0			$0.00			
Main-B&P	238.08	Mas	MAR		1898	0	8	0			$125,338.00			
Main-B&P	238.57	Mas	MAR		1898	0	12	0			$373,484.00			
Main-B&P	238.89	St	DPG		1941	0	618.5	0			$5,164,589.00			
Main-B&P	240.73	St	DPG		1923	0	23	0			$135,700.00			
Main-B&P	241.39	St	DPG		1898	0	900	0			$9,990,489.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	241.391	St	DTR		0	0	127	0			$9,990,489.00			
Main-B&P	244.39	St	DPG		1923	0	23	0			$146,556.00			
Main-B&P	245.65	St	DPG		1923	0	34	0			$201,804.00			
Main-B&P	246.18	St	DPG		1923	0	23	0			$135,700.00			
Main-B&P	248	St	DPG		1899	0	54.5	0			$321,550.00			
Main-B&P	248.93	St	TPG		1899	0	54	0			$345,600.00			
Main-B&P	249.61	St	DPG		1899	0	34	0			$200,600.00			
Main-B&P	252.12	St	DPG		1898	0	30	0			$177,000.00			
Main-B&P	252.19	St	TPG		1898	0	74.5	0			$476,800.00			
Main-B&P	252.93	St	SST		1898	0	24	0			$141,600.00			
Main-B&P	255	St	DPG		1945	0	18	0			$169,920.00			
Main-B&P	255.34	Con	CST		1964	0	10	0			$94,400.00			
Main-B&P	255.85	St	TTR		1898	0	123	0			$848,700.00			
Main-B&P	256.92	St	TTR		1898	0	123	0			$848,700.00			
Main-B&P	257.19	St	TTR		1898	0	123	0			$848,700.00			
Main-B&P	257.63	St	DPG		1898	0	96	0			$610,848.00			
Main-B&P	257.76	St	DPG		1899	0	96	0			$647,136.00			
Main-B&P	258.77	St	DPG		1964	0	44	0			$259,600.00			
Main-B&P	258.89	St	DPG		1898	1	92.42	0			20,462,159.00			
Main-B&P	258.891	St	DTR		0	3	1341	0			$0.00			
Main-B&P	258.892	St	DPG		0	5	290	0			$0.00			
Main-B&P	260.03	St	DPG		1898	0	24	0			$141,600.00			
Main-B&P	260.39	Mas	MAR		1898	0	12	0			$410,616.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-B&P	261.75	Mas	MAR		1898	0	6	0			$781,281.00			
Main-B&P	262.51	St	DPG		1898	0	482	0			$3,592,200.00			
Main-B&P	263.45	St	DPG		1898	0	460.5	0			$3,678,600.00			
Main-B&P	264.53	St	DPG		1898	0	34	0			$200,600.00			
Main-B&P	265.96	Mas	MAR		1898	0	16	0			$1,080,500.00			
Main-B&P	267.64	St	DPG		1898	0	34	0			$200,600.00			
Main-B&P	270.88	St	DTR		1898	0	127	0			$927,100.00			
Main-B&P	272.84	St	DPG		1898	0	96	0			$604,800.00			
Main-B&P	274.19	St	TPG		1898	0	132	0			$887,040.00			
Main-B&P	274.35	St	DPG		1898	0	96	0			$604,800.00			
Main-B&P	275.15	St	TPG		1898	0	198	0			$1,267,200.00			
Main-B&P	275.39	St	TPG		1898	0	65	0			$416,000.00			
Main-B&P	277.36	Mas	MAR		1898	0	16	0			$216,448.00			
Main-B&P	280.45	Mas	MAR		1898	0	6	0			$348,396.00			
Main-B&P	281.15	St	DPG		1898	0	312	0			$2,023,428.00			
Main-D&M	2.121	Con	CBX		0	0	29.25	0			$172,575.00			
Main-D&M	2.17	Con	CBX		0	0	9.67	0			$57,053.00			
Main-D&M	2.27	Con	CBX		0	0	29.25	0			$172,575.00			
Main-D&M	2.54	Con	CBX		0	0	19.5	0			$115,050.00			
Main-D&M	2.77	St	TPG		0	0	79	0			$505,600.00			
Main-D&M	3.44	Con	CBX		0	0	9.67	0			$57,053.00			
Main-D&M	5.5	Con	CBX		0	0	19.5	0			$115,050.00			
Main-D&M	6.99	Con	CBX		0	0	19.5	0			$115,050.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-D&M	7.19	Con	CBX		0	0	9.67	0			$57,053.00			
Main-D&M	7.58	Con	CBX		0	0	9.67	0			$57,053.00			
Main-East Erie	0.255	Con	CBX		0	1	8	0			$0.00			
Main-East Erie	0.509	St	CIP		0	0	36	0			$0.00			
Main-East Erie	0.77	St	CIP		0	0	36	0			$0.00			
Main-East Erie	1.038	St	DPG		1911	0	200	0			$0.00			
Main-East Erie	1.25	Con	CBX		0	1	4	0			$0.00			
Main-East Erie	1.769	Con	CSB		0	0	8	0			$0.00			
Main-East Erie	2.689	Con	CSB		0	0	20	0			$0.00			
Main-East Erie	3.038	Con	CAR		1915	0	140	0			$0.00			
Main-East Erie	3.5	Con	CBX		0	1	4	0			$0.00			
Main-East Erie	4	Con	CBX		0	1	4	0			$0.00			
Main-Everett	14.58	Con	CSB		1910	2	18.4	0	Run		$0.00			
Main-Everett	14.6	Con	CSB		0	2	18.4	0	Run		$0.00			
Main-Everett	14.77	Con	CSB		1910	2	18.4	0	Cove Run		$0.00			
Main-Everett	14.81	St	SST		1910	2	48.2	0	Cove Run		$0.00			
Main-Everett	14.95	St	DPG		1910	2	131.7	0	Frankstown		$0.00			
Main-Everett	15.02	St	TPG		1910	1	41.11	0	County road		$0.00			
Main-Everett	15.5	St	SST		1910	2	48.4	0	Run		$0.00			
Main-Everett	15.98	Con	CBX		1910	1	12	0	Run		$0.00			
Main-Everett	16.15	Con	CBX		1910	1	12	0	Run		$0.00			
Main-Everett	16.45	Con	CAR		1910	1	16	0	Pau Pau Run		$0.00			
Main-Everett	16.85	Con	CAR		1910	1	16	0	Eskerts Run		$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-Everett	17.5	Con	CBX		1910	1	12	0	Lick Run		$0.00			
Main-Everett	17.96	Con	CAR		1910	1	16	0	Dodsons Run		$0.00			
Main-Everett	18.09	St	SST		1910	1	29.2	0	Pole Cat Run		$0.00			
Main-Everett	19.21	Con	CBX		1910	1	12	0	Run		$0.00			
Main-Everett	19.8	Con	CBX		1910	1	12	0	Run		$0.00			
Main-Everett	20.14	St	DPG		1910	2	61.4	0	Poplar Run		$0.00			
Main-Everett	20.41	Con	CBX		1910	1	12	0	Cattle Pass		$0.00			
Main-Everett	20.86	St	SST		1910	1	29.1	0	Pine Run		$0.00			
Main-Everett	21.2	Con	CAR		1910	1	16	0	Run		$0.00			
Main-Getty	8.05	St	SST		1956	4	40	0	Mill Race		$0.00			
Main-Getty	9.63	St	SST		1972	1	29	0	Hunters Run		$0.00			
Main-Getty	12.731	Con	CSB		1935	1	24	0	Peach Glen Road		$0.00			
Main-Getty	13.63	Con	CSB		1935	1	12	0	Farm Road		$0.00			
Main-Getty	16.63	St	TPG		1927	1	60	0	Route 34		$0.00			
Main-Getty	20.984	St	DPG		1943	7	195.5	0	Opossum Creek		$0.00			
Main-Getty	21.05	Con	CSB		1947	1	8.5	0	Stream		$0.00			
Main-Getty	21.15	St	SST		1950	2	37	0	Quaker Run		$0.00			
Main-Getty	22.9	Con	CBX		1945	1	6	0	Stream		$0.00			
Main-Getty	24.95	St	DPG		1945	4	111.5	0	Conewago Creek		$0.00			
Main-Holiday	8.97	St	DPG		1904	4	221	0			$0.00			
Main-Holiday	10.06	St	DPG		1914	3	91.5	0			$0.00			
Main-Holiday	14.97	St	SST		1909	5	91.8	0			$0.00			
Main-Holiday	16.69	Mas	MAR		1884	1	20	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-Holiday	17.11	Mas	MAR		1871	1	6	0			$0.00			
Main-Holiday	17.7	Con	CSB		1871	1	11	0			$0.00			
Main-Holiday	18.041	Con	CSB		1911	1	15	0			$0.00			
Main-Knox	144.8	St	SST			1	32	0			$0.00			
Main-Knox	146.11	Tim	TST			1	13	0			$0.00			
Main-Knox	152.2	St	SST			1	125	0			$0.00			
Main-Knox	153.3	Tim	TST			1	598	0			$0.00			
Main-Knox	160	Tim	TST			1	507	0			$0.00			
Main-Knox	162.5	Tim	TST			1	86	0			$0.00			
Main-Knox	163.1	Tim	TST			1	11	0			$0.00			
Main-Knox	163.2	Tim	TST			1	158	0			$0.00			
Main-MA&PA	12.8	Mas	MAR			1	15	0			$0.00			
Main-MA&PA	13.52	St	TPG			2	217.67	0			$0.00			
Main-MA&PA	15.8	Mas	MAR			1	9	0			$0.00			
Main-MA&PA	18.04	Con	CSB			1	25	0			$0.00			
Main-MA&PA	18.86	St	CMP			1	6	0			$0.00			
Main-MA&PA	20.71	St	DPG			2	54.5	0			$0.00			
Main-MA&PA	21.36	St	SST			1	19	0			$0.00			
Main-MA&PA	23.61	St	DPG			1	28	0			$0.00			
Main-MA&PA	24.17	Tim	TST			1	10	0			$0.00			
Main-MA&PA	24.98	St	TPG			1	58	0			$0.00			
Main-MA&PA	27.28	Con	CSB			1	8	0			$0.00			
Main-MA&PA	27.85	St	DPG			1	40.5	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-MA&PA	28.05	St	SST			1	18	0			$0.00			
Main-MC	85.5	Concrete	allast Deck		0	0	0	0			$0.00			
Main-MC	85.6	Concrete	allast Deck		0	0	0	0			$0.00			
Main-MC	85.8	ncrete/Ste	allast Deck		0	0	0	0			$0.00			
Main-MC	98.4	ncrete/Ste	allast Deck		0	0	0	0			$0.00			
Main-ML	0.3	St	DPG		0	0	251	0			$1,850,121.00			
Main-ML	7.33	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	10.25	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	11.94	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	14.9	St	DPG		1904	0	56	0			$346,920.00			
Main-ML	19.02	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	19.81	Mas	MAR		1872	0	15	0			$215,000.00			
Main-ML	20.53	St	DPG		1906	0	45	0			$278,775.00			
Main-ML	21.75	Con	CSB		0	0	35	0			$248,000.00			
Main-ML	22.27	St	DPG		1890	0	57	0			$353,115.00			
Main-ML	22.85	St	DPG		1923	0	31	0			$182,900.00			
Main-ML	24.36	Mas	MBX		1881	0	10	0			$125,000.00			
Main-ML	24.77	St	DPG		1890	0	57	0			$353,115.00			
Main-ML	26.47	Mas	MAR		1872	0	15	0			$215,000.00			
Main-ML	27.67	Mas	MAR		1872	0	5	0			$50,000.00			
Main-ML	28.68	Mas	MAR		1872	0	15	0			$215,000.00			
Main-ML	30.76	St	DPG		1902	0	221	0			$1,525,563.00			
Main-ML	31.43	St	DPG		1890	0	57	0			$353,115.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-ML	33.47	St	CIP		1916	0	5	0			$20,000.00			
Main-ML	35.63	St	DPG		1902	0	212	0			$1,562,652.00			
Main-ML	35.921	St	DPG		0	0	267	0			$1,968,057.00			
Main-ML	37.18	Con	CBX		1945	0	10	0			$125,000.00			
Main-ML	37.96	St	DPG		1903	0	240	0			$1,769,040.00			
Main-ML	39.28	St	DPG		1889	0	36	0			$223,020.00			
Main-ML	41.01	St	DPG		0	0	212	0			$1,562,652.00			
Main-ML	41.21	St	DPG		1905	0	172	0			$1,267,812.00			
Main-ML	41.28	St	DPG		1890	0	67	0			$395,300.00			
Main-ML	41.73	St	DPG		0	1	261.47	0			$0.00			
Main-ML	41.74	St	TTR		0	1	261.47	0			$0.00			
Main-ML	41.75	St	DTR		0	1	261.47	0			$0.00			
Main-ML	42.36	St	DPG		1903	0	265	0			$1,953,315.00			
Main-ML	42.57	St	DPG		1958	0	119	0			$1,295,482.00			
Main-ML	42.63	St	DPG		1901	0	173	0			$1,275,183.00			
Main-ML	47.68	St	SST		1894	0	20	0			$118,000.00			
Main-ML	47.95	St	DPG		1901	0	246	0			$1,813,266.00			
Main-ML	48.61	Con	PIP		1916	0	12	0			$48,000.00			
Main-ML	49.09	Con	PIP		1916	0	12	0			$48,000.00			
Main-ML	50.76	Tim	TST		1980	0	37	0			$148,000.00			
Main-ML	51.68	St	DPG		1902	0	220	0			$1,621,620.00			
Main-ML	52.74	St	DPG		1899	0	24	0			$141,600.00			
Main-ML	53.29	St	DPG		1902	0	234	0			$1,724,814.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-R&S	44.13	St	TPG		1923	0	83	0			$873,696.00			
Main-R&S	44.6	Mas	MBX		0	0	3	0			$42,636.00			
Main-R&S	45.071	St	TOP		1910	0	6	0			$80,016.00			
Main-R&S	45.42	St	TOP		1910	0	6	0			$80,016.00			
Main-R&S	45.72	St	SST		1909	0	10	0			$70,800.00			
Main-R&S	47.96	St	DPG		1955	0	64	0			$377,600.00			
Main-R&S	49.061	St	TOP		1910	0	6	0			$44,016.00			
Main-R&S	49.3	Mas	MAR		1957	0	8	0			$183,936.00			
Main-R&S	83.74	St	TPG		1906	0	44	0			$304,128.00			
Main-R&S	84.04	St	TPG		1936	0	104.5	0			$722,304.00			
Main-R&S	86.08	St	CIP		1932	0	12	0			$207,938.00			
Main-R&S	89.8	St	DPG		1928	0	25	0			$154,875.00			
Main-R&S	90.23	St	DPG		1964	0	35.5	0			$219,923.00			
Main-R&S	90.59	St	DPG		1957	0	35	0			$216,825.00			
Main-R&S	90.84	St	DPG		1954	0	23.67	0			$146,636.00			
Main-R&S	91.3	St	DPG		1913	0	34	0			$210,630.00			
Main-R&S	91.75	St	DPG		1913	0	34	0			$210,630.00			
Main-R&S	92.52	St	DPG		1913	0	34	0			$210,630.00			
Main-R&S	93.58	St	TPG		1913	0	32.5	0			$218,400.00			
Main-Stras	1.115	St	SST		0	1	16	0			$0.00			
Main-Towanda	10	St	SST		1910	1	20	0			$0.00			
Main-Towanda	20	St	SST		1910	1	20	0			$0.00			
Main-Turtle	2.52	St	DPG		1891	1	54	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-Turtle	3	St	DPG		1891	1	24	0			$0.00			
Main-Turtle	3.69	St	DPG		1891	1	104	0			$0.00			
Main-Turtle	5.83	St	DPG		1895	1	55.5	0			$0.00			
Main-Turtle	7.76	St	DPG		1898	1	69.6	0			$0.00			
Main-Turtle	8.19	St	DPG		1898	1	54.5	0			$0.00			
Main-Turtle	10.19	Con	CAR		1903	1	25	0			$0.00			
Main-York	0.401	St	SST			1	16	0			$0.00			
Main-York	0.501	St	TPG			1	80	0			$0.00			
Main-York	1.111	St	SST			1	12	0			$0.00			
Main-York	2.7	St	SST			1	16.5	0			$0.00			
Main-York	3.9	St	DPG		1931	6	298.5	0			$0.00			
Main-York	4.71	St	TPG		1930	8	318.5	0			$0.00			
Main-York	6.4	St	SST			1	15	0			$0.00			
Main-York	12.31	St	TOP			1	14	0			$0.00			
Main-York	12.4	St	SST		1981	1	26.33	0			$0.00			
Main-York	15.6	St	TTR			2	286	0			$0.00			
Main-York	16.2	St	SST			1	50	0			$0.00			
Mait-JV	0.46	St	TPG	BA	1925	8	616	1	Juniata River	4/23/1997			JRA	Yes
Mait-JV	1.38	St	DPG	OP	1925	1	50	1	Driveway	4/23/1997			JRA	Yes
Mait-JV	1.51	St	DPG	OP	1925	3	159	1	Kishcoquilas Crk	4/24/1997			JRA	Yes
Mait-JV	4.53	St	DPG	OP	1925	3	96	1	Jacks Creek	4/24/1997			JRA	Yes
Meadville-Oil	61.93	St	DPG		1912	1	50	0			$0.00			
Meadville-Oil	63.5	Con	CSB			1	20	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Meadville-Oil	64.21	Con	CST			1	20	0			$0.00			
Meadville-Oil	66.18	St	DPG		1912	1	34	0			$0.00			
Meadville-Oil	66.23	St	TPG		1912	1	36				$0.00			
Meadville-Oil	66.61	St	DPG		1912	1	34	0			$0.00			
Meadville-Oil	68.77	St	TPG		1912	1	45	0			$0.00			
Meadville-Oil	70.7	Con	CAR			1	35	0			$0.00			
Meadville-Oil	72.02	Mas	MAR			1	55	0			$0.00			
Meadville-Oil	74.41	St	DPG		1912	1	44	0			$0.00			
Meadville-Oil	79.62	Mas	MAR			1	25	0			$0.00			
Meadville-Oil	79.74	St	TPG		1927	1	40	0			$0.00			
Meadville-Oil	82.45	St	DPG		1912	1	30	0			$0.00			
Meadville-Oil	83.06	St	TTR		1912	2	280	0			$0.00			
Meadville-Oil	87.14	St	TTR		1912	3	462	0			$0.00			
Meadville-Oil	88	Con	CBX			1	18	0			$0.00			
Meadville-Oil	88.46	Con	CBX			1	15	0			$0.00			
Meadville-Oil	89.31	St	DPG		1912	1	43	0			$0.00			
Meadville-Oil	91.22	St	TPG			1	60	0			$0.00			
Meadville-Oil	92.63	St	DPG			1	65	0			$0.00			
Meadville-Oil	93.47	Con	CAR		1912	1	20	0			$0.00			
Meadville-Oil	93.76	Con	CAR		1912	1	20	0			$0.00			
Meadville-Oil	96.19	St	TPG		1912	1	60	0			$0.00			
Meadville-Oil	96.5	St	TPG		1912	1	60	0			$0.00			
Meadville-Oil	97.9	St	DPG		1912	1	106	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Meadville-Oil	99.34	St	TPG		1912	1	34	0			$0.00			
Mifflin-W&LE	0.57	Con	CAR		0	1	23	0			$0.00			
Mifflin-W&LE	1.29	Con	CAR		0	1	24	0			$0.00			
Mifflin-W&LE	2.631	Con	CAR		0	1	15	0			$0.00			
Mifflin-W&LE	2.91	St	TPG		0	1	86.5	0			$0.00			
Milroy-JV	0.51	St	TPG	OP	1925	3	118	1	Kishcoquilas Crk	4/18/1997			JRA	Yes
Milroy-JV	1	St	TPG	OP	1925	3	204	1	Kishcoquilas Crk	4/18/1997			JRA	Yes
Milroy-JV	2.12	Con	CSB	BA	1918	2	48	1	Buck Run	4/22/1997			JRA	Yes
Milroy-JV	3.25	St	DPG	OP	1925	3	153	2	Kishcoquilas Crk	4/22/1997			JRA	Yes
Milton-UCI	169.99	St	TPG	BA	1927	1	52	1	Cameron Ave.	5/1/1997			WTSE	Yes
Milton-UCI	170.2	St	TPG	BA	1927	1	68	1	Front St.	5/1/1997			WTSE	Yes
Milton-UCI	170.29	St	TPG	OP	1931	7	665	1	Susq. River	5/1/1997			WTSE	Yes
Milton-UCI	170.45	St	TPG	OP	1931	7	595	1	Susq. River	5/1/1997			WTSE	Yes
Mos-P&S	0.5	Mas	MAR		0	0	10	0			$124,778.00			
New Castle-ISS	1.801	St	TPG		1992	2	350	0			$0.00			
New Castle-ISS	2	St	TPG		1999	1	60	0			$0.00			
Newberry-LV	179.65	Mas	MAR	BA	1901	1	15	3	Farm Xing	4/14/1997		10 Ft Conc.	JRA	Yes
Newberry-LV	179.72	Mas	MAR	BA	1901	1	15	3	Dougherty Run	4/14/1997			JRA	Yes
Newberry-LV	181.39	Con	CBX	BA	1925	1	8	1	Fox Run	4/14/1997			JRA	Yes
Newco-UCI	172.38	St	DPG	OP	1924	1	52	1	Stream	5/2/1997			WTSE	Yes
Northern-B&P	419	Tim	TST		0	0	44	0			$184,000.00			
Northern-B&P	420	Tim	TST		1965	0	15.5	0			$62,000.00			
Northern-B&P	422	Tim	TST		1944	0	25	0			$100,000.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Northern-B&P	424	St	DPG		1955	0	30	0			$177,000.00			
Northern-B&P	428	Tim	TST		1965	0	612	0			$2,741,760.00			
Northern-B&P	430	Tim	TST		0	0	79	0			$316,000.00			
Northern-B&P	431	Tim	TST		1966	0	429	0			$2,166,215.00			
Northern-B&P	431.1	St	DTR		0	2	57.92	0			$2,166,215.00			
Northern-B&P	432	Tim	TST		1966	0	181	0			$724,000.00			
Northern-B&P	433	Tim	TST		1966	0	529	0			$2,306,440.00			
Northern-B&P	438	Tim	TST		1944	0	23	0			$96,600.00			
Northern-B&P	439	Tim	TST		1931	0	24	0			$100,800.00			
Northern-B&P	440	Tim	TST		1895	0	36.5	0			$146,000.00			
Northern-B&P	441	St	DPG		1955	0	26.5	0			$156,350.00			
Northern-B&P	442	Tim	TST		1960	0	33.75	0			$135,000.00			
Northern-B&P	444	Tim	TST		1965	0	26	0			$104,000.00			
Northern-B&P	446	Tim	TST		1965	0	43	0			$172,000.00			
Northern-B&P	447	St	DPG		1913	0	30	0			$177,000.00			
North-MA&PA	54.17	St	DPG			1	30	0			$0.00			
North-MA&PA	54.93	Con	CSB			1	5	0			$0.00			
North-MA&PA	55.25	St	TPG			1	90	0			$0.00			
North-MA&PA	55.87	Mas	MAR			1	20	0			$0.00			
North-MA&PA	56.09	Mas	MAR			1	.15	0			$0.00			
NS-NS	180.55	St	DPG	OP	1926	1	54	1	Briar Creek				JRA	Yes
NS-NS	183.23	Con	CSB	BA	1907	1	6	1	Stream				JRA	Yes
NS-NS	185.4	St	SST	OP	1919	1	14	1	Stream				JRA	

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
NS-NS	186.181	St	SST	OP		1	15	1	Stream				JRA	No
NS-NS	188.5	Con	CSB	BA	1926	1	18	1	Stream				JRA	Yes
NS-NS	191.37	Mas	MAR	BA		1	15	1	Hemlock Creek				JRA	Yes
NS-NS	191.48	St	TPG	SP		1	30	1	Rupert Road				JRA	No
NS-NS	191.52	St	TPG	OP	1936	1	74	1	Fishing Creek				JRA	Yes
NS-NS	191.521	St	DPG	OP	1936	1	60	1	Fishing Creek				JRA	Yes
NS-NS	194.07	St	TOP	OP	1907	1	5	1	Stream				JRA	Yes
NS-NS	200.3	Con	CBX	BA	1907	1	6	1	Sluiceway				JRA	Yes
NS-NS	200.77	Con	CBX	BA	1910	1	6	1	Stream				JRA	Yes
NS-NS	201.35	St	DPG	OP	1903	1	23	1	Sechlers Creek				JRA	Yes
NS-NS	201.66	Con	CSB	BA	1907	1	11	1	Stream				JRA	Yes
NS-NS	202.07	St	DPG	OP	1903	1	45	1	Mahoning Creek				JRA	Yes
NS-NS	202.071	St	TPG	OP	1903	2	50	1	Mahoning Creek				JRA	Yes
NS-NS	204.9	St	SST	OP	1903	1	14	1	Stream				JRA	Yes
NS-NS	207.36	Con	CSB	BA	1904	1	8	1	Stream				JRA	Yes
NS-NS	209.99	Con	CSB	BA	1907	1	8	1	Stream				JRA	Yes
NS-NS	211.27	St	DPG	OP	1936	1	68	1	Johnson Run				JRA	Yes
Old CR LS 42-2244-	1.601	Mas	MAR	BA	0	1	15	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	2.72	St	DPG	OP	0	3	210	1	Chartiers Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	3.54	St	TTR	OP	0	1	150	1	Chartiers Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	3.901	St	DPG	OP	0	1	50	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	4.33	St	DPG	OP	0	2	140	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	4.67	Mas	MAR	BA	0	1	18	1	Drainage Ditch	11/18/1997	$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Old CR LS 42-2244-	7.24	St	DPG	OP	0	2	140	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	8.55	St	DPG	OP	0	2	160	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	8.75	Con	CSB	BA	0	1	25	1	Roadway	11/18/1997	$0.00			
Old CR LS 42-2244-	9.3	St	DPG	BA	0	2	160	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	9.68	Mas	MAR		0	0	900	1		11/18/1997	$0.00			
Old CR LS 42-2244-	9.84	St	DPG	OP	0	2	160	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	11.78	St	DTR	OP	0	1	125	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	12.501	St	TTR	OP	0	1	150	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	13.44	St	DPG	BA	0	1	40	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	13.45	St	DPG	OP	0	1	40	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	14.6901	St	TTR	OP	0	1	100	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	15.85	St	DTR	OP	0	1	125	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	16.19	St	TPG	OP	0	1	80	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	16.49	St	DPG	OP	0	1	80	1	Creek	11/18/1997	$0.00			
Old CR LS 42-2244-	17.29	Con	CSB	BA	0	1	20	1	Ditch	11/18/1997	$0.00			
Old CR LS 42-2244-	18.2	St	SST	OP	0	1	18	1	Ditch	11/18/1997	$0.00			
Old CR LS 42-2244-	18.76	Con	CSB	BA	0	1	18	1	Ditch	11/18/1997	$0.00			
Old CR LS 42-2244-	19.89	St	TPG	OP	1917	1	100	1	Creek	11/18/1997	$0.00			
Old P, C & Y Line	0	St	TPG	OP	0	11	550	1	X, Former P&LE Ya	11/19/1997	$0.00		PIR	
Old P, C & Y Line	1.1001	St	TPG	OP	0	2	70	2	k Road, Chartiers Cr	11/19/1997	$0.00		PIR	
Old P, C & Y Line	1.1002	St	DPG	OP	0	4	280	2	k Road, Chartiers Cr	11/19/1997	$0.00			
Old P, C & Y Line-P	0.4001	St	TPG	BA	0	3	100	2	Chartiers Road	11/19/1997	$0.00		PIR	
Old P, C, & Y Line-P	2.6	Con	CAR	BA	0	2	160	3	Chartiers Creek	11/19/1997	$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Old P, C, & Y Line-P	4.5	Mas	MAR	BA	0	1	15	2	Ditch	11/19/1997	$0.00			
Old P, C, & Y Line-P	5.501	St	TPG	OP	1910	3	180	2	Creek	11/19/1997	$0.00			
Old P, C, & Y Line-P	5.6	Con	CSB	BA	0	1	30	2	Ditch	11/19/1997	$0.00			
Pocono-LC	0.31	el/Concre	allast Deck		0	0	0	0			$0.00			
Pocono-LC	12.49	Concrete	allast Deck		0	0	0	0			$0.00			
Pocono-LC	100.26	teel Girde	imber Deck		0	0	0	0			$0.00			
Pocono-LC	102.9	Concrete	allast Deck		0	0	0	0			$0.00			
Pocono-LC	107.05	teel Girde	ck/6 Single		0	0	0	0			$0.00			
Pocono-LC	107.41	Concrete	l/Ballast D		0	0	0	0			$0.00			
Pocono-LC	108.35	Steel	ual I Beam		0	0	0	0			$0.00			
Pocono-LC	113.52	Steel	ual I Beam		0	0	0	0			$0.00			
Pocono-LC	117.8	teel Girde	imber Deck		0	0	0	0			$0.00			
Pocono-LC	118.93	Concrete	allast Deck		0	0	0	0			$0.00			
Pocono-LC	127	teel Girde	imber Deck		0	0	0	0			$0.00			
Pocono-LC	130.22	teel Girde	imber Deck		0	0	0	0			$0.00			
Pocono-LC	130.73	teel Girde	imber Deck		0	0	0	0			$0.00			
Pocono-LC	130.89	Steel	allast Deck		0	0	0	0			$0.00			
Post-NBER	52.41	St	DPG	BA	1916	6	242	1	Bald Eagle Creek	2/17/1996			JRA	Yes
Post-NBER	52.89	Con	CSB	BA	1900	1	11	2	Stream	2/17/1996			JRA	Yes
Post-NBER	53.24	Con	CSB	BA	1915	1	34	1	Race	2/17/1996			JRA	Yes
Post-NBER	54.01	Con	CSB	BA		1	20	1	Stream	2/17/1996			JRA	No
Struthers-A&E	56.79	St	TTR		0	0	523	0			$4,150,005.00			
Struthers-A&E	58.31	Con	CSB		0	0	58	0			$369,576.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
SVRR-SV	13.34	St	TPG	BA	1946	1	28	1	Stream	12/2/1998		Paxinos	JRA	No
SVRR-SV	14.93	St	TPG	OP		3	156	1	Shamokin Creek	12/2/1998			JRA	No
SVRR-SV	17.39	Con	CSB	BA		1	28	1	Creek	12/2/1998			JRA	No
SVRR-SV	136.15	Con	CSB	BA		1	1	1	Mine Trks				JRA	No
SVRR-SV	136.65	St	DPG	BA	1946	1	52	2	Shamokin Creek	12/2/1998		Haul Road	JRA	No
SVRR-SV	145.37	Con	CSB	BA		1	10	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	146.1	Con	CSB	BA		1	6	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	146.24	Con	CSB	BA		1	10	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	146.79	Con	CSB	BA		1	9	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	147.82	Con	CSB	BA		1	6	1	Stream	12/2/1998			JRA	No
SVRR-SV	148.14	Con	CSB	BA		1	7	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	149.53	Con	CSB	BA	1917	1	27	1	Stream	12/2/1998		Snydertown	JRA	Yes
SVRR-SV	150.54	Con	CSB	BA		1	6	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	150.86	Con	CSB	BA		1	7	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	151.29	Con	CSB	BA		1	7	1	Stream	12/2/1998		Anthracite I	JRA	Yes
SVRR-SV	151.82	Mas	MAR	BA		1	12	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	152.95	Con	CSB	BA		1	7	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	153.41	Con	CSB	BA		1	6	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	154.64	Mas	MAR	BA		1	10	1	Stream	12/2/1998			JRA	Yes
SVRR-SV	154.84	St	DPG	OP	1917	2	68	1	Little Shamokin Crk	12/2/1998			JRA	Yes
SVRR-SV	155.1	St	DPG	OP	1907	1	34	1	Rt 61	12/2/1998			JRA	Yes
SVRR-SV	155.22	St	DPG	OP	1903	4	250	1	Shamokin Creek	12/2/1998			JRA	Yes
SVRR-SV	155.95	Con	CBX	BA		1	8	2	Stream			WPA cover	JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Tyrone-NBER	0.05	St	TPG	OP	1905	3	177	1	Little Juniata River	2/17/1996			JRA	Yes
Tyrone-NBER	0.06	St	DPG	OP	1905	2	118	1	Little Juniata River	2/17/1996			JRA	Yes
Tyrone-NBER	0.24	St	TPG	OP	1903	1	65	1	10th St.	2/17/1996			JRA	Yes
Tyrone-NBER	0.27	St	SST	OP	1920	1	11	1	11th St.	2/17/1996			JRA	Yes
Tyrone-NBER	0.64	Con	CSB	BA	1918	1	13	1	Stream	12/2/1998			JRA	Yes
Tyrone-NBER	0.8	St	SST		1900	1	10	1	Dry Run	2/17/1996		Same as 0.6	JRA	No
Tyrone-NBER	1.02	Mas	MAR		1900	1	8	2	Stream	2/17/1996			JRA	Yes
Tyrone-NBER	1.7	St	DPG		1900	1	18	2	Decker's Run	2/17/1996			JRA	Yes
Tyrone-NBER	1.84	Con	CSB	BA	1900	1	19	2	Spring Run	2/17/1996			JRA	Yes
Vine St.-LC	0.2	Steel	ual I Beam		0	0	0	0			$0.00			
Walkers Mill-PIR	10.33	Con	CSB	BA	0	2	100	2	Creek	12/30/1997	$0.00			
Wallaceton-RJ	0.19	Con	PIP		0	1	7	0			$0.00			
Wallaceton-RJ	2.62	St	DPG		0	1	100	0			$0.00			
Wallaceton-RJ	2.6312	St	TTR		0	1	100	0			$0.00			
Wallaceton-RJ	2.64	Con	CAR		0	2	42	0			$0.00			
Wallaceton-RJ	6.86	St	DPG		0	6	469.5	0			$0.00			
Wallaceton-RJ	6.87	St	TPG		0	2	156.5	0			$0.00			
Wallaceton-RJ	7.39	Mas	MAR		0	1	10	0			$0.00			
Wallaceton-RJ	8.34	Mas	MAR		0	1	15	0			$0.00			
Wallaceton-RJ	16.38	St	SST		0	1	19	0			$0.00			
Wallaceton-RJ	17.23	St	TPG		0	2	124	0			$0.00			
Wallaceton-RJ	17.93	St	TPG		0	2	118	0			$0.00			
Wallaceton-RJ	19.06	St	DPG		0	2	120	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Wallaceton-RJ	21.5	St	CMP		0	1	5	0			$0.00			
Wallaceton-RJ	31.54	Con	CSB		0	1	24	0			$0.00			
Wallaceton-RJ	34.27	Con	CSB		0	1	21	0			$0.00			
WBV-RJ	2.02	St	DPG		0	4	402	0			$0.00			
WBV-RJ	3.64	St	DPG		0	5	422	0			$0.00			
WBV-RJ	4.54	Con	CAR		0	1	10	0			$0.00			
WBV-RJ	4.96	Con	CAR		0	1	8	0			$0.00			
WBV-RJ	6.18	Con	CAR		0	1	8	0			$0.00			
WBV-RJ	6.54	Con	PIP		0	1	6	0			$0.00			
WBV-RJ	7.63	St	DPG		0	6	603	0			$0.00			
WBV-RJ	9.8	Con	CAR		0	1	10	0			$0.00			
WBV-RJ	11.89	Con	CAR		0	1	8	0			$0.00			
WBV-RJ	12.38	Con	CAR		0	1	8	0			$0.00			
WBV-RJ	13.561	Con	CAR		0	1	8	0			$0.00			
WBV-RJ	14.57	Con	CAR		0	1	9	0			$0.00			
WBV-RJ	18.56	St	DPG		0	1	55	0			$0.00			
WBV-RJ	18.9	Con	CAR		0	1	6	0			$0.00			
WBV-RJ	20.69	Con	CAR		0	1	6	0			$0.00			
WBV-RJ	22.69	St	DPG		0	1	65	0			$0.00			
WBV-RJ	23.39	Con	CAR		0	1	5	0			$0.00			
WBV-RJ	23.93	St	SST		0	1	114	0			$0.00			
WBV-RJ	24.04	Con	CAR		0	1	22	0			$0.00			
WBV-RJ	26.98	Con	CAR		0	1	12	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
WBV-RJ	28.09	Con	CAR		0	1	12	0			$0.00			
WBV-RJ	31.431	St	DPG		0	2	89	0			$0.00			
WBV-RJ	33.99	St	DPG		0	1	22	0			$0.00			
WBV-RJ	37.8	St	TPG		0	1	54	0			$0.00			
WBV-RJ	37.81	St	TPG		0	1	54	0			$0.00			
WBV-RJ	38.05	St	DPG		0	2	56	0			$0.00			
WBV-RJ	39.24	St	DPG		0	1	46	0			$0.00			
WBV-RJ	42.801	St	SST		0	1	18	0			$0.00			
WBV-RJ	44.1	Con	CSB		0	1	14	0			$0.00			
WBV-RJ	45.37	St	DPG		0	2	73	0			$0.00			
WBV-RJ	46.56	Con	CSB		0	1	12	0			$0.00			
WBV-RJ	46.66	Con	CSB		0	1	18	0			$0.00			
WBV-RJ	46.99	Con	CSB		0	1	14	0			$0.00			
WBV-RJ	47.17	Con	CAR		0	1	6	0			$0.00			
WBV-RJ	47.24	St	SST		0	1	14	0			$0.00			
WBV-RJ	51.2	St	SST		0	1	15	0			$0.00			
WBV-RJ	51.83	Con	PIP		0	1	6	0			$0.00			
WBV-RJ	53.321	St	TPG		0	4	400	0			$0.00			
Wells-W&C	0.81	St	DPG	OP		3	105	1		12/29/1998			GROW	No
Wells-W&C	1.6	Con	CBX	BA		1	7	1		12/29/1998			GROW	No
Wells-W&C	2.03	St	DPG	OP		1	74	1		12/30/1998			GROW	No
Wells-W&C	2.25	St	TPG	OP		1	79	1		12/30/1998			GROW	No
Wells-W&C	2.37	St	TPG	OP		2	125	1		12/30/1998			GROW	No

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Wells-W&C	3.01	St	TPG	OP		1	74	1		12/29/1998			GROW	No
West End-W&LE	0.111	St	DPG		0	1	50	0			$0.00			
West End-W&LE	0.22	St	DPG		0	1	48.5	0			$0.00			
West End-W&LE	0.752	St	TPG		1955	1	68.5	0			$0.00			
West End-W&LE	0.761	St	TPG		1955	2	121	0			$0.00			
West End-W&LE	0.771	St	TPG		1955	1	77.18	0			$0.00			
West End-W&LE	0.78	St	TPG		1955	1	98.91	0			$0.00			
West End-W&LE	1.021	St	DPG		1907	1	37.83	0			$0.00			
West End-W&LE	1.03	St	DPG		1907	4	148	0			$0.00			
West End-W&LE	1.04	St	DPG		1907	8	280	0			$0.00			
West End-W&LE	1.05	St	DPG		1907	6	249.75	0			$0.00			
West End-W&LE	1.062	St	DPG		1907	5	300	0			$0.00			
West End-W&LE	1.07	St	DPG		1907	1	35	0			$0.00			
West End-W&LE	1.74	St	DPG		1907	1	20	0			$0.00			
West End-W&LE	1.75	St	DPG		1907	1	60	0			$0.00			
West End-W&LE	1.76	St	DPG		1907	1	41.67	0			$0.00			
West End-W&LE	1.771	St	DPG		1907	5	150	0			$0.00			
West End-W&LE	1.781	St	DPG		1907	1	17	0			$0.00			
West End-W&LE	1.791	St	DPG		1907	1	60	0			$0.00			
West End-W&LE	1.8	St	DPG		1901	2	33.5	0			$0.00			
West End-W&LE	1.811	St	DPG		1901	1	61.58	0			$0.00			
West End-W&LE	1.93	St	TPG		0	6	213	0			$0.00			
West End-W&LE	1.94	St	TPG		0	1	45.5	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
West End-W&LE	1.95	St	TPG		0	1	88	0			$0.00			
West End-W&LE	1.96	St	TPG		0	1	86	0			$0.00			
West End-W&LE	1.97	St	DPG		0	4	164.68	0			$0.00			
West End-W&LE	1.981	St	DPG		0	2	82.16	0			$0.00			
Wharton-B&P	41	Con	CBX		0	0	8	0			$47,200.00			
Wharton-B&P	42.26	St	TPG		0	0	68	0			$435,200.00			
Wharton-B&P	42.27	Mas	MAR		0	0	10	0			$207,536.00			
Wharton-B&P	42.28	St	TPG		0	0	75	0			$480,000.00			
Wharton-B&P	44.15	Tim	TST		0	0	71	0			$284,000.00			
Wharton-B&P	44.25	Tim	TST		0	0	72.5	0			$284,000.00	Wye Trk		
Winfield-UCI	161.8	St	DPG	BA	1917	1	45	1	Winfield Creek	12/14/1998			LBC	No
Winfield-UCI	162.88	St	DPG	BA	1927	1	65	1	Turtle Creek	12/14/1998			LBC	No
Winfield-UCI	163.95	Con	CBX	BA	1918	1	10	1	Stream	5/2/1997			LBC	No
Winfield-UCI	164.2	Con	CBX	BA	1918	1	10	1	Stream	5/2/1997			LBC	No
Winfield-UCI	164.99	Con	CSB	BA	1917	1	10	1	Farm Rd	12/14/1998			LBC	No
Winfield-UCI	165.58	St	TPG	OP	1931	1	52	2	St. George St.	5/2/1997			LBC	No
Winfield-UCI	165.63	Con	CSB	BA	1920	1	10	2	Limestne Run	12/14/1998			LBC	No
Winfield-UCI	166.54	St	DPG	BA	1917	2	139	1	Buffalo Creek	12/14/1998			LBC	No
Winfield-UCI	167.73	Mas	MAR	BA	1920	1	12	1		5/1/1997			LBC	No
Wmspt-LV	215.08	Con	CBX	BA	1945	1	16	1	Daugherty Run	4/15/1997			JRA	Yes
Wmspt-LV	216.55	Con	CSB	BA	1900	1	8	1	Foxhollow Run	4/15/1997			JRA	Yes
Wmspt-LV	217.53	St	SST	OP	1948	1	44	1	Lycoming Creek	4/15/1997			JRA	Yes
Wmspt-LV	217.54	St	TTR	OP	1948	1	212	1	Lycoming Creek	4/15/1997			JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Wmspt-LV	217.58	St	SST	OP	1948	1	38	1	Lycoming Creek	4/15/1997			JRA	

Appendix A-2: Shortline Railroad Branches

SLRR	Branch-SLRR	Branch Name	Total Length	# of Bridges
Aliquippa & Southern Railr				
	Main-A&S	Mainline	0	1
Allegheny & Eastern Railro				
	Agway-A&E	Agway TK	150	2
	Grandview-A&E	Grandview Ind. TK	0	2
	Main-A&E	Mainline	0	85
	Struthers-A&E	Struthers Ind. TK	0	2
Buffalo & Pittsburgh Railro				
	Adrian-B&P	Adrian Branch	0	1
	Bradford-B&P	Bradford Industrial	0	0
	Butler-B&P	Butler Sub	0	27
	Indiana-B&P	Indiana Branch	0	7
	Main-B&P	Mainline	286	214
	Northern-B&P	Northern Sub	0	18
	Wharton-B&P	Wharton Branch	0	6
Danville & Mt. Morris Rail				
	Main-D&M	Mainline	0	10
East Erie Commercial Railr				
	Main-EastErie	Mainline	0	10
Everett Railroad Company				
	Main-Everett	Mainline	0	20
Genesses & Wyoming Railr				
	Main-G&W	Mainline	35	42
Gettysburg Railway Compa				
	Main-Getty	Mainline	23	10
Hollidaysburg & Roaring S				
	Main-Holiday	Mainline		7
Juniata Valley Railroad Co				
	Mait-JV	Maitland IT	0	4
	Milroy-JV	Milroy IT	0	4
Knox & Kane Railroad Co				
	Main-Knox	Mainline	0	0
Lycoming Valley Railroad				
	Ant-LV	Antlers IT	0	2
	Avis-LV	Avis Ind.	0	12

Appendix A-2: Shortline Railroad Branches

SLRR	Branch-SLRR	Branch Name	Total Length	# of Bridges
	Corning-LV	Corning Sec.	0	27
	Newberry-LV	Newberry Yard	0	3
	Wmspt-LV	Wmspt IT	0	3
Maryland & Pennsylvania				
	Main-MA&PA	Mainline	0	13
	North-MA&PA	North Central Branch	0	5
Monongahela Connecting R				
	Main-Mon	Mainline	0	1
Morrisons Cove Railroad C				
	Main-Morrison	Mainline	0	5
Mount Union Connecting R				
	Main-Mount	Mainline	0	14
Mountain Laurel Railroad				
	Main-ML	Mainline	0	84
New Hope & Ivyland Railr				
	Main-New Hope	Mainline	18	15
Nittany & Bald Eagle Railr				
	Bell-NBER	Bellefonte Branch	0	9
	Main-NBER	Mainline	0	41
	Post-NBER	Post Running	0	4
	Tyrone-NBER	Tyrone Running	0	8
North Shore Railroad				
	NS-NS	North Shore	0	18
Oil Creek and Titusville Lin				
	Field-Oil	Fieldmore Springs Branch	2	3
	Main-Oil	Mainline	13	5
	Meadville-Oil	Meadville Division	40	26
Philadelphia Belt Line Railr				
	Main-Phila	Mainline	0	0
Pittsburgh & Shawmut Rail				
	Brock-P&S	Brockway Yard	206	3
	Main-P&S	Mainline	0	83
	Mos-P&S	W. Mosgrove Branch	0	1
Pittsburgh, Allegheny & M				
	Main-PAM	Mainline	0	0

Appendix A-2: Shortline Railroad Branches

SLRR	Branch-SLRR	Branch Name	Total Length	# of Bridges
R.J. Corman Railroad Com				
	C&M-RJ	C&M	0	9
	CherryTree-RJ	Cherry Tree	0	26
	Cresson-RJ	Cresson Branch	66	39
	Helen-RJ	Helen Branch	11	0
	Hillman-RJ	Hillman	0	3
	Irvona-RJ	Irvona	0	13
	Wallaceton-RJ	Wallaceton		14
	Wallington-RJ	Wallington Branch	22	0
	WBV-RJ	WBV	0	38
Rochester & Southern Railr				
	Belt-R&S	Beltline	56	10
	Main-R&S	Mainline	0	77
Shamokin Valley Railroad				
	Carbon-SV	Carbon Run	0	2
	Fleetwood-SV	Fleetwood	0	1
	Reed-SV	Reed Ind. Park	0	1
	SVRR-SV	SVRR	0	23
Strasburg Railroad Compan				
	Main-Stras	Mainline	0	0
Towanda-Monroeton Shipp				
	Main-Towanda	Mainline	0	2
Turtle Creek Industrial Rail				
	Main-Turtle	Mainline	11	7
Tyburn Railroad Co.				
	Main-Tyburn	Mainline	0	0
Union County Industrial Ra				
	Lewisburg-UCI	Lewisburg	0	1
	Milton-UCI	Milton RT	0	4
	Newco-UCI	Newco RT	0	1
	Winfield-UCI	Winfield RT	0	9
Wellsboro & Corning Railr				
	Corning-W&C	Corning Sec.	0	26
	Wells-W&C	Wells Ind.	0	8
Wheeling & Lake Erie Railr				

Appendix A-2: Shortline Railroad Branches

SLRR	Branch-SLRR	Branch Name	Total Length	# of Bridges
	Clairton-W&LE	Clairton Branch		7
	Connellsville-W&LE	Connellsville Line	0	309
	Mifflin-W&LE	Mifflin Branch	0	4
	West End-W&LE	West End Branch	0	26
Yorkrail, Inc.				
	Main-York	Mainline	0	11

Appendix A-3: Owners/Operators _SLRR

Owners/Operators	SLRR	SLRR Length	Contact Person	hone Number	Engineerin	Location of SL	Notes
	Aliquippa & Southern Railroad Co	46	Mr. John G. Bixby	7243785125		Aliquippa, PA	
	Allegheny Valley Railroad Compa	23	Mr. Russell A. Peterson	4124266600		Verona, PA	
	Amherst Industries, Inc.	3	Mr. C.T. Jones	7178982271		Landisville, PA	
	B&E Railroad	4	Mr. Edward G. Metkn	8144676585		Windber, PA	
	Bessemer & Lake Erie Railroad Co	640	Larry Dierson	4128296866		Monroeville, PA	
	Bradford Industrial Rail, Inc.	4	Mr. Dave Collins	7164633304		Punxsutawney, PA	
	Brandywine Valley Railroad Comp	4	Mr. Brain McComsey	6106943318		Coatesville, PA	
	C&S Railroad Corporation	18	Mr. James Zurn	5703258421		Jim Thorpe, PA	One bridge
	Cambria & Indiana Railroad Comp	21	Mr. J. Michael Zaia	6106945930		Bethlehem, PA	Bethlehem S
	Cambria County Transit Authority		Mr. Irving Cure	8145355526		Johnstown, PA	
	Can Do, Inc.	2	Mr. Kevin O'Donnell	5704551508		Hazleton, PA	
	Chester Valley Railway	2	Mr. John C. Nolan	2157856192		Bristol, PA	
	Chestnut Ridge Railway Company	6	Mr. Wilbur Smith	7247732239		Monaca, PA	
	Conemaugh & Black Lick Railroad	6	Mr. J. Micheal Zaia	6106945937		Bethlehem, PA	
	Cumberland Mine Railroad	17	Mr. John Brister	7246277084		Waynesburg, PA	
	Delaware Lackawanna RR Compan	75	Mr. Craig King	5703434580		Scranton, PA	Contact Mon
	Delaware Valley Railway Compan	45	Jack Conser	5619946015		Kennett Square, PA	
	East Erie Commercial Railroad	12	Doug Roberts	8148752393		Erie, PA	

Owners/Operators	SLRR	SLRR Length	Contact Person	hone Number	Engineerin	Location of SL	Notes
	East Penn Railways, Inc.	15	Mr. John Nolan	2157574002		Bristol, PA	
	Everett Railroad Company	15	Alan Maples	3016709305		Gaithersburg, PA	
	Gettysburg Railway Company, Inc.	23.4	Mr. Wayne Laepple	7173341597		Gettysburg, PA	
	Hollidaysburg & Roaring Spring R	10	Alan Maples	3016709305		Duncannsville, PA	
	ISS Rail, Inc.	9	Mr. Dale K. Berkley	7246523115		New Castle, PA	
	Juniata Terminal Company	1	Mr. Bennett Levin	2156347911		Narbeth, PA	
	Kiski Junction Railroad	5	Mr. Dale K. Berkley	7246571268		New Castle, PA	
	Knox & Kane Railroad Company	78	Mr. S. Cornell	8149276620		Marienville, PA	48 miles ope
	Lackawanna County Railroad Auth	58	Charlene Dodyle	5709636676		Scranton, PA	
	Lancaster Northern Railway Comp	12	Mr. John Nolan	2157856192		Bristol, PA	
	Landisville Railroad Co.	3	Mr. Mark Shipe	7178982271		Landisville, PA	
	Lewisburg & Buffalo Creek Railro	8.5	Ms. Julia Sanders	5705244310		Lewisburg, PA	
	Luzerne County Rail Corporation		Mr. Robert P. Connolly	5706553329		West Pittston, PA	
	Maryland Midland Railway	0.4	Mr. Paul Denton	4108765464		Union Bridge, PA	
	Mckeesport Connecting Railroad C	16.3	Mr. R. S. Rosati	4128293460		Monroeville, PA	
	Mclaughlin Line Railroad	9	Mr. H. W. Mclaughlin III	4126973495		Apollo, PA	Is freight bei
	Middletown & Hummelstown Railr	9	Mr. Wendell J. Dillinger	7179444435		Middletown, PA	
	Midland Terminal Co.		Mr. Kirk Vincent	4123381611		Midland, PA	
	Monongahela Connecting R.R. Co.	20.05	Mr. John G. Bixby	4122274903		Pittsburgh, PA	
	Morrisons Cove Railroad Co.	7	Mr. Kenneth Weaver	8147932137		Martinsburg, PA	

Owners/Operators	SLRR	SLRR Length	Contact Person	hone Number	Engineerin	Location of SL	Notes
	Mount Union Connecting R.R. Co.		Mr. Allen J. Levin	7172484971		Lewiston, PA	
	N.D.C. Railroad Company	1	Ms. Regina Grim	6102612220		Northhampton, PA	
	New Hope & Ivyland Railroad	18	Mr. Paul Nichini	2158625240		New Hope, PA	
	Northern Central Railway, Inc.	22	George Norden	7172354000		New Freedom, PA	
	Northwest Pennsylvania Rail Auth		Mr. Anthony Petruso	8146643884		Meadville, PA	
	Ohio & Pennsylvania RR		Mr. Michael J. Connor	7406228095		Coshocton, OH	
	Oil Creek and Titusville Lines, Inc.	20	R. O. Dingman, Jr.	7165325242		Gowanda, NY	
	Penn-Jersey Rail Lines, Inc.	0		0			
	Philadelphia Belt Line Railroad Co	16.3	Mr. Robert Turner	2155927775		Philadelphia, PA	e-mail: PBL
	Philadelphia, Bethlehem & New E	8	Mr. J. Michael Zaia	6106945930		Bethlehem, PA	
	Pittsburgh & Ohio Valley Railway	7.21	Mr. Wayne Amber	4127776677		Pittsburgh, PA	
	Pittsburgh Industrial Railroad	42	Bob Butter	4123316200		McKees Rocks, PA	
	Pittsburgh, Allegheny & Mckees R	5	Mr. John P. Klee	4123313555		McKees Rocks, PA	
	R.J. Corman Railroad Company	210	Timonthy Potts	8147687555		Clearfield, PA	Pennsylvania
	Reading Blue Mountain and Northe	138	Del Gian Saylor	6105622100		Port Clinton, PA	
	SMS/Penn Jersey Rail Lines		Mr. Jeffrey L. Sutch	8564674800		Bridgeport, PA	
	Southeastern Pennsylvania Transpo	193	Mr. W. B. Dwinnell	2155808400		Philadelphia, PA	
	Southwestern Pennsylvania Railroa		Mr. Russell A. Peterson	4124264400		Verona, PA	
	Steelton & Highspire railroad Com	27	Mr. E. W. Haser	7179862455		Steelton, PA	Bethlehem S
	Stewartstown Railroad Company	7	John Anderson	7173824880		Stewartstown, PA	

Owners/Operators	SLRR	SLRR Length	Contact Person	hone Number	Engineerin	Location of SL	Notes
	Stourbridge Railroad Company	4	Mr. Richard D. Robey	5704737949		Northumberland, PA	
	Strasburg Railroad Company	4.6	Mr. G. F. Bartels	7176877522		Strasburg, PA	
	Towanda-Monroeton Shippers Life	5.89	Mr. Joseph T. Zadrusky	5702656469		Monroeton, PA	
	Turtle Creek Industrial Railroad Co	10.7	Mr. Wayne Norris	4123270280		Export, PA	
	Tyburn Railroad Co.	5	Mr. Edward L. McHugh	2154289290		Morrisville, PA	
	Union Railroad Company	34.68	Mr. R. S. Rosati	4128293460		Monroeville, PA	
	Upper Merion & Plymouth Railroa	15	Mr. Brian McComsey	6106943318		Coatesville, PA	
	West Erie Shortline, Inc.		Mr. Gary E. Lunger	8147455394		Erie, PA	
	West Shore Railroad Corp.		Ms. Julia Sanders	5704737949		Lewisburg, PA	
	Wheeling & Lake Erie Railroad	98	Charles Burrowes	3307677279		Brewster, OH	769 miles tot
	White Deer & Reading Railroad	0		0			
	Wilkes-Barre Connecting Railroad	0		0			
	York County Rail Trail Authority		Gwen Loose	7174282586		York, PA	
Canadian Pacific Railway	Delaware & Hudson Railway Com	137	Mr. Brian Wilson	5183837200		Clifton Park, NY	Owned by C
Delaware Lackawanna RR Company	Luzerne & Susquehanna Railway C	44	Mr. Steve May	6076876883		Owego, NY	Operated
Delaware Lackawanna RR Company	Monroe County Rail Authority	17	Mr. Robert C. Hay	5704762420		Stroudsburg, PA	Operator is
Emons Transportation Group	Maryland & Pennsylvania Railroad	26	Michael Bull	7177711700		York, PA	
Emons Transportation Group	Penn Eastern Rail Lines	2	Mr. Philip DuPont	7177711700		York, PA	
Emons Transportation Group	Yorkrail, Inc.	16	Micheal Bull	7177711700		York, PA	
Genesse & Wyoming Industries	Allegheny & Eastern Railroad, Inc.	153	Wayne Duffett	2077676068	TEC Associates	Punxsutawney, PA	

Owners/Operators	SLRR	SLRR Length	Contact Person	hone Number	Engineerin	Location of SL	Notes
Genesse & Wyoming Industries	Buffalo & Pittsburgh Railroad, Inc.	369	Wayne Duffett	2077676068	TEC Associates	Punxsutawney, PA	
Genesse & Wyoming Industries	Danville & Mt. Morris Railroad		Wayne Duffett	2077676068	TEC Associates		
Genesse & Wyoming Industries	Genesses & Wyoming Railroad		Wayne Duffett	2077676068	TEC Associates		
Genesse & Wyoming Industries	Mountain Laurel Railroad		Wayne Duffett	2077676068	TEC Associates		Part of the P
Genesse & Wyoming Industries	Pittsburgh & Shawmut Railroad, In	100.7	Wayne Duffett	2077676068	TEC Associates	Punxsutawney, PA	
Genesse & Wyoming Industries	Rochester & Southern Railroad		Wayne Duffett	2077676068	TEC Associates		
GROW	Wellsboro & Corning Railroad Co	5	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
NYSW	New York, Susquehanna, and West	0	Abe Burnett	5708501618			
Seda Cog Joint Rail Authority	Juniata Valley Railroad Company	12	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
Seda Cog Joint Rail Authority	Lycoming Valley Railroad Compa	14	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
Seda Cog Joint Rail Authority	Nittany & Bald Eagle Railroad Co	42	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
Seda Cog Joint Rail Authority	North Shore Railroad	43	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
Seda Cog Joint Rail Authority	Seda-Cog Joint Rail Authority	190	Abe Burnett	5708501618	Uni-Tec Consul	Lewisburg, PA	
Seda Cog Joint Rail Authority	Shamokin Valley Railroad Compan	25	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	
West Shore Railroad Corporation	Union County Industrial Railroad	2	Abe Burnett	5708501618	Uni-Tec Consul	Northumberland, PA	

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-ML	53.5	St	DPG		1902	0	154	0			$1,135,134.00			
Main-ML	53.66	St	DPG		1899	0	26	0			$153,400.00			
Main-ML	54.51	St	TPG		1899	0	175	0			$1,310,400.00			
Main-ML	55.31	St	DPG		1903	0	136	0			$1,002,456.00			
Main-ML	55.45	St	TOP		1978	0	81	0			$825,811.00			
Main-ML	57.78	Tim	TST		1901	0	25	0			$100,000.00			
Main-ML	60.74	Con	PIP		1954	0	7	0			$28,000.00			
Main-ML	61.7	Con	PIP		1916	0	10	0			$40,000.00			
Main-ML	62.64	St	TPG		1903	0	76	0			$510,720.00			
Main-ML	63.11	St	DPG		1901	0	30	0			$185,850.00			
Main-ML	64.35	St	DPG		1901	0	30	0			$185,850.00			
Main-ML	64.78	Con	CBX		1945	0	15	0			$92,925.00			
Main-ML	67.16	Mas	MBX		0	0	5	0			$50,000.00			
Main-ML	68.42	St	DPG		1897	0	20	0			$123,900.00			
Main-ML	68.93	Mas	MAR		1889	0	6	0			$65,000.00			
Main-ML	70.46	St	DPG		1903	0	34	0			$210,630.00			
Main-ML	74.63	Mas	MAR		1889	0	13	0			$165,000.00			
Main-ML	75.69	Mas	MAR		1887	0	13	0			$165,000.00			
Main-ML	77.24	Mas	MAR		0	0	6	0			$65,000.00			
Main-ML	77.81	Mas	MAR		1890	0	8	0			$95,000.00			
Main-ML	78.82	Mas	MAR		1887	0	8	0			$95,000.00			
Main-ML	85.24	St	DPG		1903	0	152	0			$1,120,392.00			
Main-ML	85.69	St	DPG		1904	0	119	0			$877,149.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-ML	86.97	St	DPG		1903	0	77	0			$509,355.00			
Main-ML	88.19	Mas	MAR		1873	0	10	0			$125,000.00			
Main-ML	90.21	St	DPG		1889	0	88	0			$582,120.00			
Main-ML	90.34	Mas	MAR		1873	0	10	0			$125,000.00			
Main-ML	90.96	Mas	MAR		1873	0	10	0			$125,000.00			
Main-ML	94.57	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	96.27	Mas	MAR		1872	0	14	0			$175,000.00			
Main-ML	98.31	Mas	MAR		1872	0	12	0			$165,000.00			
Main-ML	100.19	Mas	MAR		1872	0	12	0			$165,000.00			
Main-ML	102.04	Mas	MAR		1872	0	10	0			$125,000.00			
Main-ML	103.64	St	DPG		1903	0	84	0			$555,660.00			
Main-ML	105.49	St	DPG		1903	0	84	0			$555,660.00			
Main-ML	108.66	St	TTR		1903	0	324	0			$2,615,562.00			
Main-ML	109.24	St	DPG		1892	0	20	0			$118,000.00			
Main-ML	109.79	St	TPG		1903	0	301	0			$2,394,756.00			
Main-Mon	1.101	St	DPG		1920	1	65	0	Hazelwood Avenue		$0.00			
Main-Morrison	21.19	St	DPG		1908	1	14.33	0			$0.00			
Main-Morrison	21.57	St	SST		1872	1	14.25	0			$0.00			
Main-Morrison	21.66	St	SST		1872	1	16	0			$0.00			
Main-Morrison	22	St	SST		1872	1	14	0			$0.00			
Main-Morrison	22.12	St	SST		1872	1	13.67	0			$0.00			
Main-Mount	113.5	Con	CAR		0	1	30	0			$0.00			
Main-Mount	124.37	Tim	TST		0	1	5	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-Mount	125.92	Tim	TST		0	1	5	0			$0.00			
Main-Mount	129.1	St	CIP		0	1	5	0			$0.00			
Main-Mount	132.5	Mas	MBX		0	1	5	0			$0.00			
Main-Mount	151.39	Mas	MAR		0	1	8	0			$0.00			
Main-Mount	183.14	Tim	TST		0	1	5	0			$0.00			
Main-Mount	185.96	Tim	TST		0	1	5	0			$0.00			
Main-Mount	197	Mas	MBX		0	1	5	0			$0.00			
Main-Mount	204.04	Mas	MBX		0	1	5	0			$0.00			
Main-Mount	244.85	Mas	MBX		0	1	5	0			$0.00			
Main-Mount	254.25	Tim	TST		0	1	5	0			$0.00			
Main-Mount	261.4	Tim	TST		0	1	5	0			$0.00			
Main-Mount	270.66	St	CIP		0	1	5	0			$0.00			
Main-NBER	3.21	Con	CSB	BA	1914	1	12	1	Stream	2/17/1996			JRA	Yes
Main-NBER	3.93	St	TPG	BA	1915	1	46	1	Laurel Run	2/17/1996			JRA	Yes
Main-NBER	4.68	St	TPG	BA	1915	1	50	1	L. Bald Eagle Cr	2/17/1996			JRA	Yes
Main-NBER	4.85	St	TPG	BA	1915	1	54	1	L. Bald Eagle Cr	2/17/1996			JRA	Yes
Main-NBER	5.57	Con	CSB	BA	1915	1	12	1	Stream	2/17/1996			JRA	Yes
Main-NBER	6.17	St	TPG	TB	1907	1	51	1	L. Bald Eagle Cr	2/17/1996			JRA	Yes
Main-NBER	6.79	St	TPG	TB	1912	1	48	1	L. Bald Eagle Cr	2/17/1996			JRA	Yes
Main-NBER	9.24	St	SST	OP	1912	1	16	1	L. Bald Eagle Cr	2/17/1996		Tmbrs & Br	JRA	Yes
Main-NBER	9.76	Con	CSB	BA	1915	1	28	1	Bald Eagle Cr	2/17/1996			JRA	Yes
Main-NBER	10.98	Con	CSB		1917	1	6	1	Stream	2/17/1996			JRA	Yes
Main-NBER	11.96	Con	CSB		1919	1	8	1	Stream	2/17/1996			JRA	Yes

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-NBER	16.75	St	DPG	BA	1914	3	190	1	Bald Eagle Cr	2/17/1996		3 @63' Pier	JRA	Some
Main-NBER	17.13	Con	CSB		1915	1	18	1	Thompson Run	2/17/1996			JRA	Yes
Main-NBER	17.95	St	TPG	BA	1916	1	30	1	Fisher's Run	2/17/1996			JRA	Yes
Main-NBER	19.03	Con	CSB		1910	1	18	1	Shingleton's Run	2/17/1996			JRA	Yes
Main-NBER	19.5	Con	CSB		1916	1	24	1	Mudlick Run	2/17/1996			JRA	Yes
Main-NBER	20.67	St	TPG	BA	1912	1	24	1	Williams Run	2/17/1996			JRA	Yes
Main-NBER	21.46	Con	CSB	BA	1913	2	42	1	Adams Creek	2/17/1996			JRA	Yes
Main-NBER	22.43	St	SST	BA	1919	1	7	1	Stream	2/17/1996			JRA	Yes
Main-NBER	22.55	Con	CSB	BA	1926	1	18	1	Yeager's Run	2/17/1996			JRA	Yes
Main-NBER	23.06	St	SST	OP	1916	1	14	1	Stream	2/17/1996		New Timbe	JRA	Yes
Main-NBER	24.01	Con	CSB	BA		1	15	1	Stream	12/1/1998			JRA	Yes
Main-NBER	24.68	St	TPG	BA	1915	1	45	1	Dick's Run	2/17/1996			JRA	Yes
Main-NBER	25.75	St	TPG	BA	1916	1	37	1	Dewitt's Run	2/17/1996			JRA	Yes
Main-NBER	26.01	Con	CSB	BA	1915	1	13	1	Stream	2/17/1996			JRA	Yes
Main-NBER	26.59	Con	CSB	BA	1912	1	11	1	Stream	2/17/1996			JRA	Yes
Main-NBER	27.07	Con	CSB	BA	1916	1	26	1	Hays Run	2/17/1996			JRA	Yes
Main-NBER	28.04	Con	CSB	BA	1916	1	28	1	Egypt Run	2/17/1996			JRA	Yes
Main-NBER	29.07	Con	CSB	BA	1915	1	17	1	Stream	2/17/1996			JRA	Yes
Main-NBER	29.39	Con	CSB	BA	1915	2	61	1	Wallace Run	2/17/1996		2 @30'	JRA	Yes
Main-NBER	30.03	Con	CSB	BA	1919	1	9	1	Stream	2/17/1996			JRA	Yes
Main-NBER	30.94	Con	CSB	BA	1915	1	23	1	Stream	2/17/1996			JRA	Yes
Main-NBER	32.11	St	SST	TB	1900	1	18	1	Shope's Run	2/17/1996			JRA	No
Main-NBER	33.65	Con	CSB	BA	1900	1	18	1	Stream	2/17/1996			JRA	No

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-NBER	33.84	St	DPG	BA	1900	6	454	1	Bald Eagle Creek	2/17/1996			JRA	No
Main-NBER	33.97	St	DPG	OP	1900	1	40	1	Bald Eagle Canal	2/17/1996			JRA	No
Main-NBER	34.32	Con	CSB	BA	1900	1	20	1	Stream	2/17/1996			JRA	No
Main-NBER	40	Con	CSB	BA	1968	1	20	1	Lick Run	2/17/1996			JRA	No
Main-NBER	44.33	Con	CSB	BA	1968	1	20	1	Frank's Run	2/17/1996			JRA	No
Main-NBER	50.65	Con	CSB	BA	1916	1	52	1	NYC	2/17/1996			JRA	Yes
Main-NBER	51.21	St	TPG	OP	1915	3	183	1	Fishing Creek	2/17/1996			JRA	Yes
Main-New Hope	9.5	Mas	MAR		1890	1	8	0			$0.00			
Main-New Hope	11.25	Mas	MAR		1890	1	5	0			$0.00			
Main-New Hope	11.8	Mas	MAR		1890	1	8	0			$0.00			
Main-New Hope	12.3	St	SST		1890	1	12	0			$0.00			
Main-New Hope	12.5	Mas	MAR		1890	1	12	0			$0.00			
Main-New Hope	13.14	St	SST		1890	8	400	0			$0.00			
Main-New Hope	13.56	St	SST		1890	3	140	0			$0.00			
Main-New Hope	14.62	St	SST		1890	1	8	0			$0.00			
Main-New Hope	15.28	Mas	MAR		1890	1	12	0			$0.00			
Main-New Hope	15.44	St	SST		1890	1	12	0			$0.00			
Main-New Hope	15.62	St	SST		1890	1	12	0			$0.00			
Main-New Hope	16.12	Mas	MAR		1890	1	10	0			$0.00			
Main-New Hope	17.51	St	SST		1890	3	13	0			$0.00			
Main-New Hope	24.681	Mas	MAR		1890	1	14	0			$0.00			
Main-New Hope	24.82	St	SST		1890	4	200	0			$0.00			
Main-Oil	120.7	St	TPG		1911	3	300	0			$0.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-Oil	121.35	Con	CSB			1	26	0			$0.00			
Main-Oil	121.89	St	DPG			5	325	0			$0.00			
Main-Oil	130.27	St	TTR		1910	2	292	0			$0.00			
Main-Oil	132.29	St	TPG		1915	3	300	0			$0.00			
Main-P&S	0.33	St	DPG		1918	0	213.67	0			$1,403,107.00			
Main-P&S	0.73	St	DPG		1907	0	618.92	0			$4,716,323.00			
Main-P&S	0.731	St	TPG		0	0	75.75	0			$4,716,323.00			
Main-P&S	19.57	St	TPG		1921	0	64.67	0			$434,582.00			
Main-P&S	20.72	St	DPG		0	0	33.33	0			$206,479.00			
Main-P&S	20.981	St	DPG		0	0	537.42	0			$7,248,289.00			
Main-P&S	20.982	St	TTR		0	0	123	0			$0.00			
Main-P&S	20.983	St	DTR		0	0	125	0			$0.00			
Main-P&S	21.43	St	SST		1908	0	21.17	0			$125,080.00			
Main-P&S	21.51	Mas	MAR		0	0	15	0			$417,900.00			
Main-P&S	23.95	St	DPG		0	0	52	0			$306,800.00			
Main-P&S	25.55	St	SST		1906	0	21.17	0			$125,080.00			
Main-P&S	26.5	St	SST		1906	0	21.17	0			$125,080.00			
Main-P&S	26.92	Mas	MAR		0	0	15	0			$442,500.00			
Main-P&S	28.02	Mas	MAR		0	0	16	0			$282,676.00			
Main-P&S	29.11	Mas	MAR		0	0	15	0			$170,138.00			
Main-P&S	29.5	Mas	MAR		1910	0	15	0			$155,241.00			
Main-P&S	33.7	St	DPG		0	0	1470	0			12,658,244.00			
Main-P&S	38.42	St	DPG		0	0	1430	0			12,313,802.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-P&S	41.27	St	DPG		1911	0	21.33	0			$125,847.00			
Main-P&S	42.34	St	DPG		1910	0	23.33	0			$137,647.00			
Main-P&S	42.39	Mas	MAR		0	0	6	0			$108,900.00			
Main-P&S	42.86	Mas	MAR		0	0	12	0			$169,248.00			
Main-P&S	43.16	Mas	MAR		0	0	8	0			$144,032.00			
Main-P&S	43.59	Mas	MAR		0	0	15	0			$163,380.00			
Main-P&S	44.48	St	SST		1911	0	23	0			$135,700.00			
Main-P&S	44.57	Mas	MAR		0	0	15	0			$207,938.00			
Main-P&S	45.09	Mas	MAR		1910	0	12	0			$113,737.00			
Main-P&S	45.59	St	DPG		1910	0	65.33	0			$432,158.00			
Main-P&S	45.94	St	DPG		0	0	23.33	0			$137,647.00			
Main-P&S	46.32	St	DPG		1911	0	66.33	0			$438,773.00			
Main-P&S	46.67	St	TPG		1911	0	44.25	0			$283,200.00			
Main-P&S	47.59	St	TPG		1911	0	55	0			$352,000.00			
Main-P&S	47.92	Mas	MAR		1910	0	10	0			$153,836.00			
Main-P&S	48.57	Mas	MAR		1910	0	6	0			$90,932.00			
Main-P&S	48.92	Mas	MAR		1910	0	16	0			$178,688.00			
Main-P&S	49.06	St	SST		1910	0	23	0			$135,700.00			
Main-P&S	49.73	Mas	MAR		1910	0	8	0			$169,300.00			
Main-P&S	50.49	Mas	MAR		1910	0	8	0			$145,700.00			
Main-P&S	51.23	St	DPG		0	0	630.2	0			$5,192,438.00			
Main-P&S	51.86	St	DPG		0	0	660	0			$5,437,971.00			
Main-P&S	52.69	Mas	MAR		1910	0	10	0			$154,838.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-P&S	52.75	St	SST		1910	0	23	0			$135,700.00			
Main-P&S	53.56	Mas	MAR		0	0	8	0			$192,900.00			
Main-P&S	55.43	St	DPG		0	2	80	0			$4,819,090.00			
Main-P&S	55.431	St	DTR		0	2	202	0			$4,819,090.00			
Main-P&S	55.44	St	DTR		0	3	306	0			$0.00			
Main-P&S	55.95	Mas	MBX		0	0	6	0			$100,100.00			
Main-P&S	57.81	St	TTR		0	0	310.08	0			$3,073,451.00			
Main-P&S	58.46	St	DPG		1910	0	23.33	0			$146,636.00			
Main-P&S	59.21	St	DPG		1910	0	23.33	0			$146,636.00			
Main-P&S	59.41	St	SST		1910	0	23	0			$142,485.00			
Main-P&S	61.66	Mas	MAR		1910	0	6	0			$98,500.00			
Main-P&S	62.13	Mas	MAR		1910	0	15	0			$211,476.00			
Main-P&S	62.33	St	SST		0	0	23	0			$135,700.00			
Main-P&S	63	St	DPG		0	0	23.33	0			$144,529.00			
Main-P&S	63.23	St	TTR		0	0	1123	0			14,539,100.00			
Main-P&S	63.81	Mas	MAR		1910	0	6	0			$57,200.00			
Main-P&S	66.68	Mas	MAR		1912	0	8	0			$74,800.00			
Main-P&S	69.38	Mas	MAR		1911	0	10	0			$98,500.00			
Main-P&S	69.94	St	DPG		1913	0	108	0			$669,060.00			
Main-P&S	70.62	St	SST		1970	0	23.33	0			$137,647.00			
Main-P&S	70.82	St	SST		1970	0	23.33	0			$137,647.00			
Main-P&S	70.83	Con	PIP		0	0	6	0			$53,216.00			
Main-P&S	71.35	Mas	MAR		0	0	6	0			$60,291.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-P&S	71.71	Mas	MAR		0	0	6	0			$60,291.00			
Main-P&S	72.94	Mas	MAR		1911	0	6	0			$60,291.00			
Main-P&S	73.86	Mas	MAR		0	0	20	0			$165,200.00			
Main-P&S	73.89	St	TPG		0	0	106.5	0			$1,094,990.00			
Main-P&S	74.27	St	SST		0	0	6	0			$37,170.00			
Main-P&S	74.32	St	SST		0	0	8	0			$49,560.00			
Main-P&S	74.6	St	DPG		1913	0	34.5	0			$213,728.00			
Main-P&S	77.72	St	SST		0	0	6.5	0			$38,350.00			
Main-P&S	78.92	St	DPG		1913	0	56.33	0			$348,964.00			
Main-P&S	79.85	Mas	MAR		1914	0	8	0			$92,403.00			
Main-P&S	81.6	Mas	MAR		0	0	20	0			$254,736.00			
Main-P&S	82.98	Tim	TST		0	0	116	0			$348,000.00			
Main-P&S	84.01	Mas	MAR		0	0	8	0			$92,403.00			
Main-P&S	84.93	Mas	MAR		1911	0	8	0			$92,403.00			
Main-P&S	86.14	St	DPG		0	0	23.33	0			$144,529.00			
Main-R&S	0.42	St	TPG		1917	0	105	0			$725,760.00			
Main-R&S	0.6	St	DPG		1915	0	70	0			$476,280.00			
Main-R&S	0.95	St	DPG		1952	0	53	0			$337,716.00			
Main-R&S	1.21	St	DPG		1952	0	52	0			$331,344.00			
Main-R&S	1.65	St	DPG		1952	0	66	0			$718,502.00			
Main-R&S	2.63	St	TPG		1908	0	136	0			$1,398,298.00			
Main-R&S	2.71	St	DTR		1940	0	130	0			$1,482,338.00			
Main-R&S	3.46	St	DPG		1913	0	37	0			$218,300.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-R&S	4.48	Con	CSB		1914	0	96	0			$611,712.00			
Main-R&S	4.87	St	TOP		1909	0	6	0			$36,300.00			
Main-R&S	6.47	Con	CSB		1913	0	139	0			$885,708.00			
Main-R&S	9.4	St	TOP		1909	0	6	0			$33,456.00			
Main-R&S	10.18	St	TOP		1913	0	6	0			$33,456.00			
Main-R&S	12.35	St	TPG		1914	0	43.5	0			$300,672.00			
Main-R&S	12.73	Con	PIP		1950	0	8	0			$57,668.00			
Main-R&S	13.04	Tim	TST		1931	0	14	0			$56,000.00			
Main-R&S	13.21	St	TPG		1911	0	104	0			$736,776.00			
Main-R&S	14.59	St	TOP		1909	0	8	0			$56,640.00			
Main-R&S	15.57	St	DPG		1904	0	142	0			$879,690.00			
Main-R&S	17.6	St	TOP		1899	0	7	0			$49,560.00			
Main-R&S	18.35	St	DPG		1914	0	44	0			$259,600.00			
Main-R&S	22.78	St	DPG		1914	0	18	0			$127,440.00			
Main-R&S	23.99	St	DPG		1913	0	23	0			$135,700.00			
Main-R&S	25.03	Mas	MAR		0	1	105	0			$2,129,840.00			
Main-R&S	25.031	St	DPG		0	1	105	0			$0.00			
Main-R&S	25.032	St	TPG		0	1	105	0			$0.00			
Main-R&S	25.77	St	TPG		1935	0	83.6	0			$577,843.00			
Main-R&S	26.86	St	DPG		1905	0	180	0			$1,258,740.00			
Main-R&S	27.48	Con	CBX		1947	0	8	0			$56,640.00			
Main-R&S	30.2	Con	PIP		0	0	5	0			$25,536.00			
Main-R&S	30.87	St	DPG		1934	0	57	0			$336,300.00			

Branch-SLRR	Br Name	Br Mat	Br Type	Deck	Year	pans	Length	# Tracks	Over	Inspected	Replace $	Remarks	Owner	Plan
Main-R&S	31.58	St	TOP		1909	0	8	0			$56,640.00			
Main-R&S	31.95	Mas	MBX		0	0	3	0			$21,900.00			
Main-R&S	32.12	Mas	MAR		1954	0	6	0			$44,016.00			
Main-R&S	32.26	Tim	TST		1932	0	10.33	0			$41,320.00			
Main-R&S	33.11	St	TOP		1910	0	17	0			$100,300.00			
Main-R&S	33.38	St	TOP		1910	0	17	0			$100,300.00			
Main-R&S	35.45	St	DPG		1927	0	33	0			$194,700.00			
Main-R&S	37.241	St	TOP		1917	0	8	0			$47,200.00			
Main-R&S	37.5	St	CMP		0	0	5	0			$24,000.00			
Main-R&S	38.79	St	TOP		1910	0	8	0			$56,640.00			
Main-R&S	39.83	St	TOP		1906	0	6	0			$35,400.00			
Main-R&S	40.33	St	TOP		1913	0	6	0			$35,400.00			
Main-R&S	41.271	Con	CST		0	0	18	0			$127,440.00			
Main-R&S	41.34	Mas	MBX		0	0	5	0			$20,000.00			
Main-R&S	41.7	St	CMP		0	0	4	0			$22,400.00			
Main-R&S	41.95	St	TOP		1913	0	6	0			$35,400.00			
Main-R&S	42.12	Mas	MBX		0	0	3	0			$19,500.00			
Main-R&S	42.44	Mas	MAR		1907	0	12	0			$223,676.00			
Main-R&S	42.6	Mas	MBX		0	0	3	0			$23,520.00			
Main-R&S	42.8	St	CIP		0	0	5	0			$36,320.00			
Main-R&S	43.2	St	CIP		0	0	4	0			$34,500.00			
Main-R&S	43.32	St	TOP		1913	0	6	0			$43,376.00			
Main-R&S	43.44	St	CIP		1954	0	6	0			$36,320.00			

APPENDIX B

BRIDGE POPULATION DATA

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Adrian-B&P	1.1	SST	12
Agway-A&E	25.28	DPG	16
Agway-A&E	25.47	DPG	16
Ant-LV	179.44	TPG	94
Ant-LV	213.86	TTR	1128
Avis-LV	0.12	SST	10
Avis-LV	1.78	DPG	407
Avis-LV	1.98	TPG	40
Avis-LV	168.67	MAR	15
Avis-LV	169.68	MAR	16
Avis-LV	170.65	MAR	8
Avis-LV	171.3	TPG	101
Avis-LV	171.46	MAR	82
Avis-LV	172.78	CAR	10
Avis-LV	174.48	SST	25
Avis-LV	175.62	MAR	10
Avis-LV	177.2	MAR	19
Bell-NBER	30.95	CSB	14
Bell-NBER	31.08	TPG	115
Bell-NBER	33.1	CSB	40
Bell-NBER	33.79	TPG	203
Bell-NBER	34.05	TPG	66
Bell-NBER	35.6	MAR	9
Bell-NBER	36.9	DPG	27
Bell-NBER	37.3	DPG	12
Bell-NBER	37.69	SST	10
Brock-P&S	0.47	SST	44
Brock-P&S	0.48	SST	57.5
Brock-P&S	0.49	SST	57.5
Butler-B&P	283.79	DPG	24
Butler-B&P	284.13	DPG	22
Butler-B&P	285.1	TPG	65

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Butler-B&P	285.2	TST	13
Butler-B&P	404	DPG	80
Butler-B&P	405	DPG	50
Butler-B&P	406	MAR	10
Butler-B&P	407	DPG	160
Butler-B&P	408	DPG	20
Butler-B&P	408.4	TPG	100
Butler-B&P	409	DPG	100
Butler-B&P	410	DPG	114.5
Butler-B&P	412	TST	47
Butler-B&P	413	TST	13
Butler-B&P	414	TST	15
Butler-B&P	604	TPG	150
Butler-B&P	605	DPG	120
Butler-B&P	606	DPG	25
Butler-B&P	606.1	DPG	100
Butler-B&P	607	DPG	100
Butler-B&P	608	DPG	220
Carbon-SV	0.08	SST	82
Carbon-SV	0.18	SST	38
CherryTree-RJ	19.61	DPG	372
CherryTree-RJ	21.291	TPG	30
CherryTree-RJ	21.67	MAR	10
CherryTree-RJ	21.7	MAR	30
CherryTree-RJ	21.73	TPG	30
CherryTree-RJ	21.96	DPG	563
CherryTree-RJ	22.88	DPG	379
CherryTree-RJ	26.54	TTR	155
CherryTree-RJ	29.84	DPG	31
CherryTree-RJ	31.05	CAR	10
CherryTree-RJ	31.99	DPG	28
CherryTree-RJ	33.77	TPG	36

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
CherryTree-RJ	35.46	TOP	12
CherryTree-RJ	36.04	DPG	45
CherryTree-RJ	37.691	DPG	24
CherryTree-RJ	39.391	SST	18
CherryTree-RJ	43.77	SST	24
CherryTree-RJ	43.9	MAR	32
CherryTree-RJ	47.62	CAR	8
CherryTree-RJ	49.48	SST	25
CherryTree-RJ	49.5	DPG	40
CherryTree-RJ	49.58	SST	17
CherryTree-RJ	50.46	DPG	100
CherryTree-RJ	50.61	DPG	120
CherryTree-RJ	52.33	DPG	110
CherryTree-RJ	52.49	SST	24
Clairton-W&LE	0.181	CAR	10
Clairton-W&LE	0.4	TTR	137.5
Clairton-W&LE	0.41	DPG	264
Clairton-W&LE	0.421	DPG	65
Clairton-W&LE	0.59	DPG	30
Clairton-W&LE	2.31	CAR	6
Clairton-W&LE	4.41	CAR	10
Connellsville-W&LE	0.010676	DPG	60
Connellsville-W&LE	0.09	DPG	58.5
Connellsville-W&LE	0.1011	DPG	30
Connellsville-W&LE	0.118	DPG	120
Connellsville-W&LE	0.14085	TTR	262
Connellsville-W&LE	0.19047	DPG	120
Connellsville-W&LE	0.2132	DPG	30
Connellsville-W&LE	0.23024	DPG	60
Connellsville-W&LE	0.2984	DPG	50
Connellsville-W&LE	0.3078	TTR	168
Connellsville-W&LE	0.3397	DPG	60

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	0.9	DPG	54
Connellsville-W&LE	4.86	DPG	30
Connellsville-W&LE	4.866	DPG	70
Connellsville-W&LE	4.878	DPG	30
Connellsville-W&LE	4.885	DPG	70
Connellsville-W&LE	4.897	DPG	30
Connellsville-W&LE	4.9035	DPG	93
Connellsville-W&LE	4.9388	DPG	100
Connellsville-W&LE	5.43	DPG	64
Connellsville-W&LE	6.26	DPG	75.66
Connellsville-W&LE	6.274	DPG	29.5
Connellsville-W&LE	6.73	DPG	91.5
Connellsville-W&LE	6.747	DPG	90
Connellsville-W&LE	6.78	DPG	91.5
Connellsville-W&LE	8.51	TTR	130
Connellsville-W&LE	8.53	DPG	29.33
Connellsville-W&LE	8.98	DPG	85
Connellsville-W&LE	9.012	DPG	120
Connellsville-W&LE	9.58	DPG	90
Connellsville-W&LE	10.251	DPG	80
Connellsville-W&LE	10.265	DPG	40
Connellsville-W&LE	10.273	DTR	160
Connellsville-W&LE	10.303	DPG	80
Connellsville-W&LE	10.318	DPG	40
Connellsville-W&LE	10.326	DPG	80
Connellsville-W&LE	12.52	DPG	54.5
Connellsville-W&LE	12.53	DPG	40
Connellsville-W&LE	12.543	DPG	80
Connellsville-W&LE	12.558	DPG	55
Connellsville-W&LE	12.569	DPG	100
Connellsville-W&LE	12.588	DPG	55
Connellsville-W&LE	12.598	DPG	100

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	12.617	DPG	55
Connellsville-W&LE	12.6278	DPG	100
Connellsville-W&LE	12.646	DPG	55
Connellsville-W&LE	12.657	DPG	80
Connellsville-W&LE	12.672	DPG	55
Connellsville-W&LE	12.683	DPG	80
Connellsville-W&LE	12.698	DPG	40
Connellsville-W&LE	12.705	DPG	80
Connellsville-W&LE	12.721	DPG	40
Connellsville-W&LE	12.728	DPG	79.5
Connellsville-W&LE	13.97	DPG	80
Connellsville-W&LE	14	DPG	50
Connellsville-W&LE	14.01	DPG	80
Connellsville-W&LE	14.025	DPG	50
Connellsville-W&LE	14.034	DPG	80
Connellsville-W&LE	14.05	DPG	50
Connellsville-W&LE	14.059	DPG	122
Connellsville-W&LE	14.082	DPG	230
Connellsville-W&LE	14.126	DTR	370
Connellsville-W&LE	14.196	DPG	230
Connellsville-W&LE	14.239	DPG	80
Connellsville-W&LE	14.46	SST	25.67
Connellsville-W&LE	14.465	SST	45
Connellsville-W&LE	14.473	SST	32
Connellsville-W&LE	14.478	SST	23.5
Connellsville-W&LE	15.35	DPG	80.67
Connellsville-W&LE	15.365	DPG	68
Connellsville-W&LE	15.48	DPG	55
Connellsville-W&LE	15.49	DPG	80
Connellsville-W&LE	15.506	DPG	80
Connellsville-W&LE	15.516	DPG	55
Connellsville-W&LE	15.539	DPG	120

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	15.549	DPG	55
Connellsville-W&LE	15.579	DPG	80
Connellsville-W&LE	15.595	DPG	55
Connellsville-W&LE	15.73	SST	36.5
Connellsville-W&LE	17.01	SST	56
Connellsville-W&LE	18.08	DPG	52.5
Connellsville-W&LE	18.091	DPG	40
Connellsville-W&LE	18.098	DPG	57.5
Connellsville-W&LE	20.82	DPG	44
Connellsville-W&LE	20.828	DPG	52
Connellsville-W&LE	21.34	SST	33.5
Connellsville-W&LE	21.68	DPG	240
Connellsville-W&LE	21.681	DPG	70
Connellsville-W&LE	21.682	DPG	40
Connellsville-W&LE	23.01	DTR	50
Connellsville-W&LE	23.02	DPG	240
Connellsville-W&LE	23.03	DPG	80
Connellsville-W&LE	23.04	DPG	120
Connellsville-W&LE	23.05	DPG	130
Connellsville-W&LE	23.061	DTR	290
Connellsville-W&LE	23.07	DTR	200
Connellsville-W&LE	23.08	DTR	450
Connellsville-W&LE	23.09	DTR	380
Connellsville-W&LE	23.1	DTR	350
Connellsville-W&LE	23.11	DTR	480
Connellsville-W&LE	23.991	DPG	120
Connellsville-W&LE	24	DPG	240
Connellsville-W&LE	24.011	DPG	80
Connellsville-W&LE	24.801	DPG	40
Connellsville-W&LE	24.81	DPG	120
Connellsville-W&LE	24.821	DPG	60
Connellsville-W&LE	24.83	DPG	80

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	25.22	SST	50.67
Connellsville-W&LE	25.23	SST	46.67
Connellsville-W&LE	25.24	SST	44.67
Connellsville-W&LE	25.88	DPG	110
Connellsville-W&LE	25.89	DPG	80
Connellsville-W&LE	25.9	DPG	100
Connellsville-W&LE	25.91	DPG	70
Connellsville-W&LE	26.2	DPG	400
Connellsville-W&LE	26.21	DPG	240
Connellsville-W&LE	26.22	DPG	100
Connellsville-W&LE	26.23	DPG	120
Connellsville-W&LE	26.66	DPG	320
Connellsville-W&LE	26.67	DPG	120
Connellsville-W&LE	26.68	DPG	110
Connellsville-W&LE	27.051	DPG	240
Connellsville-W&LE	27.06	DPG	180
Connellsville-W&LE	27.071	DPG	300
Connellsville-W&LE	27.79	TPG	44.17
Connellsville-W&LE	30.12	DPG	87.5
Connellsville-W&LE	30.13	DPG	280
Connellsville-W&LE	30.14	DPG	560
Connellsville-W&LE	30.15	DPG	220
Connellsville-W&LE	30.16	DPG	122
Connellsville-W&LE	30.17	DPG	270
Connellsville-W&LE	30.18	DPG	67.5
Connellsville-W&LE	31.71	CAR	25
Connellsville-W&LE	32.261	SST	45.74
Connellsville-W&LE	32.27	SST	50
Connellsville-W&LE	32.28	SST	54.26
Connellsville-W&LE	32.4	DPG	160
Connellsville-W&LE	32.41	DPG	80
Connellsville-W&LE	32.42	DTR	140

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	33.36	DPG	200
Connellsville-W&LE	33.37	CAR	74
Connellsville-W&LE	33.67	DPG	70
Connellsville-W&LE	33.68	DPG	210
Connellsville-W&LE	33.69	DPG	80
Connellsville-W&LE	33.701	DPG	330
Connellsville-W&LE	33.71	DPG	591.65
Connellsville-W&LE	33.721	DPG	420
Connellsville-W&LE	33.73	DPG	88.35
Connellsville-W&LE	35.29	DTR	160
Connellsville-W&LE	35.3	DTR	65
Connellsville-W&LE	35.31	DPG	80
Connellsville-W&LE	35.32	DPG	180
Connellsville-W&LE	36.92	DPG	72
Connellsville-W&LE	37.27	DTR	200
Connellsville-W&LE	37.85	CAR	25
Connellsville-W&LE	39.16	CAR	25
Connellsville-W&LE	39.38	DPG	480
Connellsville-W&LE	39.39	DPG	200
Connellsville-W&LE	39.4	DPG	65
Connellsville-W&LE	39.671	CAR	25
Connellsville-W&LE	39.86	SST	21.33
Connellsville-W&LE	40.23	SST	21.33
Connellsville-W&LE	41.32	CAR	18
Connellsville-W&LE	41.77	CAR	16
Connellsville-W&LE	42.09	CAR	20
Connellsville-W&LE	42.1	CAR	6
Connellsville-W&LE	42.631	TPG	76
Connellsville-W&LE	42.64	DPG	32
Connellsville-W&LE	43.28	CSB	18
Connellsville-W&LE	43.75	DPG	94.84
Connellsville-W&LE	44.21	DPG	43.5

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	45.36	CAR	6
Connellsville-W&LE	45.38	CAR	24
Connellsville-W&LE	46.57	DPG	37.67
Connellsville-W&LE	46.87	SST	24.33
Connellsville-W&LE	47.14	SST	18
Connellsville-W&LE	47.49	DPG	135
Connellsville-W&LE	47.5	DPG	90
Connellsville-W&LE	47.51	DPG	420
Connellsville-W&LE	47.52	DPG	38.75
Connellsville-W&LE	47.53	DPG	32.67
Connellsville-W&LE	47.54	DPG	67.08
Connellsville-W&LE	47.55	DPG	52
Connellsville-W&LE	47.56	DPG	34
Connellsville-W&LE	48.07	CAR	40
Connellsville-W&LE	48.42	CAR	16
Connellsville-W&LE	48.62	CAR	21
Connellsville-W&LE	48.63	CAR	6
Connellsville-W&LE	48.7	CAR	10
Connellsville-W&LE	48.93	CAR	24
Connellsville-W&LE	49.11	CAR	6
Connellsville-W&LE	49.43	CAR	33
Connellsville-W&LE	50.15	TPG	160
Connellsville-W&LE	50.36	DPG	31.67
Connellsville-W&LE	50.75	SST	154
Connellsville-W&LE	50.78	DPG	86.25
Connellsville-W&LE	50.79	DPG	68.83
Connellsville-W&LE	50.8	DPG	130
Connellsville-W&LE	51.71	TPG	73.25
Connellsville-W&LE	51.72	DPG	45.5
Connellsville-W&LE	51.73	DPG	43.42
Connellsville-W&LE	51.74	DPG	64.33
Connellsville-W&LE	51.75	DPG	68.75

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	52.16	SST	26
Connellsville-W&LE	52.71	DPG	50
Connellsville-W&LE	52.81	DPG	150.75
Connellsville-W&LE	53.31	DPG	78.84
Connellsville-W&LE	53.32	DPG	97.5
Connellsville-W&LE	53.33	DPG	95
Connellsville-W&LE	53.34	DPG	60
Connellsville-W&LE	53.35	DPG	58
Connellsville-W&LE	53.36	DPG	98
Connellsville-W&LE	53.91	TPG	86.25
Connellsville-W&LE	53.97	CAR	12
Connellsville-W&LE	54.25	SST	15
Connellsville-W&LE	56.39	DTR	276
Connellsville-W&LE	56.4	DPG	71.21
Connellsville-W&LE	56.41	DPG	40
Connellsville-W&LE	56.42	DPG	210
Connellsville-W&LE	56.43	DPG	150
Connellsville-W&LE	56.44	DPG	50.92
Connellsville-W&LE	56.98	DPG	123.91
Connellsville-W&LE	57.67	DPG	118
Connellsville-W&LE	57.68	DPG	120
Connellsville-W&LE	57.69	DPG	17.5
Connellsville-W&LE	57.7	DPG	116
Connellsville-W&LE	58.3	MAR	40
Connellsville-W&LE	58.56	CAR	12
Connellsville-W&LE	59.18	CAR	30
Connellsville-W&LE	59.42	DPG	165
Connellsville-W&LE	59.43	DPG	90
Connellsville-W&LE	59.44	DPG	44.22
Connellsville-W&LE	59.45	DTR	100
Connellsville-W&LE	59.46	DTR	138
Connellsville-W&LE	59.47	DTR	91.33

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	60.26	DTR	240
Connellsville-W&LE	60.45	DPG	39.66
Connellsville-W&LE	60.46	TPG	55.83
Connellsville-W&LE	60.85	TPG	35
Connellsville-W&LE	61.01	TTR	150
Connellsville-W&LE	61.44	DPG	60
Connellsville-W&LE	61.71	DPG	50
Connellsville-W&LE	62.02	TTR	142
Connellsville-W&LE	62.03	TTR	166
Connellsville-W&LE	62.04	DPG	90
Connellsville-W&LE	62.05	DPG	268
Connellsville-W&LE	64.01	DPG	170
Connellsville-W&LE	64.1	CAR	4
Connellsville-W&LE	64.65	CAR	6
Connellsville-W&LE	64.84	DPG	26
Connellsville-W&LE	65.36	DPG	23
Connellsville-W&LE	65.38	DPG	151
Connellsville-W&LE	65.79	DPG	38.5
Connellsville-W&LE	65.8	CAR	6
Connellsville-W&LE	66.36	DPG	38.5
Connellsville-W&LE	67.47	DPG	38.42
Connellsville-W&LE	67.48	CAR	6
Connellsville-W&LE	68.1	CAR	20
Connellsville-W&LE	68.59	DTR	200
Connellsville-W&LE	68.69	DPG	36.5
Connellsville-W&LE	73.03	DPG	25.5
Connellsville-W&LE	76.08	DPG	53.42
Connellsville-W&LE	77.43	SST	22.25
Connellsville-W&LE	78.53	SST	22.25
Connellsville-W&LE	79.16	SST	38.42
Connellsville-W&LE	79.64	DPG	38.42
Connellsville-W&LE	80.5	SST	22.25

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Connellsville-W&LE	80.84	DPG	58.17
Connellsville-W&LE	81.3	SST	23.67
Connellsville-W&LE	82.61	TTR	99.75
Connellsville-W&LE	82.87	DTR	100
Connellsville-W&LE	84.71	DTR	100
Connellsville-W&LE	85.15	DTR	100
Connellsville-W&LE	85.72	DPG	77.5
Connellsville-W&LE	94.92	DPG	36.5
Corning-LV	182.34	TPG	280
Corning-LV	182.66	CSB	10
Corning-LV	182.88	DPG	42
Corning-LV	184.27	CSB	11
Corning-LV	185.03	CSB	7
Corning-LV	185.38	CSB	10
Corning-LV	185.87	DPG	16
Corning-LV	186.18	CSB	58
Corning-LV	188.23	DPG	94
Corning-LV	188.32	TPG	360
Corning-LV	190.58	MAR	11
Corning-LV	194.34	DPG	28
Corning-LV	195.84	MAR	12
Corning-LV	196.33	DPG	160
Corning-LV	196.62	CSB	32
Corning-LV	197.91	CSB	25
Corning-LV	198.04	DPG	1290
Corning-LV	198.91	SST	33
Corning-W&C	76.3	TPG	25
Corning-W&C	76.44	CAR	8
Corning-W&C	78.1	CAR	8
Corning-W&C	79.07	SST	10
Corning-W&C	81.08	DPG	23
Corning-W&C	81.84	TPG	40

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Corning-W&C	82.6	TPG	27
Corning-W&C	84.24	TPG	24
Corning-W&C	85.3	CSB	12
Corning-W&C	85.87	SST	11
Corning-W&C	86.89	TPG	229
Corning-W&C	88.86	SST	11
Corning-W&C	92.97	SST	57
Corning-W&C	93.63	DPG	134
Corning-W&C	96.57	SST	55
Corning-W&C	97.56	SST	57
Corning-W&C	99.64	SST	335
Corning-W&C	102.74	TPG	35
Corning-W&C	102.98	CSB	16
Corning-W&C	103.25	DPG	27
Corning-W&C	104.13	CSB	16
Cresson-RJ	0.72	CSB	41
Cresson-RJ	8.66	MAR	8
Cresson-RJ	10.03	CSB	23
Cresson-RJ	11.31	CSB	34
Cresson-RJ	12.74	SST	39
Cresson-RJ	15.29	CSB	23
Cresson-RJ	16.151	DPG	65
Cresson-RJ	16.31	DPG	66
Cresson-RJ	18.02	CSB	22
Cresson-RJ	18.59	DPG	76
Cresson-RJ	24.7	DPG	24
Cresson-RJ	27.69	TPG	33
Cresson-RJ	28.08	TPG	112
Cresson-RJ	30.24	CSB	14
Cresson-RJ	30.941	SST	13
Cresson-RJ	31.61	SST	19
Cresson-RJ	35.17	SST	11

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Cresson-RJ	37.05	CSB	24
Cresson-RJ	39.1	TTR	100
Cresson-RJ	39.11	DTR	100
Cresson-RJ	39.12	DPG	490
Cresson-RJ	42.81	MAR	9
Cresson-RJ	44.78	DPG	272
Cresson-RJ	45.57	SST	112
Cresson-RJ	57.62	DPG	52
Cresson-RJ	58.36	DPG	365
Cresson-RJ	58.88	DPG	855
Cresson-RJ	59.98	MAR	16
Cresson-RJ	61.16	TPG	74
Cresson-RJ	62.81	TPG	74
Cresson-RJ	65.29	TPG	74
Cresson-RJ	65.6	TTR	350
Field-Oil	0.86	TPG	162
Field-Oil	0.87	DPG	20
Field-Oil	2.4	TPG	20
Grandview-A&E	0.16	DPG	20
Hillman-RJ	0.461	SST	18
Hillman-RJ	2.29	MAR	8
Hillman-RJ	4.69	MAR	9
Indiana-B&P	0.01	DPG	160.5
Indiana-B&P	0.83	MAR	60
Indiana-B&P	0.91	TTR	103
Indiana-B&P	0.92	TPG	104
Irvona-RJ	4.671	DPG	30
Irvona-RJ	7.12	SST	13
Irvona-RJ	8.751	CSB	24
Irvona-RJ	10.81	SST	19
Irvona-RJ	12.12	CSB	20
Irvona-RJ	14.38	SST	23

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Irvona-RJ	18.36	DPG	33
Irvona-RJ	18.88	MAR	8
Kiski Junction-KJR	0.0104	TPG	740
Lewisburg-UCI	169.38	CSB	34
Main-A&E	2.83	CSB	75
Main-A&E	7.22	DPG	36
Main-A&E	7.26	MAR	20
Main-A&E	9.33	DPG	12
Main-A&E	9.74	CSB	18
Main-A&E	11.41	CSB	12
Main-A&E	14.69	CSB	64
Main-A&E	15.71	CSB	23
Main-A&E	17.65	CSB	64
Main-A&E	18.23	CSB	64
Main-A&E	18.82	CSB	18
Main-A&E	20.9	CSB	14
Main-A&E	22.92	MAR	8
Main-A&E	23.24	TPG	195
Main-A&E	24.72	TPG	92
Main-A&E	25.05	CSB	18
Main-A&E	25.97	TPG	106
Main-A&E	26.35	TPG	134
Main-A&E	26.78	DPG	64
Main-A&E	27.05	DPG	70
Main-A&E	27.3	CSB	23
Main-A&E	27.98	MAR	16
Main-A&E	28.23	DPG	55
Main-A&E	31.37	CSB	24
Main-A&E	32.7	CSB	16
Main-A&E	33.13	CSB	96
Main-A&E	33.72	CSB	16
Main-A&E	34.41	CSB	20

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-A&E	35.96	MAR	20
Main-A&E	38.65	CSB	14
Main-A&E	41.14	TPG	106
Main-A&E	42.56	DPG	25
Main-A&E	46.09	CSB	31
Main-A&E	51.1	DPG	45
Main-A&E	53.59	TPG	104
Main-A&E	54.86	CSB	12
Main-A&E	56.28	DPG	23
Main-A&E	56.97	TPG	306
Main-A&E	60.09	TPG	213
Main-A&E	60.39	DPG	54
Main-A&E	61.36	CSB	18
Main-A&E	62.8	CSB	18
Main-A&E	65.9	TTR	465
Main-A&E	68.91	MAR	20
Main-A&E	73.42	DPG	17
Main-A&E	75.15	TPG	48
Main-A&E	76.9	TPG	48
Main-A&E	79.56	CSB	27
Main-A&E	82.65	DPG	76
Main-A&E	101.28	CSB	40
Main-A&E	103.79	DPG	153
Main-A&E	104.85	DPG	24
Main-A&E	106.78	SST	32
Main-A&E	107.32	DPG	108
Main-A&E	109.39	CSB	28
Main-A&E	109.91	DPG	260
Main-A&E	110.82	CSB	32
Main-A&E	118.86	DPG	108
Main-A&E	120.32	DPG	106
Main-A&E	126.8	MAR	16

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-A&E	126.89	DPG	26
Main-A&E	134.12	MAR	20
Main-A&E	137.52	CSB	16
Main-A&E	139.5	DPG	106
Main-A&E	147.821	TPG	144
Main-A&E	148.77	TPG	288
Main-A&S	2.101	DPG	150
Main-B&P	120.78	DPG	30
Main-B&P	121.68	TPG	50.5
Main-B&P	122.31	TPG	173.3
Main-B&P	122.84	TPG	96
Main-B&P	123.01	CST	74
Main-B&P	123.87	TOP	8
Main-B&P	124.54	SST	20
Main-B&P	126.17	TPG	34
Main-B&P	138.02	CST	33
Main-B&P	138.17	CAR	19
Main-B&P	155.61	TOP	10
Main-B&P	157.96	TOP	6
Main-B&P	161.05	TOP	6
Main-B&P	167.4	TPG	129
Main-B&P	167.92	DPG	684
Main-B&P	168.27	MAR	10
Main-B&P	173.3	TPG	46
Main-B&P	174.83	TPG	28
Main-B&P	176.8	DPG	54.5
Main-B&P	179.14	DPG	80
Main-B&P	180.05	CST	7.5
Main-B&P	180.87	DPG	228
Main-B&P	181.82	MAR	10
Main-B&P	183.8	DPG	240
Main-B&P	193.73	SST	16

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-B&P	196.21	DPG	68
Main-B&P	199.6	DPG	16
Main-B&P	200.16	DPG	24
Main-B&P	201.31	DPG	130
Main-B&P	202.01	TPG	76.5
Main-B&P	203.27	DPG	27
Main-B&P	203.75	TPG	62.5
Main-B&P	204.28	DPG	33.5
Main-B&P	205.6	SST	15.5
Main-B&P	209.47	MAR	12
Main-B&P	211.47	DPG	60
Main-B&P	211.71	DPG	60
Main-B&P	212.02	TOP	6
Main-B&P	213.82	DPG	16
Main-B&P	215.53	SST	16
Main-B&P	217.03	DPG	75
Main-B&P	217.46	DPG	75
Main-B&P	220.67	DPG	181
Main-B&P	221.38	DPG	181
Main-B&P	222.35	SST	26
Main-B&P	222.54	DPG	181
Main-B&P	222.89	CST	27
Main-B&P	225.05	CST	64
Main-B&P	226.08	TTR	190
Main-B&P	226.29	TTR	140
Main-B&P	226.37	DPG	153
Main-B&P	226.371	DTR	127
Main-B&P	226.372	TTR	58.5
Main-B&P	226.373	TTR	155.5
Main-B&P	228.5	DPG	34
Main-B&P	229.16	DPG	18
Main-B&P	230.96	DPG	30

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-B&P	231.04	MAR	12
Main-B&P	234.65	DPG	24
Main-B&P	235.59	TPG	98.08
Main-B&P	235.591	DPG	114
Main-B&P	238.08	MAR	8
Main-B&P	238.57	MAR	12
Main-B&P	238.89	DPG	618.5
Main-B&P	240.73	DPG	23
Main-B&P	241.39	DPG	900
Main-B&P	241.391	DTR	127
Main-B&P	244.39	DPG	23
Main-B&P	245.65	DPG	34
Main-B&P	246.18	DPG	23
Main-B&P	248	DPG	54.5
Main-B&P	248.93	TPG	54
Main-B&P	249.61	DPG	34
Main-B&P	252.12	DPG	30
Main-B&P	252.19	TPG	74.5
Main-B&P	252.93	SST	24
Main-B&P	255	DPG	18
Main-B&P	255.34	CST	10
Main-B&P	255.85	TTR	123
Main-B&P	256.92	TTR	123
Main-B&P	257.19	TTR	123
Main-B&P	257.63	DPG	96
Main-B&P	257.76	DPG	96
Main-B&P	258.77	DPG	44
Main-B&P	258.89	DPG	92.42
Main-B&P	258.891	DTR	1341
Main-B&P	258.892	DPG	290
Main-B&P	260.03	DPG	24
Main-B&P	260.39	MAR	12

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-B&P	261.75	MAR	6
Main-B&P	262.51	DPG	482
Main-B&P	263.45	DPG	460.5
Main-B&P	264.53	DPG	34
Main-B&P	265.96	MAR	16
Main-B&P	267.64	DPG	34
Main-B&P	270.88	DTR	127
Main-B&P	272.84	DPG	96
Main-B&P	274.19	TPG	132
Main-B&P	274.35	DPG	96
Main-B&P	275.15	TPG	198
Main-B&P	275.39	TPG	65
Main-B&P	277.36	MAR	16
Main-B&P	280.45	MAR	6
Main-B&P	281.15	DPG	312
Main-East Erie	1.038	DPG	200
Main-East Erie	1.769	CSB	8
Main-East Erie	2.689	CSB	20
Main-East Erie	3.038	CAR	140
Main-Everett	14.58	CSB	18.4
Main-Everett	14.6	CSB	18.4
Main-Everett	14.77	CSB	18.4
Main-Everett	14.81	SST	48.2
Main-Everett	14.95	DPG	131.7
Main-Everett	15.02	TPG	41.11
Main-Everett	15.5	SST	48.4
Main-Everett	16.45	CAR	16
Main-Everett	16.85	CAR	16
Main-Everett	17.96	CAR	16
Main-Everett	18.09	SST	29.2
Main-Everett	20.14	DPG	61.4
Main-Everett	20.86	SST	29.1

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-Everett	21.2	CAR	16
Main-Getty	8.05	SST	40
Main-Getty	9.63	SST	29
Main-Getty	12.731	CSB	24
Main-Getty	13.63	CSB	12
Main-Getty	16.63	TPG	60
Main-Getty	20.984	DPG	195.5
Main-Getty	21.05	CSB	8.5
Main-Getty	21.15	SST	37
Main-Getty	24.95	DPG	111.5
Main-Holiday	8.97	DPG	221
Main-Holiday	10.06	DPG	91.5
Main-Holiday	14.97	SST	91.8
Main-Holiday	16.69	MAR	20
Main-Holiday	17.11	MAR	6
Main-Holiday	17.7	CSB	11
Main-Holiday	18.041	CSB	15
Main-Knox	144.8	SST	32
Main-Knox	146.11	TST	13
Main-Knox	152.2	SST	125
Main-Knox	153.3	TST	598
Main-Knox	160	TST	507
Main-Knox	162.5	TST	86
Main-Knox	163.1	TST	11
Main-Knox	163.2	TST	158
Main-MA&PA	12.8	MAR	15
Main-MA&PA	13.52	TPG	217.67
Main-MA&PA	15.8	MAR	9
Main-MA&PA	18.04	CSB	25
Main-MA&PA	20.71	DPG	54.5
Main-MA&PA	21.36	SST	19
Main-MA&PA	23.61	DPG	28

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-MA&PA	24.17	TST	10
Main-MA&PA	24.98	TPG	58
Main-MA&PA	27.28	CSB	8
Main-MA&PA	27.85	DPG	40.5
Main-MA&PA	28.05	SST	18
Main-ML	0.3	DPG	251
Main-ML	7.33	MAR	10
Main-ML	10.25	MAR	10
Main-ML	11.94	MAR	10
Main-ML	14.9	DPG	56
Main-ML	19.02	MAR	10
Main-ML	19.81	MAR	15
Main-ML	20.53	DPG	45
Main-ML	21.75	CSB	35
Main-ML	22.27	DPG	57
Main-ML	22.85	DPG	31
Main-ML	24.77	DPG	57
Main-ML	26.47	MAR	15
Main-ML	27.67	MAR	5
Main-ML	28.68	MAR	15
Main-ML	30.76	DPG	221
Main-ML	31.43	DPG	57
Main-ML	35.63	DPG	212
Main-ML	35.921	DPG	267
Main-ML	37.96	DPG	240
Main-ML	39.28	DPG	36
Main-ML	41.01	DPG	212
Main-ML	41.21	DPG	172
Main-ML	41.28	DPG	67
Main-ML	41.73	DPG	261.47
Main-ML	41.74	TTR	261.47
Main-ML	41.75	DTR	261.47

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-ML	42.36	DPG	265
Main-ML	42.57	DPG	119
Main-ML	42.63	DPG	173
Main-ML	47.68	SST	20
Main-ML	47.95	DPG	246
Main-ML	50.76	TST	37
Main-ML	51.68	DPG	220
Main-ML	52.74	DPG	24
Main-ML	53.29	DPG	234
Main-ML	53.5	DPG	154
Main-ML	53.66	DPG	26
Main-ML	54.51	TPG	175
Main-ML	55.31	DPG	136
Main-ML	55.45	TOP	81
Main-ML	57.78	TST	25
Main-ML	62.64	TPG	76
Main-ML	63.11	DPG	30
Main-ML	64.35	DPG	30
Main-ML	68.42	DPG	20
Main-ML	68.93	MAR	6
Main-ML	70.46	DPG	34
Main-ML	74.63	MAR	13
Main-ML	75.69	MAR	13
Main-ML	77.24	MAR	6
Main-ML	77.81	MAR	8
Main-ML	78.82	MAR	8
Main-ML	85.24	DPG	152
Main-ML	85.69	DPG	119
Main-ML	86.97	DPG	77
Main-ML	88.19	MAR	10
Main-ML	90.21	DPG	88
Main-ML	90.34	MAR	10

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-ML	90.96	MAR	10
Main-ML	94.57	MAR	10
Main-ML	96.27	MAR	14
Main-ML	98.31	MAR	12
Main-ML	100.19	MAR	12
Main-ML	102.04	MAR	10
Main-ML	103.64	DPG	84
Main-ML	105.49	DPG	84
Main-ML	108.66	TTR	324
Main-ML	109.24	DPG	20
Main-ML	109.79	TPG	301
Main-Mon	1.101	DPG	65
Main-Morrison	21.19	DPG	14.33
Main-Morrison	21.57	SST	14.25
Main-Morrison	21.66	SST	16
Main-Morrison	22	SST	14
Main-Morrison	22.12	SST	13.67
Main-Mount	113.5	CAR	30
Main-Mount	124.37	TST	5
Main-Mount	125.92	TST	5
Main-Mount	151.39	MAR	8
Main-Mount	183.14	TST	5
Main-Mount	185.96	TST	5
Main-Mount	254.25	TST	5
Main-Mount	261.4	TST	5
Main-NBER	3.21	CSB	12
Main-NBER	3.93	TPG	46
Main-NBER	4.68	TPG	50
Main-NBER	4.85	TPG	54
Main-NBER	5.57	CSB	12
Main-NBER	6.17	TPG	51
Main-NBER	6.79	TPG	48

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-NBER	9.24	SST	16
Main-NBER	9.76	CSB	28
Main-NBER	10.98	CSB	6
Main-NBER	11.96	CSB	8
Main-NBER	16.75	DPG	190
Main-NBER	17.13	CSB	18
Main-NBER	17.95	TPG	30
Main-NBER	19.03	CSB	18
Main-NBER	19.5	CSB	24
Main-NBER	20.67	TPG	24
Main-NBER	21.46	CSB	42
Main-NBER	22.43	SST	7
Main-NBER	22.55	CSB	18
Main-NBER	23.06	SST	14
Main-NBER	24.01	CSB	15
Main-NBER	24.68	TPG	45
Main-NBER	25.75	TPG	37
Main-NBER	26.01	CSB	13
Main-NBER	26.59	CSB	11
Main-NBER	27.07	CSB	26
Main-NBER	28.04	CSB	28
Main-NBER	29.07	CSB	17
Main-NBER	29.39	CSB	61
Main-NBER	30.03	CSB	9
Main-NBER	30.94	CSB	23
Main-NBER	32.11	SST	18
Main-NBER	33.65	CSB	18
Main-NBER	33.84	DPG	454
Main-NBER	33.97	DPG	40
Main-NBER	34.32	CSB	20
Main-NBER	40	CSB	20
Main-NBER	44.33	CSB	20

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-NBER	50.65	CSB	52
Main-NBER	51.21	TPG	183
Main-New Hope	9.5	MAR	8
Main-New Hope	11.25	MAR	5
Main-New Hope	11.8	MAR	8
Main-New Hope	12.3	SST	12
Main-New Hope	12.5	MAR	12
Main-New Hope	13.14	SST	400
Main-New Hope	13.56	SST	140
Main-New Hope	14.62	SST	8
Main-New Hope	15.28	MAR	12
Main-New Hope	15.44	SST	12
Main-New Hope	15.62	SST	12
Main-New Hope	16.12	MAR	10
Main-New Hope	17.51	SST	13
Main-New Hope	24.681	MAR	14
Main-New Hope	24.82	SST	200
Main-Oil	120.7	TPG	300
Main-Oil	121.35	CSB	26
Main-Oil	121.89	DPG	325
Main-Oil	130.27	TTR	292
Main-Oil	132.29	TPG	300
Main-P&S	0.33	DPG	213.67
Main-P&S	0.73	DPG	618.92
Main-P&S	0.731	TPG	75.75
Main-P&S	19.57	TPG	64.67
Main-P&S	20.72	DPG	33.33
Main-P&S	20.981	DPG	537.42
Main-P&S	20.982	TTR	123
Main-P&S	20.983	DTR	125
Main-P&S	21.43	SST	21.17
Main-P&S	21.51	CAR	15

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-P&S	23.95	DPG	52
Main-P&S	25.55	SST	21.17
Main-P&S	26.5	SST	21.17
Main-P&S	26.92	CAR	15
Main-P&S	28.02	CAR	16
Main-P&S	29.11	CAR	15
Main-P&S	29.5	CAR	15
Main-P&S	33.7	DPG	1470
Main-P&S	38.42	DPG	1430
Main-P&S	41.27	DPG	21.33
Main-P&S	42.34	DPG	23.33
Main-P&S	42.39	CAR	6
Main-P&S	42.86	CAR	12
Main-P&S	43.16	CAR	8
Main-P&S	43.59	CAR	15
Main-P&S	44.48	SST	23
Main-P&S	44.57	CAR	15
Main-P&S	45.09	CAR	12
Main-P&S	45.59	DPG	65.33
Main-P&S	45.94	DPG	23.33
Main-P&S	46.32	DPG	66.33
Main-P&S	46.67	TPG	44.25
Main-P&S	47.59	TPG	55
Main-P&S	47.92	CAR	10
Main-P&S	48.57	CAR	6
Main-P&S	48.92	CAR	16
Main-P&S	49.06	SST	23
Main-P&S	49.73	CAR	8
Main-P&S	50.49	CAR	8
Main-P&S	51.23	DPG	630.2
Main-P&S	51.86	DPG	660
Main-P&S	52.69	CAR	10

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-P&S	52.75	SST	23
Main-P&S	53.56	CAR	8
Main-P&S	55.43	DPG	80
Main-P&S	55.431	DTR	202
Main-P&S	55.44	DTR	306
Main-P&S	57.81	TTR	310.08
Main-P&S	58.46	DPG	23.33
Main-P&S	59.21	DPG	23.33
Main-P&S	59.41	SST	23
Main-P&S	61.66	CAR	6
Main-P&S	62.13	CAR	15
Main-P&S	62.33	SST	23
Main-P&S	63	DPG	23.33
Main-P&S	63.23	TTR	1123
Main-P&S	63.81	CAR	6
Main-P&S	66.68	CAR	8
Main-P&S	69.38	CAR	10
Main-P&S	69.94	DPG	108
Main-P&S	70.62	SST	23.33
Main-P&S	70.82	SST	23.33
Main-P&S	71.35	CAR	6
Main-P&S	71.71	CAR	6
Main-P&S	72.94	CAR	6
Main-P&S	73.86	CAR	20
Main-P&S	73.89	TPG	106.5
Main-P&S	74.27	SST	6
Main-P&S	74.32	SST	8
Main-P&S	74.6	DPG	34.5
Main-P&S	77.72	SST	6.5
Main-P&S	78.92	DPG	56.33
Main-P&S	79.85	CAR	8
Main-P&S	81.6	CAR	20

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Main-P&S	82.98	TST	116
Main-P&S	84.01	CAR	8
Main-P&S	84.93	CAR	8
Main-P&S	86.14	DPG	23.33
Main-Stras	1.115	SST	16
Main-Towanda	10	SST	20
Main-Towanda	20	SST	20
Main-Turtle	2.52	DPG	54
Main-Turtle	3	DPG	24
Main-Turtle	3.69	DPG	104
Main-Turtle	5.83	DPG	55.5
Main-Turtle	7.76	DPG	69.6
Main-Turtle	8.19	DPG	54.5
Main-Turtle	10.19	CAR	25
Main-York	0.401	SST	16
Main-York	0.501	TPG	80
Main-York	1.111	SST	12
Main-York	2.7	SST	16.5
Main-York	3.9	DPG	298.5
Main-York	4.71	TPG	318.5
Main-York	6.4	SST	15
Main-York	12.31	TOP	14
Main-York	12.4	SST	26.33
Main-York	15.6	TTR	286
Main-York	16.2	SST	50
Mait-JV	0.46	TPG	616
Mait-JV	1.38	DPG	50
Mait-JV	1.51	DPG	159
Mait-JV	4.53	DPG	96
Meadville-Oil	61.93	DPG	50
Meadville-Oil	63.5	CSB	20
Meadville-Oil	64.21	CST	20

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Meadville-Oil	66.18	DPG	34
Meadville-Oil	66.23	TPG	36
Meadville-Oil	66.61	DPG	34
Meadville-Oil	68.77	TPG	45
Meadville-Oil	70.7	CAR	35
Meadville-Oil	72.02	MAR	55
Meadville-Oil	74.41	DPG	44
Meadville-Oil	79.62	MAR	25
Meadville-Oil	79.74	TPG	40
Meadville-Oil	82.45	DPG	30
Meadville-Oil	83.06	TTR	280
Meadville-Oil	87.14	TTR	462
Meadville-Oil	89.31	DPG	43
Meadville-Oil	91.22	TPG	60
Meadville-Oil	92.63	DPG	65
Meadville-Oil	93.47	CAR	20
Meadville-Oil	93.76	CAR	20
Meadville-Oil	96.19	TPG	60
Meadville-Oil	96.5	TPG	60
Meadville-Oil	97.9	DPG	106
Meadville-Oil	99.34	TPG	34
Mifflin-W&LE	0.57	CAR	23
Mifflin-W&LE	1.29	CAR	24
Mifflin-W&LE	2.631	CAR	15
Mifflin-W&LE	2.91	TPG	86.5
Milroy-JV	0.51	TPG	118
Milroy-JV	1	TPG	204
Milroy-JV	2.12	CSB	48
Milroy-JV	3.25	DPG	153
Milton-UCI	169.99	TPG	52
Milton-UCI	170.2	TPG	68
Milton-UCI	170.29	TPG	665

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Milton-UCI	170.45	TPG	595
Mos-P&S	0.5	CAR	10
New Castle-ISS	1.801	TPG	350
New Castle-ISS	2	TPG	60
Newberry-LV	179.65	MAR	15
Newberry-LV	179.72	MAR	15
Newco-UCI	172.38	DPG	52
Northern-B&P	419	TST	44
Northern-B&P	420	TST	15.5
Northern-B&P	422	TST	25
Northern-B&P	424	DPG	30
Northern-B&P	428	TST	612
Northern-B&P	430	TST	79
Northern-B&P	431	TST	429
Northern-B&P	431.1	DTR	57.92
Northern-B&P	432	TST	181
Northern-B&P	433	TST	529
Northern-B&P	438	TST	23
Northern-B&P	439	TST	24
Northern-B&P	440	TST	36.5
Northern-B&P	441	DPG	26.5
Northern-B&P	442	TST	33.75
Northern-B&P	444	TST	26
Northern-B&P	446	TST	43
Northern-B&P	447	DPG	30
North-MA&PA	54.17	DPG	30
North-MA&PA	54.93	CSB	5
North-MA&PA	55.25	TPG	90
North-MA&PA	55.87	MAR	20
North-MA&PA	56.09	MAR	15
NS-NS	180.55	DPG	54
NS-NS	183.23	CSB	6

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
NS-NS	185.4	SST	14
NS-NS	186.181	SST	15
NS-NS	188.5	CSB	18
NS-NS	191.37	MAR	15
NS-NS	191.48	TPG	30
NS-NS	191.52	TPG	74
NS-NS	191.521	DPG	60
NS-NS	194.07	TOP	5
NS-NS	201.35	DPG	23
NS-NS	201.66	CSB	11
NS-NS	202.07	DPG	45
NS-NS	202.071	TPG	50
NS-NS	204.9	SST	14
NS-NS	207.36	CSB	8
NS-NS	209.99	CSB	8
NS-NS	211.27	DPG	68
Old CR LS 42-2244-PIR	1.601	MAR	15
Old CR LS 42-2244-PIR	2.72	DPG	210
Old CR LS 42-2244-PIR	3.54	TTR	150
Old CR LS 42-2244-PIR	3.901	DPG	50
Old CR LS 42-2244-PIR	4.33	DPG	140
Old CR LS 42-2244-PIR	4.67	MAR	18
Old CR LS 42-2244-PIR	7.24	DPG	140
Old CR LS 42-2244-PIR	8.55	DPG	160
Old CR LS 42-2244-PIR	8.75	CSB	25
Old CR LS 42-2244-PIR	9.3	DPG	160
Old CR LS 42-2244-PIR	9.68	MAR	900
Old CR LS 42-2244-PIR	9.84	DPG	160
Old CR LS 42-2244-PIR	11.78	DTR	125
Old CR LS 42-2244-PIR	12.501	TTR	150
Old CR LS 42-2244-PIR	13.44	DPG	40
Old CR LS 42-2244-PIR	13.45	DPG	40

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Old CR LS 42-2244-PIR	14.6901	TTR	100
Old CR LS 42-2244-PIR	15.85	DTR	125
Old CR LS 42-2244-PIR	16.19	TPG	80
Old CR LS 42-2244-PIR	16.49	DPG	80
Old CR LS 42-2244-PIR	17.29	CSB	20
Old CR LS 42-2244-PIR	18.2	SST	18
Old CR LS 42-2244-PIR	18.76	CSB	18
Old CR LS 42-2244-PIR	19.89	TPG	100
Old P, C & Y Line	0	TPG	550
Old P, C & Y Line	1.1001	TPG	70
Old P, C & Y Line	1.1002	DPG	280
Old P, C & Y Line-PIR	0.4001	TPG	100
Old P, C, & Y Line-PIR	2.6	CAR	160
Old P, C, & Y Line-PIR	4.5	MAR	15
Old P, C, & Y Line-PIR	5.501	TPG	180
Old P, C, & Y Line-PIR	5.6	CSB	30
Post-NBER	52.41	DPG	242
Post-NBER	52.89	CSB	11
Post-NBER	53.24	CSB	34
Post-NBER	54.01	CSB	20
Struthers-A&E	56.79	TTR	523
Struthers-A&E	58.31	CSB	58
SVRR-SV	13.34	TPG	28
SVRR-SV	14.93	TPG	156
SVRR-SV	17.39	CSB	28
SVRR-SV	136.15	CSB	1
SVRR-SV	136.65	DPG	52
SVRR-SV	145.37	CSB	10
SVRR-SV	146.1	CSB	6
SVRR-SV	146.24	CSB	10
SVRR-SV	146.79	CSB	9
SVRR-SV	147.82	CSB	6

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
SVRR-SV	148.14	CSB	7
SVRR-SV	149.53	CSB	27
SVRR-SV	150.54	CSB	6
SVRR-SV	150.86	CSB	7
SVRR-SV	151.29	CSB	7
SVRR-SV	151.82	MAR	12
SVRR-SV	152.95	CSB	7
SVRR-SV	153.41	CSB	6
SVRR-SV	154.64	MAR	10
SVRR-SV	154.84	DPG	68
SVRR-SV	155.1	DPG	34
SVRR-SV	155.22	DPG	250
Tyrone-NBER	0.05	TPG	177
Tyrone-NBER	0.06	DPG	118
Tyrone-NBER	0.24	TPG	65
Tyrone-NBER	0.27	SST	11
Tyrone-NBER	0.64	CSB	13
Tyrone-NBER	0.8	SST	10
Tyrone-NBER	1.02	MAR	8
Tyrone-NBER	1.7	DPG	18
Tyrone-NBER	1.84	CSB	19
Walkers Mill-PIR	10.33	CSB	100
Wallaceton-RJ	2.62	DPG	100
Wallaceton-RJ	2.6312	TTR	100
Wallaceton-RJ	2.64	CAR	42
Wallaceton-RJ	6.86	DPG	469.5
Wallaceton-RJ	6.87	TPG	156.5
Wallaceton-RJ	7.39	MAR	10
Wallaceton-RJ	8.34	MAR	15
Wallaceton-RJ	16.38	SST	19
Wallaceton-RJ	17.23	TPG	124
Wallaceton-RJ	17.93	TPG	118

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
Wallaceton-RJ	19.06	DPG	120
Wallaceton-RJ	31.54	CSB	24
Wallaceton-RJ	34.27	CSB	21
WBV-RJ	2.02	DPG	402
WBV-RJ	3.64	DPG	422
WBV-RJ	4.54	CAR	10
WBV-RJ	4.96	CAR	8
WBV-RJ	6.18	CAR	8
WBV-RJ	7.63	DPG	603
WBV-RJ	9.8	CAR	10
WBV-RJ	11.89	CAR	8
WBV-RJ	12.38	CAR	8
WBV-RJ	13.561	CAR	8
WBV-RJ	14.57	CAR	9
WBV-RJ	18.56	DPG	55
WBV-RJ	18.9	CAR	6
WBV-RJ	20.69	CAR	6
WBV-RJ	22.69	DPG	65
WBV-RJ	23.39	CAR	5
WBV-RJ	23.93	SST	114
WBV-RJ	24.04	CAR	22
WBV-RJ	26.98	CAR	12
WBV-RJ	28.09	CAR	12
WBV-RJ	31.431	DPG	89
WBV-RJ	33.99	DPG	22
WBV-RJ	37.8	TPG	54
WBV-RJ	37.81	TPG	54
WBV-RJ	38.05	DPG	56
WBV-RJ	39.24	DPG	46
WBV-RJ	42.801	SST	18
WBV-RJ	44.1	CSB	14
WBV-RJ	45.37	DPG	73

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
WBV-RJ	46.56	CSB	12
WBV-RJ	46.66	CSB	18
WBV-RJ	46.99	CSB	14
WBV-RJ	47.17	CAR	6
WBV-RJ	47.24	SST	14
WBV-RJ	51.2	TOP	15
WBV-RJ	53.321	TPG	400
Wells-W&C	0.81	DPG	105
Wells-W&C	2.03	DPG	74
Wells-W&C	2.25	TPG	79
Wells-W&C	2.37	TPG	125
Wells-W&C	3.01	TPG	74
West End-W&LE	0.111	DPG	50
West End-W&LE	0.22	DPG	48.5
West End-W&LE	0.752	TPG	68.5
West End-W&LE	0.761	TPG	121
West End-W&LE	0.771	TPG	77.18
West End-W&LE	0.78	TPG	98.91
West End-W&LE	1.021	DPG	37.83
West End-W&LE	1.03	DPG	148
West End-W&LE	1.04	DPG	280
West End-W&LE	1.05	DPG	249.75
West End-W&LE	1.062	DPG	300
West End-W&LE	1.07	DPG	35
West End-W&LE	1.74	DPG	20
West End-W&LE	1.75	DPG	60
West End-W&LE	1.76	DPG	41.67
West End-W&LE	1.771	DPG	150
West End-W&LE	1.781	DPG	17
West End-W&LE	1.791	DPG	60
West End-W&LE	1.8	DPG	33.5
West End-W&LE	1.811	DPG	61.58

Population

Branch-SLRR	Br Name	Br Type	Total Length (ft)
West End-W&LE	1.93	TPG	213
West End-W&LE	1.94	TPG	45.5
West End-W&LE	1.95	TPG	88
West End-W&LE	1.96	TPG	86
West End-W&LE	1.97	DPG	164.68
West End-W&LE	1.981	DPG	82.16
Wharton-B&P	42.26	TPG	68
Wharton-B&P	42.27	MAR	10
Wharton-B&P	42.28	TPG	75
Wharton-B&P	44.15	TST	71
Wharton-B&P	44.25	TST	72.5
Winfield-UCI	161.8	DPG	45
Winfield-UCI	162.88	DPG	65
Winfield-UCI	164.99	CSB	10
Winfield-UCI	165.58	TPG	52
Winfield-UCI	165.63	CSB	10
Winfield-UCI	166.54	DPG	139
Winfield-UCI	167.73	MAR	12
Wmspt-LV	216.55	CSB	8
Wmspt-LV	217.53	SST	44
Wmspt-LV	217.54	TTR	212
Wmspt-LV	217.58	SST	38

APPENDIX C

BRIDGE SAMPLE DATA

Sample

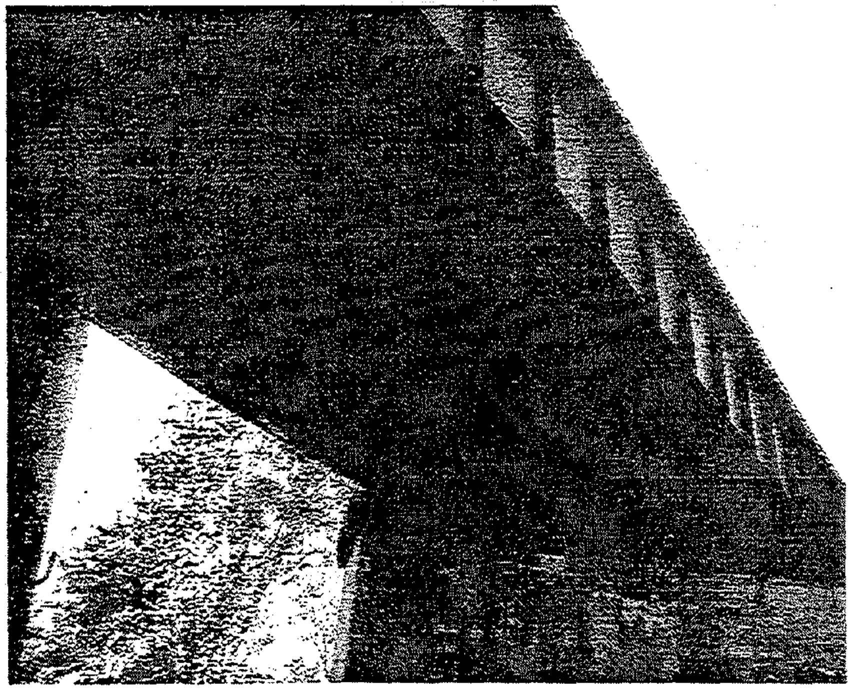
r Number	Br Mat	Br Type	Deck	Year	Spans	Length	Tracks	Over	Inspected	Replace $	Remarks	Owner	Pla
1	St	DPG	OP	0	4	280	2	Creek Road, Chartiers Cree	11/19/1997	$0.00			
2	St	DPG		1931	6	298.5	0			$0.00			
3	St	DPG		1930	1	91.5	0			$0.00			
4	St	TPG	TB	1912	1	48	1	L. Bald Eagle Cr	2/17/1996			JRA	Yes
5	St	DPG		1930	1	40	0			$0.00			
6	St	DPG		1930	1	55	0			$0.00			
7	St	DPG		1930	1	80	0			$0.00			
8	St	TPG	BA	1912	1	24	1	Williams Run	2/17/1996			JRA	Yes
9	St	SST		1930	1	33.5	0			$0.00			
10	St	TPG	BA	1915	1	45	1	Dick's Run	2/17/1996			JRA	Yes
11	St	DPG		0	1	31	0			$0.00			
12	St	DPG		1929	1	72	0			$0.00			
13	St	DPG		0	1	95	0			$0.00			
14	St	DPG		1902	2	151	0			$0.00			
15	St	DTR		1902	1	100	0			$0.00			
16	St	TTR		1912	2	280	0			$0.00			
17	Mas	MAR		1873	0	10	0			$125,000.00			
18	Mas	MAR		0	0	16	0			$151,040.00			
19	Tim	TST			1	13	0			$0.00			

APPENDIX D

BRIEF DESCRIPTION OF EACH SAMPLE BRIDGE

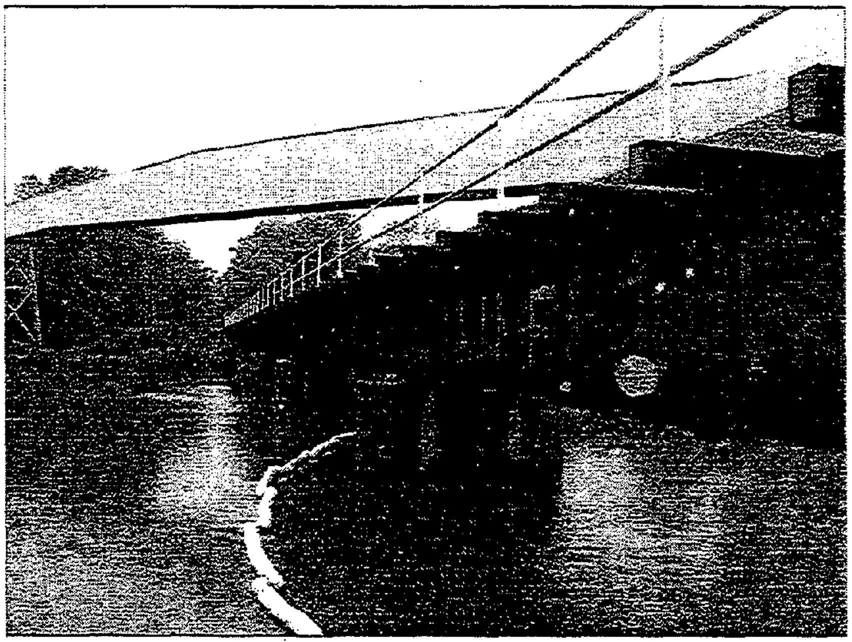
Appendix D-1

BRIDGE # 1



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	N/A
Over:	Creek Road, Chartiers Creek
Number of Spans:	4
Total Length:	280'
Number of Tracks:	2
Width of Bridge:	20'

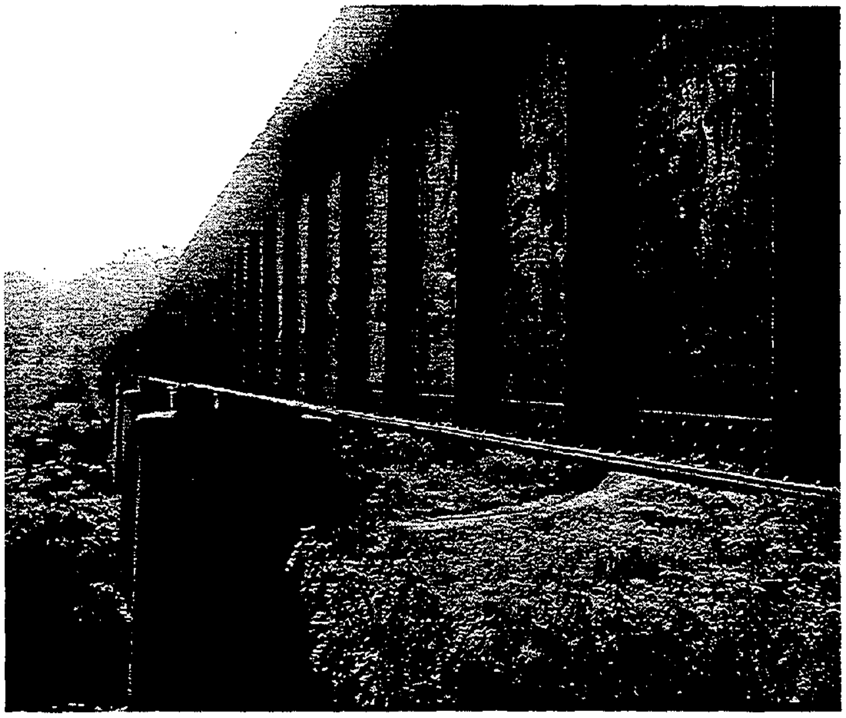
BRIDGE # 2



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1931
Over:	Paper Drainage Creek
Number of Spans:	6
Total Length:	300'
Number of Tracks:	1
Width of Bridge:	13'

Appendix D-3

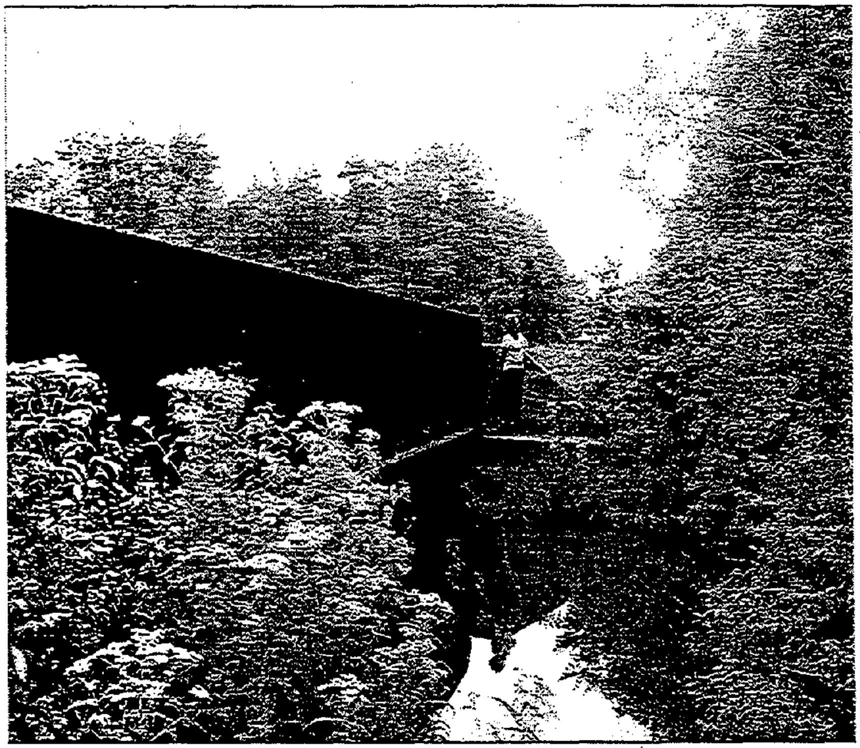
BRIDGE # 3



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1930
Over:	Jacob's Creek
Number of Spans:	1
Total Length:	91.5'
Number of Tracks:	1
Width of Bridge:	10'

Appendix D-4

BRIDGE # 4



Bridge Type:	Steel Through Plate Girder Bridge
Abbreviation:	TPG
Date built:	1912
Over:	Little Bald Eagle Creek
Number of Spans:	1
Total Length:	48'
Number of Tracks:	1
Width of Bridge:	27'

Appendix D-5

BRIDGE # 5

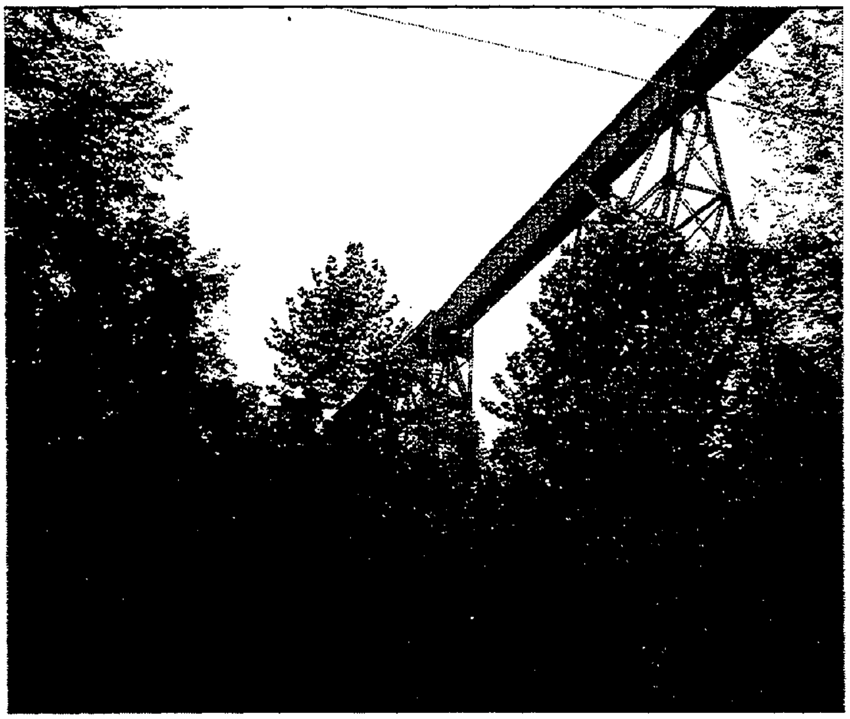
Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1930
Over:	Jacob's Creek
Number of Spans:	1
Total Length:	40'
Number of Tracks:	1
Width of Bridge:	10'

BRIDGE # 6

Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1930
Over:	Valley
Number of Spans:	1
Total Length:	55'
Number of Tracks:	1
Width of Bridge:	10'

Appendix D-7

BRIDGE # 7



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1930
Over:	Youghiogheny River
Number of Spans:	1
Total Length:	80'
Number of Tracks:	1
Width of Bridge:	10'

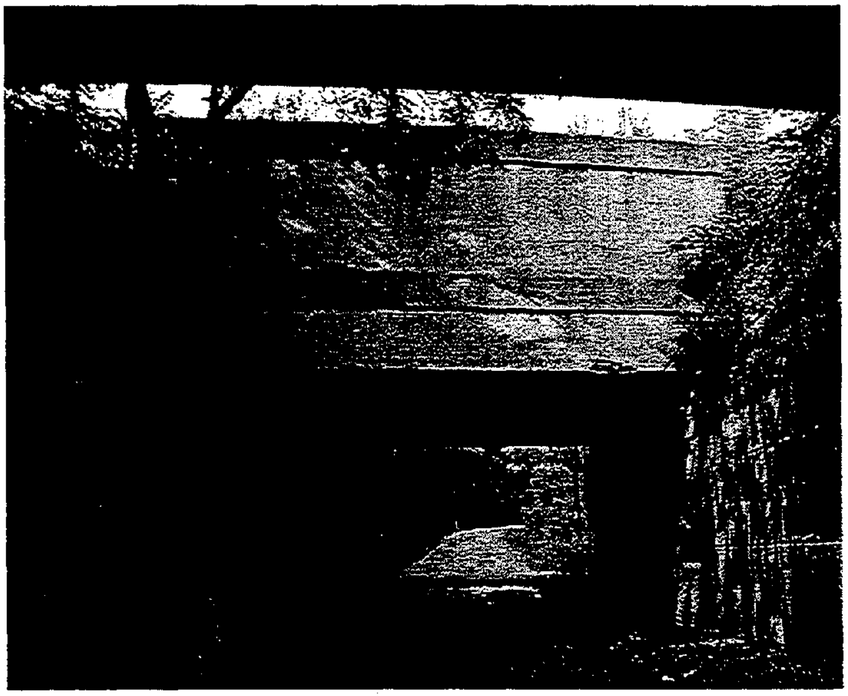
Appendix D-8

BRIDGE # 8

Bridge Type:	Steel Through Plate Girder Bridge
Abbreviation:	TPG
Date built:	1912
Over:	Williams Creek
Number of Spans:	1
Total Length:	21'
Number of Tracks:	1
Width of Bridge:	27'

Appendix D-9

BRIDGE # 9



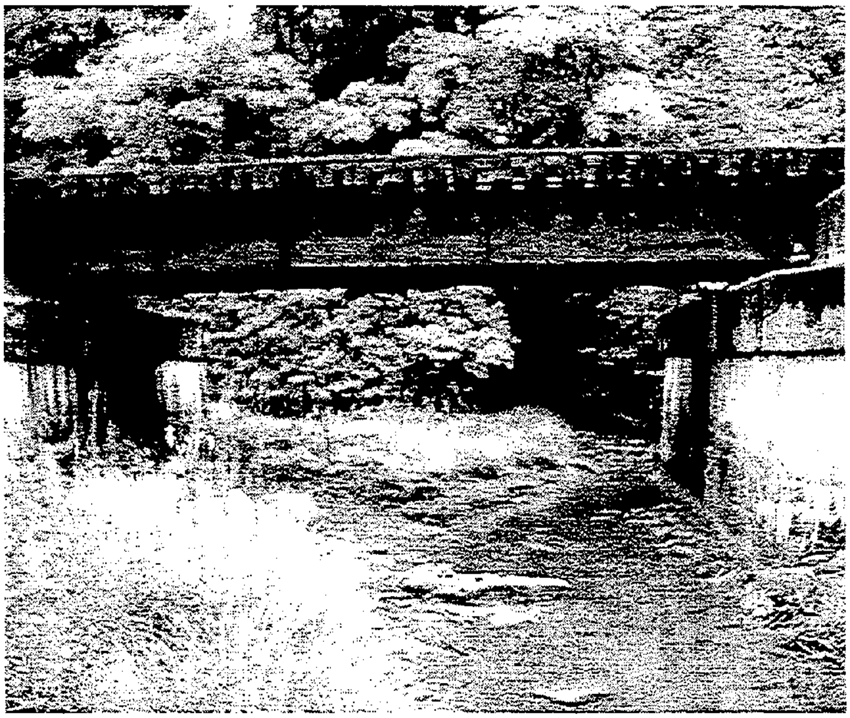
Bridge Type:	Steel Stringer Bridge
Abbreviation:	SST
Date built:	1930
Over:	Tyroll Road
Number of Spans:	1
Total Length:	29'-6"
Number of Tracks:	1
Width of Bridge:	51'-6"

BRIDGE # 10

Bridge Type:	Steel Through Plate Girder Bridge
Abbreviation:	TPG
Date built:	1915
Over:	Dick's Creek
Number of Spans:	1
Total Length:	45'
Number of Tracks:	1
Width of Bridge:	14'

Appendix D-11

BRIDGE # 11



Bridge Type: Steel Deck Plate Girder Bridge

Abbreviation: DPG

Date built: 1903

Over: Rock Run

Number of Spans: 1

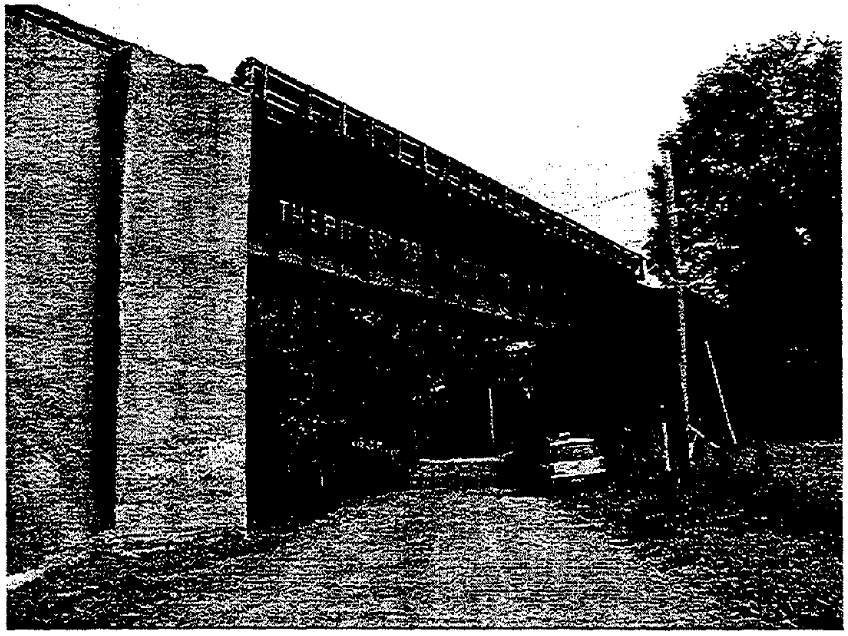
Total Length: 30'

Number of Tracks: 1

Width of Bridge: 9'

Appendix D-12

BRIDGE # 12



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1929
Over:	Patterson Road
Number of Spans:	1
Total Length:	70'-6"
Number of Tracks:	1
Width of Bridge:	14'

Appendix D-13

BRIDGE # 13

Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	Estimated to be 1930's
Over:	Route 279
Number of Spans:	1
Total Length:	98'
Number of Tracks:	1
Width of Bridge:	12'

Appendix D-14

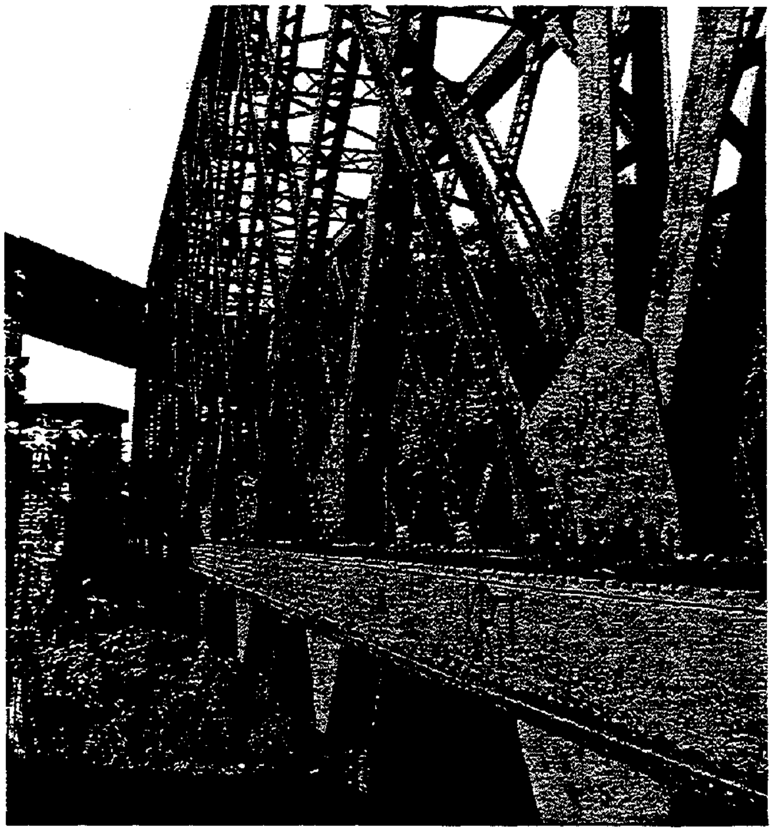
BRIDGE # 14

Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1902
Over:	Township Road 776
Number of Spans:	2
Total Length:	151'
Number of Tracks:	1
Width of Bridge:	10'

BRIDGE # 15

Bridge Type:	Steel Deck Truss Bridge
Abbreviation:	DTR
Date built:	1902
Over:	Cross Creek
Number of Spans:	1
Total Length:	100'
Number of Tracks:	1
Width of Bridge:	12'

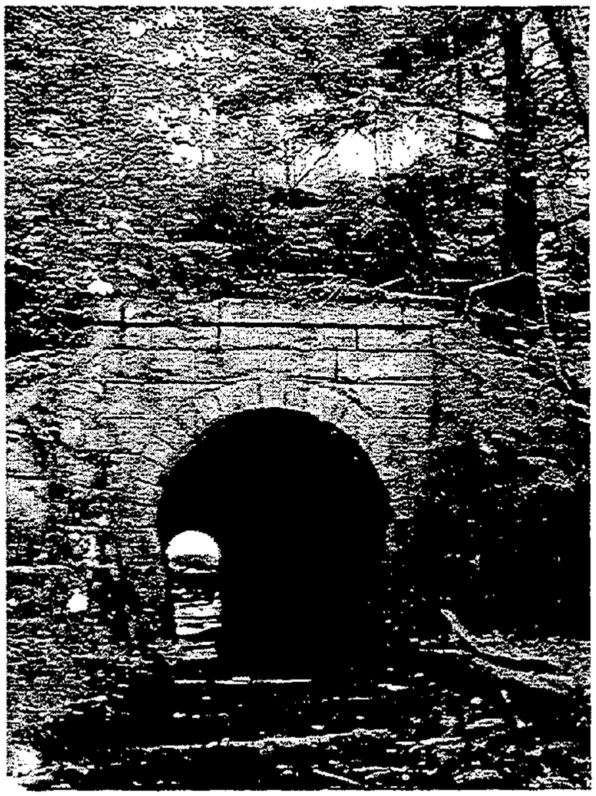
BRIDGE # 16



Bridge Type:	Through Truss Bridge
Abbreviation:	TTR
Date built:	1912
Over:	French Creek
Number of Spans:	1
Total Length:	152'
Number of Tracks:	1
Width of Bridge:	17'-6"

Appendix D-17

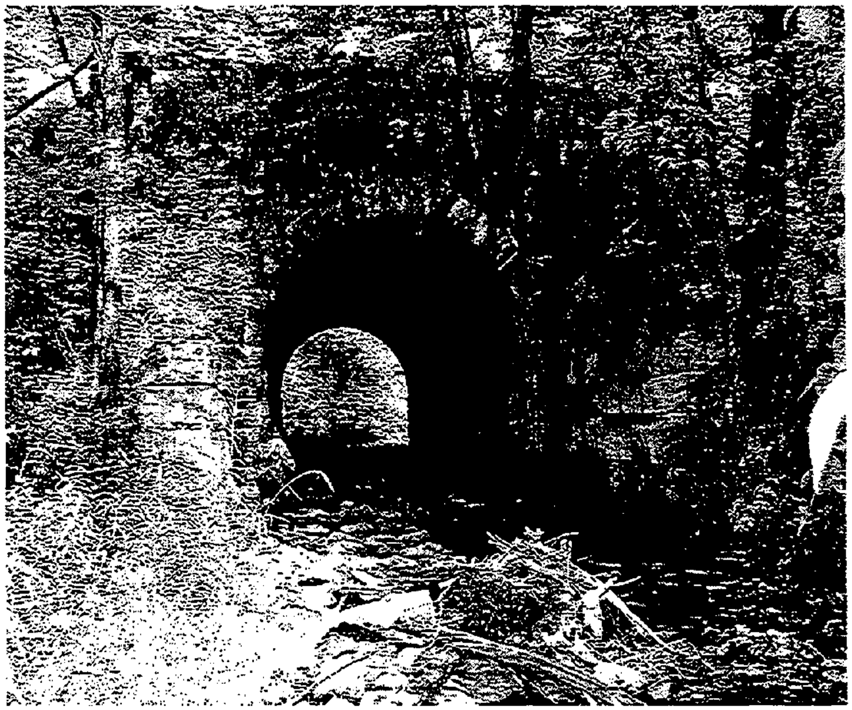
BRIDGE # 17



Bridge Type:	Masonry Arch Bridge
Abbreviation:	MAR
Date built:	1873
Over:	Medix Run
Number of Spans:	1
Total Bridge Length:	20’
Number of Tracks:	1
Width of Bridge:	127’

Appendix D-18

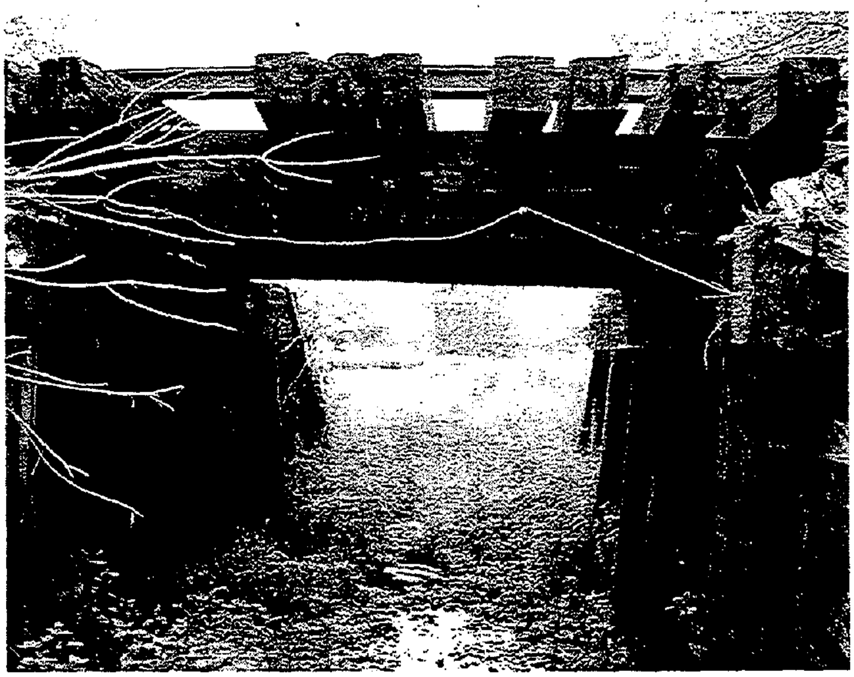
BRIDGE # 18



Bridge Type:	Masonry Arch Bridge
Abbreviation:	MAR
Date built:	N/A- Estimated to be early 1900's
Over:	Silver Run
Number of Spans:	1
Total Length:	42'-6"
Number of Tracks:	1
Width of Bridge:	142'-6"

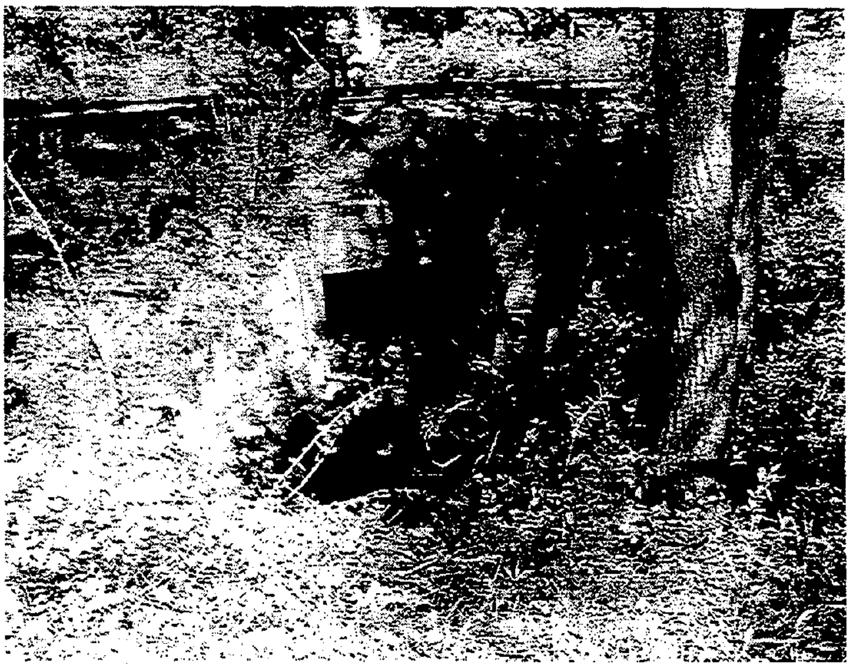
Appendix D-19

BRIDGE # 19



Bridge Type:	Timber Stringer Bridge
Abbreviation:	TST
Date built:	N/A-Estimated to be 1900's
Over:	Cow Path
Number of Spans:	1
Total Length:	9'
Number of Tracks:	1
Width of Bridge:	8'

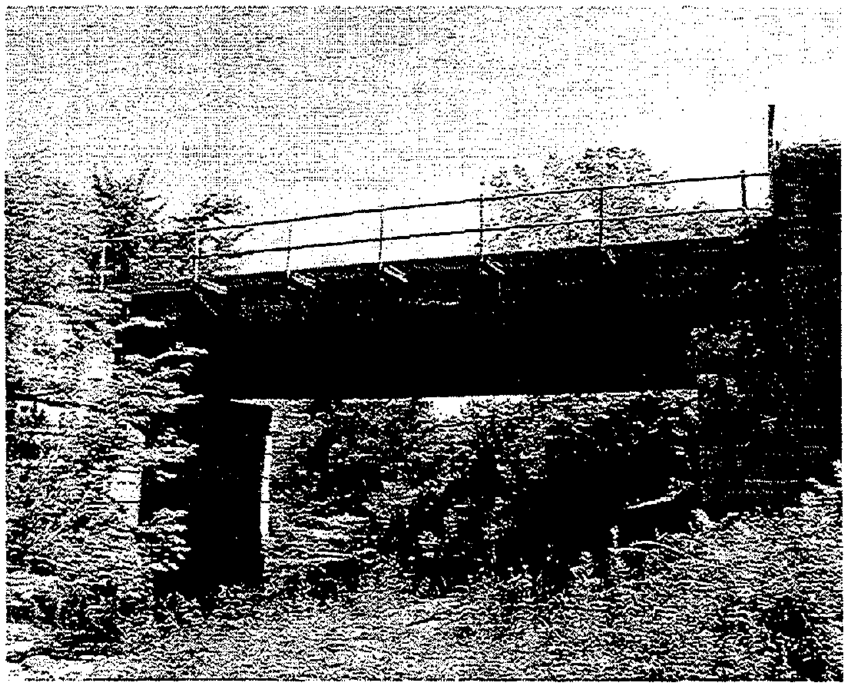
BRIDGE # 20



Bridge Type:	Concrete Slab Bridge
Abbreviation:	CSB
Date built:	N/A-Estimated to be 1900's
Over:	small stream
Number of Spans:	1
Total Length:	6'
Number of Tracks:	1
Width of Bridge:	31'-8"

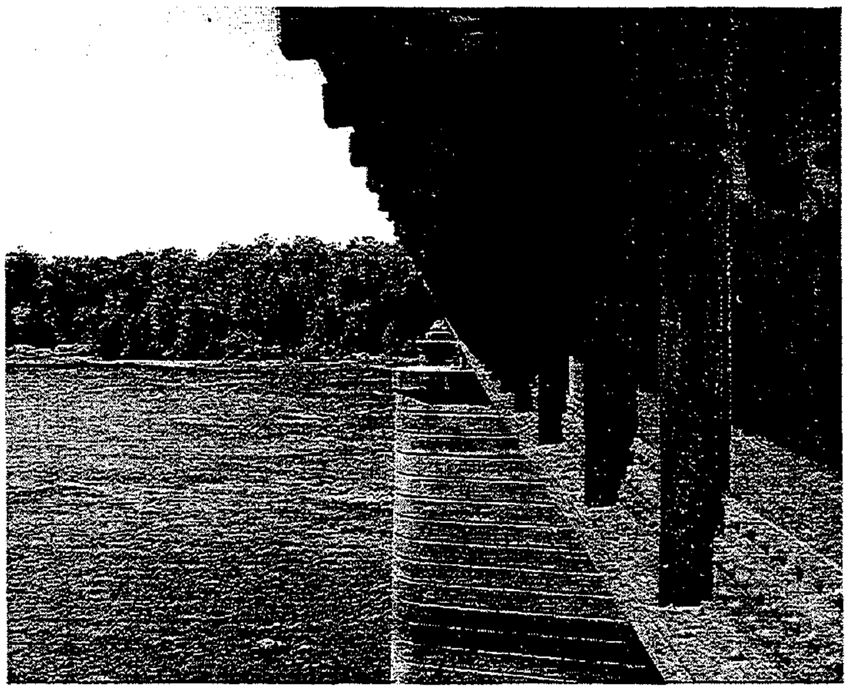
Appendix D-21

BRIDGE # 21



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1917
Over:	Winfield Creek
Number of Spans:	1
Total Length:	42'-6"
Number of Tracks:	1
Width of Bridge:	19'

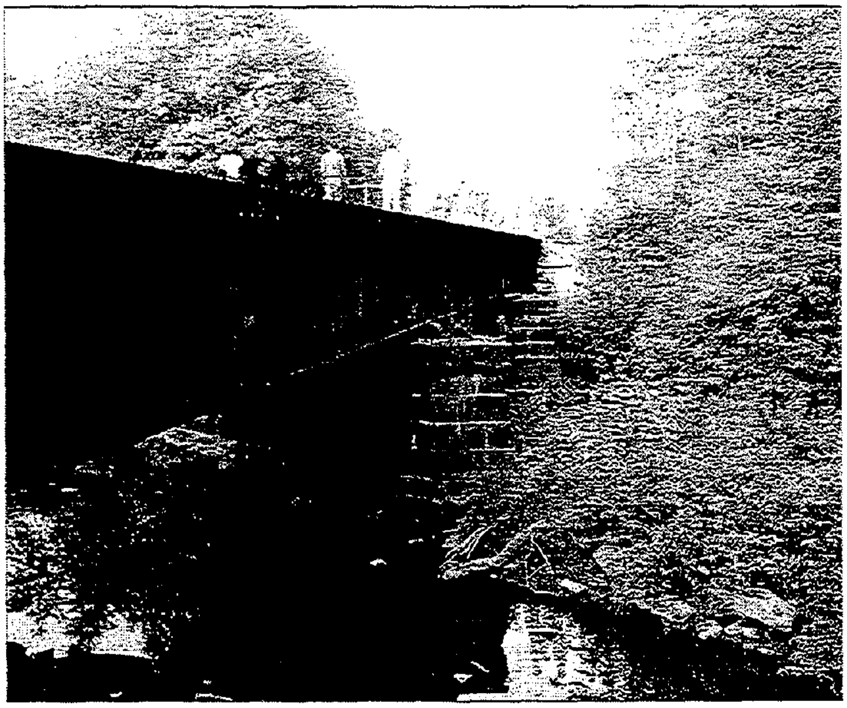
BRIDGE # 22



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1930
Over:	Susquehanna River
Number of Spans:	18
Total Length:	1290'
Number of Tracks:	1
Width of Bridge:	28'-6"

Appendix D-23

BRIDGE # 23



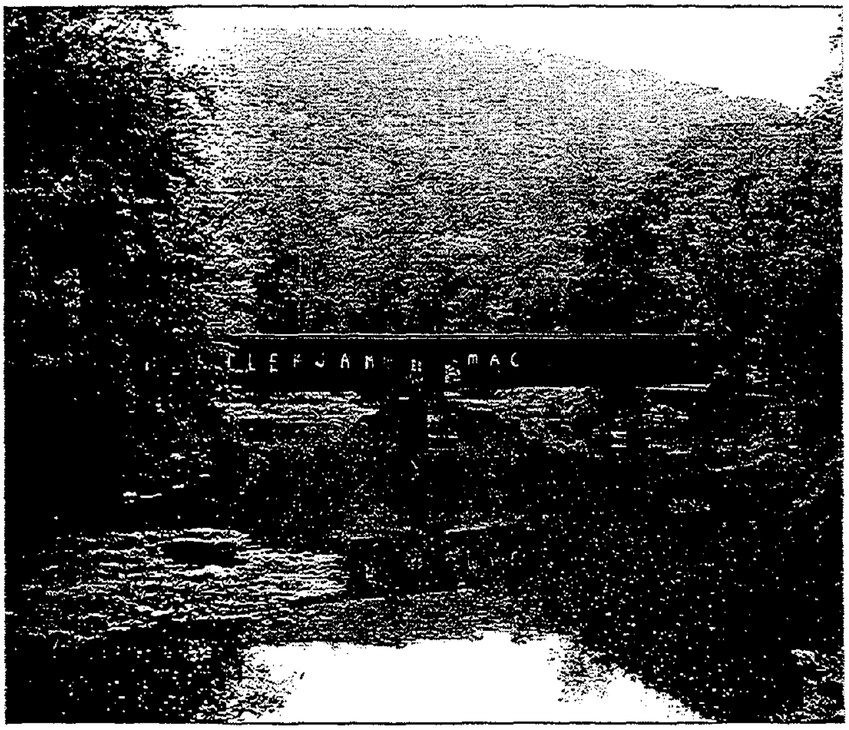
Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	1905
Over:	Mahoning Creek
Number of Spans:	3
Total Length:	181'
Number of Tracks:	1
Width of Bridge:	8'

Appendix D-24

BRIDGE # 24

Bridge Type:	Steel Through Truss Bridge
Abbreviation:	TTR
Date built:	1898
Over:	Mahoning Creek
Number of Spans:	1
Total Length:	150'-6"
Number of Tracks:	1
Width of Bridge:	17'-8"

BRIDGE # 25



Bridge Type:	Steel Deck Plate Girder Bridge
Abbreviation:	DPG
Date built:	N/A-Estimated to be 1900's
Over:	Connoquenessing Creek
Number of Spans:	2
Total Length:	120
Number of Tracks:	1
Width of Bridge:	10'

APPENDIX E

RESULTS OF THE ANALYSES OF THE SAMPLE BRIDGES

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	450.45	38845
70.8	450.45	38845
141.6	450.45	38845
212.4	450.45	47223
283.2	450.45	47223
354	450.45	54921
424.8	450.45	47223
495.6	450.45	47223
566.4	450.45	38845
637.2	450.45	38845
708	450.45	38845

Length(ft)	59	708
Proportion	0.522	
Impact	0.5347	

	V	M
263,000	**182.6%**	**135.3%**
286,000	**169.2%**	**125.6%**
315,000	**178.8%**	**122.5%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
70.8		1518.82
141.6		2700.13
212.4		3543.92
283.2		4050.19
354		4218.95
424.8	4.77	4050.19
495.6	9.53	3543.92
566.4	14.3	2700.13
637.2	19.07	1518.82
708	23.84	0

E-Ratings

263,000	**47.5**	**48.9**
286,000	**51.6**	**53.1**
315,000	**54.7**	**55.2**
Cooper E-Loc	**108.9**	**69.9**
Cooper E-Lane	**180.5**	**107.5**
Cooper Alt	**123.3**	**76.7**

Bridge #1 - DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	6.84	16170.55
141.6	19.99	27612.37
212.4	39.12	34576.61
283.2	65.08	38524.24
354	91.38	38496.63
424.8	117.68	38524.24
495.6	148.12	34576.61
566.4	185.4	27612.37
637.2	228.4	16170.55
708	278.23	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	1.15E-01	296.93
141.6	3.46E-01	518.86
212.4	6.92E-01	680.41
283.2	1.10E+00	771.02
354	1.59	787.65
424.8	2.16	771.02
495.6	2.8	680.41
566.4	3.5	518.86
637.2	4.19	296.93
708	4.89	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	7.43	17584.71
141.6	21.73	30027.14
212.4	42.54	37600.42
283.2	70.77	41893.28
354	99.37	41863.25
424.8	127.97	41893.28
495.6	161.08	37600.42
566.4	201.61	30027.14
637.2	248.37	17584.71
708	302.56	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
70.8		187.97
141.6		334.18
212.4		438.61
283.2		501.26
354		522.15
424.8	5.90E-01	501.26
495.6	1.18E+00	438.61
566.4	1.77	334.18
637.2	2.36	187.97
708	2.95	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	7.88	16994.25
141.6	23.49	28753.2
212.4	46.4	37573.2
283.2	77.06	43066.8
354	108.56	44100
424.8	140.06	43066.8
495.6	171.56	37573.2
566.4	203.06	28753.2
637.2	240.03	16994.25
708	284.75	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	1.44E-01	270.6
141.6	4.11E-01	470.4
212.4	8.22E-01	614.4
283.2	1.32	702.6
354	1.82	720
424.8	2.32	702.6
495.6	2.82	614.4
566.4	3.32	470.4
637.2	3.82	270.6
708	4.32	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	5.479616	12954.44
141.6	16.01426	22120.64
212.4	31.33956	27699.79
283.2	52.13646	30862.28
354	73.20574	30840.17
424.8	94.27502	30862.28
495.6	118.6609	27699.79
566.4	148.5264	22120.64
637.2	182.9743	12954.44
708	222.8938	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	0.092368	237.8746
141.6	0.277025	415.6657
212.4	0.55397	545.0856
283.2	0.881225	617.6745
354	1.27377	630.997
424.8	1.730405	617.6745
495.6	2.243118	545.0856
566.4	2.803897	415.6657
637.2	3.356665	237.8746
708	3.917445	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	5.952273	14087.35
141.6	17.40819	24055.14
212.4	34.07936	30122.2
283.2	56.6948	33561.27
354	79.60664	33537.21
424.8	102.5185	33561.27
495.6	129.0433	30122.2
566.4	161.5125	24055.14
637.2	198.9725	14087.35
708	242.3849	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
70.8		150.5853
141.6		267.7161
212.4		351.3763
283.2		401.5661
354		418.3014
424.8	0.472657	401.5661
495.6	0.945314	351.3763
566.4	1.417971	267.7161
637.2	1.890628	150.5853
708	2.363285	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	6.312774	13614.32
141.6	18.81815	23034.57
212.4	37.17166	30100.39
283.2	61.7338	34501.39
354	86.96887	35329.1
424.8	112.2039	34501.39
495.6	137.439	30100.39
566.4	162.6741	23034.57
637.2	192.2912	13614.32
708	228.117	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	0.11544	216.7813
141.6	0.329258	376.8437
212.4	0.658515	492.2041
283.2	1.05747	562.8623
354	1.458026	576.8016
424.8	1.858583	562.8623
495.6	2.25914	492.2041
566.4	2.659696	376.8437
637.2	3.060253	216.7813
708	3.46081	0

Strength

263,000

Loc(in)	V	M
0		
70.8		268.4%
141.6		156.5%
212.4		151.1%
283.2		135.3%
354		156.7%
424.8	454.8%	135.3%
495.6	351.4%	151.1%
566.4	276.6%	156.5%
637.2	222.9%	268.4%
708	182.6%	
	182.6%	135.3%

286,000

Loc(in)	V	M
0		
70.8		248.9%
141.6		145.2%
212.4		140.3%
283.2		125.6%
354		145.5%
424.8	419.8%	125.6%
495.6	325.1%	140.3%
566.4	256.2%	145.2%
637.2	206.6%	248.9%
708	169.2%	
	169.2%	125.6%

315,000

Loc(in)	V	M
0		
70.8		256.7%
141.6		150.9%
212.4		140.4%
283.2		122.5%
354		138.9%
424.8	385.1%	122.5%
495.6	306.5%	140.4%
566.4	254.5%	150.9%
637.2	213.1%	256.7%
708	178.8%	
	178.8%	122.5%

E-Ratings

263,000

Loc(in)	V	M
0		
70.8	47.5	54.5
141.6	48.6	53.2
212.4	47.6	50.8
283.2	49.3	50.0
354	50.2	48.9
424.8	50.7	50.0
495.6	52.5	50.8
566.4	53.0	53.2
637.2	54.5	54.5
708	56.9	
	47.5	48.9

Cooper E1-Locomotive

Loc(in)	V	M
0		
70.8		156.9
141.6		87.0
212.4		80.1
283.2		69.9
354		80.4
424.8	257.6	69.9
495.6	196.6	80.1
566.4	155.6	87.0
637.2	128.5	156.9
708	108.9	
	108.9	69.9

286,000

Loc(in)	V	M
0		
70.8	51.6	59.2
141.6	52.9	57.9
212.4	51.8	55.3
283.2	53.6	54.3
354	54.6	53.1
424.8	55.2	54.3
495.6	57.1	55.3
566.4	57.6	57.9
637.2	59.3	59.2
708	61.9	
	51.6	53.1

Cooper E1-Lane

Loc(in)	V	M
0		
70.8		247.9
141.6		135.0
212.4		124.3
283.2		107.5
354		121.2
424.8	942.9	107.5
495.6	466.4	124.3
566.4	307.6	135.0
637.2	228.2	247.9
708	180.5	
	180.5	107.5

315,000

Loc(in)	V	M
0		
70.8	54.7	57.2
141.6	57.2	55.4
212.4	56.4	55.2
283.2	58.4	55.9
354	59.6	56.0
424.8	60.4	55.9
495.6	60.8	55.2
566.4	58.0	55.4
637.2	57.3	57.2
708	58.2	
	54.7	55.2

Cooper Alt Load

Loc(in)	V	M
0		
70.8		172.2
141.6		95.9
212.4		88.7
283.2		76.7
354		87.9
424.8	239.8	76.7
495.6	195.2	88.7
566.4	164.0	95.9
637.2	141.0	172.2
708	123.3	
	123.3	76.7

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	372.49	29762
70.8	372.49	29762
141.6	372.49	53045
212.4	372.49	53045
283.2	372.49	53045
354	372.49	53045
424.8	372.49	53045
495.6	372.49	53045
566.4	372.49	53045
637.2	372.49	29762
708	372.49	29762

Length(ft)	59	708
Proportion	0.5	
Impact	0.5347	

	V	M
263,000	**155.2%**	**155.0%**
286,000	**144.0%**	**144.1%**
315,000	**152.0%**	**137.7%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
70.8		1688.01
141.6		3000.9
212.4		3938.68
283.2		4501.35
354		4688.9
424.8	5.3	4501.35
495.6	10.6	3938.68
566.4	15.89	3000.9
637.2	21.19	1688.01
708	26.49	0

E-Ratings

263,000	**47.5**	**48.9**
286,000	**51.6**	**53.1**
315,000	**54.7**	**55.2**
Cooper E-Loc	**92.2**	**80.0**
Cooper E-Lane	**152.8**	**120.7**
Cooper Alt	**104.4**	**87.5**

Bridge #2-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	6.84	16170.55
141.6	19.99	27612.37
212.4	39.12	34576.61
283.2	65.08	38524.24
354	91.38	38496.63
424.8	117.68	38524.24
495.6	148.12	34576.61
566.4	185.4	27612.37
637.2	228.4	16170.55
708	278.23	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	1.15E-01	296.93
141.6	3.46E-01	518.86
212.4	6.92E-01	680.41
283.2	1.10E+00	771.02
354	1.59	787.65
424.8	2.16	771.02
495.6	2.8	680.41
566.4	3.5	518.86
637.2	4.19	296.93
708	4.89	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	7.43	17584.71
141.6	21.73	30027.14
212.4	42.54	37600.42
283.2	70.77	41893.28
354	99.37	41863.25
424.8	127.97	41893.28
495.6	161.08	37600.42
566.4	201.61	30027.14
637.2	248.37	17584.71
708	302.56	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
70.8		187.97
141.6		334.18
212.4		438.61
283.2		501.26
354		522.15
424.8	5.90E-01	501.26
495.6	1.18E+00	438.61
566.4	1.77	334.18
637.2	2.36	187.97
708	2.95	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	7.88	16994.25
141.6	23.49	28753.2
212.4	46.4	37573.2
283.2	77.06	43066.8
354	108.56	44100
424.8	140.06	43066.8
495.6	171.56	37573.2
566.4	203.06	28753.2
637.2	240.03	16994.25
708	284.75	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	1.44E-01	270.6
141.6	4.11E-01	470.4
212.4	8.22E-01	614.4
283.2	1.32	702.6
354	1.82	720
424.8	2.32	702.6
495.6	2.82	614.4
566.4	3.32	470.4
637.2	3.82	270.6
708	4.32	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	5.248674	12408.47
141.6	15.33933	21188.35
212.4	30.01873	26532.36
283.2	49.93914	29561.58
354	70.12044	29540.39
424.8	90.30175	29561.58
495.6	113.6599	26532.36
566.4	142.2667	21188.35
637.2	175.2627	12408.47
708	213.4998	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	0.088475	227.8492
141.6	0.26535	398.1472
212.4	0.530623	522.1126
283.2	0.844085	591.6422
354	1.220087	604.4032
424.8	1.657476	591.6422
495.6	2.14858	522.1126
566.4	2.685725	398.1472
637.2	3.215197	227.8492
708	3.752342	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	5.701411	13493.63
141.6	16.67452	23041.33
212.4	32.64307	28852.68
283.2	54.30536	32146.81
354	76.25157	32123.76
424.8	98.19778	32146.81
495.6	123.6047	28852.68
566.4	154.7054	23041.33
637.2	190.5867	13493.63
708	232.1694	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
70.8		144.2388
141.6		256.433
212.4		336.5674
283.2		384.6419
354		400.6718
424.8	0.452737	384.6419
495.6	0.905473	336.5674
566.4	1.35821	256.433
637.2	1.810946	144.2388
708	2.263683	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	6.046718	13040.54
141.6	18.02505	22063.77
212.4	35.60504	28831.8
283.2	59.13199	33047.31
354	83.30352	33840.14
424.8	107.475	33047.31
495.6	131.6466	28831.8
566.4	155.8181	22063.77
637.2	184.187	13040.54
708	218.5029	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
70.8	0.110575	207.6449
141.6	0.315381	360.9614
212.4	0.630762	471.4598
283.2	1.012902	539.1401
354	1.396577	552.492
424.8	1.780252	539.1401
495.6	2.163927	471.4598
566.4	2.547602	360.9614
637.2	2.931277	207.6449
708	3.314952	0

Strength		
263,000		
Loc(in)	V	M
0		
70.8		211.1%
141.6		219.3%
212.4		174.1%
283.2		155.7%
354		155.0%
424.8	389.6%	155.7%
495.6	299.8%	174.1%
566.4	235.5%	219.3%
637.2	189.6%	211.1%
708	155.2%	
	155.2%	155.0%
286,000		
Loc(in)	V	M
0		
70.8		196.0%
141.6		203.7%
212.4		161.8%
283.2		144.7%
354		144.1%
424.8	359.9%	144.7%
495.6	277.6%	161.8%
566.4	218.3%	203.7%
637.2	175.9%	196.0%
708	144.0%	
	144.0%	144.1%
315,000		
Loc(in)	V	M
0		
70.8		202.1%
141.6		211.6%
212.4		161.9%
283.2		141.3%
354		137.7%
424.8	330.3%	141.3%
495.6	261.9%	161.9%
566.4	216.9%	211.6%
637.2	181.4%	202.1%
708	152.0%	
	152.0%	137.7%

E-Ratings

263,000

Loc(in)	V	M
0		
70.8	47.5	54.5
141.6	48.6	53.2
212.4	47.6	50.8
283.2	49.3	50.0
354	50.2	48.9
424.8	50.7	50.0
495.6	52.5	50.8
566.4	53.0	53.2
637.2	54.5	54.5
708	56.9	
	47.5	48.9

Cooper E1-Locomotive

Loc(in)	V	M
0		
70.8		123.2
141.6		125.7
212.4		94.1
283.2		82.0
354		80.0
424.8	221.5	82.0
495.6	168.4	94.1
566.4	132.8	125.7
637.2	109.3	123.2
708	92.2	
	92.2	80.0

286,000

Loc(in)	V	M
0		
70.8	51.6	59.2
141.6	52.9	57.9
212.4	51.8	55.3
283.2	53.6	54.3
354	54.6	53.1
424.8	55.2	54.3
495.6	57.1	55.3
566.4	57.6	57.9
637.2	59.3	59.2
708	61.9	
	51.6	53.1

Cooper E1-Lane

Loc(in)	V	M
0		
70.8		194.6
141.6		195.2
212.4		145.9
283.2		126.2
354		120.7
424.8	811.0	126.2
495.6	399.7	145.9
566.4	262.6	195.2
637.2	194.0	194.6
708	152.8	
	152.8	120.7

315,000

Loc(in)	V	M
0		
70.8	54.7	57.2
141.6	57.2	55.4
212.4	56.4	55.2
283.2	58.4	55.9
354	59.6	56.0
424.8	60.4	55.9
495.6	60.8	55.2
566.4	58.0	55.4
637.2	57.3	57.2
708	58.2	
	54.7	55.2

Cooper Alt Load

Loc(in)	V	M
0		
70.8		135.2
141.6		138.6
212.4		104.2
283.2		90.0
354		87.5
424.8	206.3	90.0
495.6	167.2	104.2
566.4	140.0	138.6
637.2	119.8	135.2
708	104.4	
	104.4	87.5

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	615.037	62590
106.104	615.037	78952
212.208	615.037	78952
318.312	615.037	97323
424.416	615.037	97323
530.52	615.037	97323
636.624	615.037	97323
742.728	615.037	97323
848.832	615.037	78952
954.936	615.037	78952
1061.04	615.037	62590

Length(ft)	88.42	1061.04
Proportion	0.5	
Impact	0.4627	

	V	M
263,000	**193.5%**	**134.8%**
286,000	**179.9%**	**125.6%**
315,000	**187.5%**	**141.2%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
106.104		4077.92
212.208		7249.64
318.312		9515.16
424.416		10874.46
530.52		11327.57
636.624	8.54	10874.46
742.728	17.08	9515.16
848.832	25.62	7249.64
954.936	34.16	4077.92
1061.04	42.71	0

E-Ratings

263,000	**47.6**	**52.2**
286,000	**51.8**	**56.8**
315,000	**56.5**	**48.2**
Cooper E-Loc	**115.1**	**73.8**
Cooper E-Lane	**177.1**	**100.3**
Cooper Alt	**172.0**	**101.3**

Bridge #3-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	8.94	33033.46
212.208	26.06	57086.78
318.312	52.13	72935.16
424.416	78.43	81553.67
530.52	110.37	83206.63
636.624	152.15	81553.67
742.728	202.86	72935.16
848.832	255.46	57086.78
954.936	311.34	33033.46
1061.04	376.16	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	1.43E-01	602.59
212.208	4.61E-01	1041.14
318.312	8.89E-01	1353.56
424.416	1.44E+00	1546.33
530.52	2.1	1593.26
636.624	2.79	1546.33
742.728	3.49	1353.56
848.832	4.46	1041.14
954.936	5.57	602.59
1061.04	6.8	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	9.72	35922.32
212.208	28.34	62079.16
318.312	56.69	79313.52
424.416	85.29	88685.74
530.52	120.02	90483.25
636.624	165.45	88685.74
742.728	220.61	79313.52
848.832	277.81	62079.16
954.936	338.57	35922.32
1061.04	409.05	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
106.104		422.15
212.208		750.48
318.312		985.01
424.416		1125.72
530.52		1172.63
636.624	8.84E-01	1125.72
742.728	1.77E+00	985.01
848.832	2.65	750.48
954.936	3.54	422.15
1061.04	4.42	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	10.41	34706.7
212.208	30.92	59446.8
318.312	61.84	74346.3
424.416	93.34	79405.2
530.52	124.84	76761.56
636.624	159.95	79405.2
742.728	205.96	74346.3
848.832	264.11	59446.8
954.936	327.11	34706.7
1061.04	390.11	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	1.79E-01	429.45
212.208	5.48E-01	752.8
318.312	1.05E+00	985.05
424.416	1.55	1126.2
530.52	2.05	1161.25
636.624	2.55	1126.2
742.728	3.05	985.05
848.832	3.55	752.8
954.936	4.05	429.45
1061.04	4.55	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	6.538269	24159.02
212.208	19.05898	41750.42
318.312	38.12528	53341.13
424.416	57.35978	59644.28
530.52	80.7191	60853.17
636.624	111.2749	59644.28
742.728	148.3617	53341.13
848.832	186.8307	41750.42
954.936	227.6985	24159.02
1061.04	275.1046	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	0.104876	440.7042
212.208	0.336933	761.4377
318.312	0.65039	989.9261
424.416	1.053144	1130.908
530.52	1.535835	1165.231
636.624	2.040467	1130.908
742.728	2.552412	989.9261
848.832	3.261821	761.4377
954.936	4.07362	440.7042
1061.04	4.97318	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	7.108722	26271.79
212.208	20.72646	45401.59
318.312	41.46023	58005.94
424.416	62.37684	64860.32
530.52	87.77663	66174.92
636.624	121.0019	64860.32
742.728	161.3431	58005.94
848.832	203.1763	45401.59
954.936	247.6132	26271.79
1061.04	299.1587	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
106.104		308.7394
212.208		548.8635
318.312		720.3871
424.416		823.2953
530.52		857.603
636.624	0.64666	823.2953
742.728	1.29449	720.3871
848.832	1.938078	548.8635
954.936	2.588979	308.7394
1061.04	3.232567	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	7.613354	25382.75
212.208	22.61334	43476.42
318.312	45.22668	54373.17
424.416	68.26421	58072.99
530.52	91.30173	56139.57
636.624	116.9794	58072.99
742.728	150.6288	54373.17
848.832	193.1568	43476.42
954.936	239.2319	25382.75
1061.04	285.3069	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
106.104	0.131131	314.0783
212.208	0.400487	550.5603
318.312	0.767918	720.4163
424.416	1.133593	823.6464
530.52	1.499268	849.2802
636.624	1.864943	823.6464
742.728	2.230618	720.4163
848.832	2.596293	550.5603
954.936	2.961968	314.0783
1061.04	3.327643	0

Strength

263,000		
Loc(in)	V	M .
0		
106.104		279.6%
212.208		161.1%
318.312		154.8%
424.416		138.0%
530.52		134.8%
636.624	513.3%	138.0%
742.728	371.8%	154.8%
848.832	289.5%	161.1%
954.936	234.9%	279.6%
1061.04	193.5%	
	193.5%	134.8%

286,000		
Loc(in)	V	M
0		
106.104		260.1%
212.208		150.0%
318.312		144.1%
424.416		128.5%
530.52		125.6%
636.624	474.8%	128.5%
742.728	344.7%	144.1%
848.832	268.8%	150.0%
954.936	218.3%	260.1%
1061.04	179.9%	
	179.9%	125.6%

315,000		
Loc(in)	V	M
0		
106.104		268.0%
212.208		155.6%
318.312		152.3%
424.416		141.2%
530.52		144.3%
636.624	490.0%	141.2%
742.728	366.7%	152.3%
848.832	281.1%	155.6%
954.936	225.0%	268.0%
1061.04	187.5%	
	187.5%	141.2%

E-Ratings

263,000

Loc(in)	V	M
0		
106.104	49.9	54.8
212.208	47.6	54.8
318.312	49.6	53.9
424.416	50.6	52.7
530.52	52.6	52.2
636.624	54.5	52.7
742.728	58.1	53.9
848.832	57.3	54.8
954.936	55.9	54.8
1061.04	55.3	
	47.6	52.2

286,000

Loc(in)	V	M
0		
106.104	54.2	59.6
212.208	51.8	59.6
318.312	54.0	58.6
424.416	55.0	57.4
530.52	57.2	56.8
636.624	59.3	57.4
742.728	63.2	58.6
848.832	62.3	59.6
954.936	60.8	59.6
1061.04	60.2	
	51.8	56.8

315,000

Loc(in)	V	M
0		
106.104	58.1	57.6
212.208	56.5	57.1
318.312	58.9	54.9
424.416	60.2	51.4
530.52	59.4	48.2
636.624	57.3	51.4
742.728	59.0	54.9
848.832	59.2	57.1
954.936	58.7	57.6
1061.04	57.4	
	56.5	48.2

Cooper E1-Locomotive

Loc(in)	V	M
0		
106.104		169.9
212.208		94.2
318.312		88.7
424.416		76.4
530.52		73.8
636.624	297.2	76.4
742.728	234.3	88.7
848.832	180.7	94.2
954.936	142.6	169.9
1061.04	115.1	
	115.1	73.8

Cooper E1-Lane

Loc(in)	V	M
0		
106.104		242.5
212.208		130.6
318.312		121.9
424.416		105.0
530.52		100.3
636.624	937.9	105.0
742.728	461.9	121.9
848.832	304.1	130.6
954.936	224.4	242.5
1061.04	177.1	
	177.1	100.3

Cooper Alt Load

Loc(in)	V	M
0		
106.104		238.4
212.208		130.2
318.312		121.9
424.416		105.0
530.52		101.3
636.624	325.2	105.0
742.728	268.1	121.9
848.832	227.0	130.2
954.936	196.1	238.4
1061.04	172.0	
	172.0	101.3

Results - Floorbeam

Resistance

Loc(in)	V(k)	M(k-in)
0	232.5	7497
15.6	232.5	7497
31.2	232.5	7497
46.8	232.5	7497
62.4	232.5	7497
78	232.5	7497
93.6	232.5	7497
109.2	232.5	7497
124.8	232.5	7497
140.4	232.5	7497
156	232.5	7497

Length(ft)	13	156
Proportion	1	
Impact	0.4158	

	V	M
263,000	**184.8%**	**127.8%**
286,000	**172.8%**	**119.4%**
315,000	**159.6%**	**110.3%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-25.35	0
15.6	-25.07	393.31
31.2	-24.79	782.23
46.8	-24.51	1166.78
62.4	-0.3731	1203.41
78	-0.09231	1207.04
93.6	0.1885	1206.29
109.2	24.63	1172.18
124.8	24.91	785.83
140.4	25.19	395.11
156	25.47	0

E-Ratings

263,000	**47.9**	**47.9**
286,000	**52.1**	**52.1**
315,000	**57.4**	**57.3**
Cooper E-Loc	**114.2**	**74.9**
Cooper E-Lane	**223.0**	**145.6**
Cooper Alt	**98.8**	**64.5**

Bridge #4-TPG-Floorbeam

Live Loads

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0		0	0		0
15.6		917.31	15.6		16.5
31.2		1834.61	31.2		33
46.8		2751.92	46.8		49.51
62.4		2961.52	62.4		53.28
78		3112.15	78		55.99
93.6		3262.78	93.6		58.7
109.2	70.87	3316.78	109.2	1.28	59.68
124.8	70.87	2211.18	124.8	1.28	39.78
140.4	70.87	1105.59	140.4	1.28	19.89
156	70.87	0	156	1.28	0

286,000			Cooper E1-Lane		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	-63.94	0	0		0
15.6		997.53	15.6		8.49
31.2		1995.06	31.2		16.98
46.8		2992.59	46.8		25.47
62.4		3220.53	62.4		27.41
78		3384.34	78		28.8
93.6		3548.14	93.6		30.19
109.2	77.07	3606.86	109.2	6.56E-01	30.69
124.8	77.07	2404.57	124.8	0.6558	20.46
140.4	77.07	1202.29	140.4	0.6558	10.23
156	77.07	0	156	0.6558	0

315,000			Cooper Alt Load		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0		0	0		0
15.6		1098.68	15.6		19.15
31.2		2197.35	31.2		38.31
46.8		3296.03	46.8		57.46
62.4		3547.08	62.4		61.84
78		3727.49	78		64.99
93.6		3907.9	93.6		68.14
109.2	84.88	3972.57	109.2	1.48	69.27
124.8	84.88	2648.38	124.8	1.48	46.18
140.4	84.88	1324.19	140.4	1.48	23.09
156	84.88	0	156	1.48	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	1298.727
31.2	0	2597.441
46.8	0	3896.168
62.4	0	4192.92
78	0	4406.182
93.6	0	4619.444
109.2	100.3377	4695.897
124.8	100.3377	3130.589
140.4	100.3377	1565.294
156	100.3377	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	23.3607
31.2	0	46.7214
46.8	0	70.09626
62.4	0	75.43382
78	0	79.27064
93.6	0	83.10746
109.2	1.812224	84.49494
124.8	1.812224	56.32052
140.4	1.812224	28.16026
156	1.812224	0

286,000

Loc(in)	V(k)	M(k-in)
0	-90.52625	0
15.6	0	1412.303
31.2	0	2824.606
46.8	0	4236.909
62.4	0	4559.626
78	0	4791.549
93.6	0	5023.457
109.2	109.1157	5106.592
124.8	109.1157	3404.39
140.4	109.1157	1702.202
156	109.1157	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
15.6		12.02014
31.2		24.04028
46.8		36.06043
62.4		38.80708
78		40.77504
93.6	0	42.743
109.2	0.928482	43.4509
124.8	0.928482	28.96727
140.4	0.928482	14.48363
156	0.928482	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	1555.511
31.2	0	3111.008
46.8	0	4666.519
62.4	0	5021.956
78	0	5277.38
93.6	0	5532.805
109.2	120.1731	5624.365
124.8	120.1731	3749.576
140.4	120.1731	1874.788
156	120.1731	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	27.11257
31.2	0	54.2393
46.8	0	81.35187
62.4	0	87.55307
78	0	92.01284
93.6	0	96.47261
109.2	2.095384	98.07247
124.8	2.095384	65.38164
140.4	2.095384	32.69082
156	2.095384	0

Strength

263,000		
Loc(in)	V	M
0		
15.6		443.1%
31.2		221.8%
46.8		148.1%
62.4		138.9%
78		133.6%
93.6		128.7%
109.2	186.0%	127.8%
124.8	185.6%	191.4%
140.4	185.2%	382.4%
156	184.8%	
	184.8%	127.8%
286,000		
Loc(in)	V	M
0		
15.6		415.2%
31.2		207.9%
46.8		138.7%
62.4		130.1%
78		125.0%
93.6		120.3%
109.2	173.8%	119.4%
124.8	173.5%	178.9%
140.4	173.1%	357.5%
156	172.8%	
	172.8%	119.4%
315,000		
Loc(in)	V	M
0		
15.6		384.7%
31.2		192.6%
46.8		128.5%
62.4		120.4%
78		115.6%
93.6		111.2%
109.2	160.6%	110.3%
124.8	160.3%	165.3%
140.4	159.9%	330.3%
156	159.6%	
	159.6%	110.3%

E-Ratings

263,000

Loc(in)	V	M
0		
15.6		47.9
31.2		47.9
46.8		47.9
62.4		47.9
78		47.9
93.6		47.9
109.2	47.9	47.9
124.8	47.9	47.9
140.4	47.9	47.9
156	47.9	
	47.9	47.9

Cooper E1-Locomotive

Loc(in)	V	M
0		
15.6		304.1
31.2		143.7
46.8		90.3
62.4		83.4
78		79.3
93.6		75.7
109.2	114.7	74.9
124.8	114.5	119.2
140.4	114.4	252.2
156	114.2	
	114.2	74.9

286,000

Loc(in)	V	M
0		
15.6		52.1
31.2		52.1
46.8		52.1
62.4		52.1
78		52.1
93.6		52.1
109.2	52.1	52.1
124.8	52.1	52.1
140.4	52.1	52.1
156	52.1	
	52.1	52.1

Cooper E1-Lane

Loc(in)	V	M
0		
15.6		591.0
31.2		279.3
46.8		175.5
62.4		162.2
78		154.3
93.6		147.2
109.2	223.9	145.6
124.8	223.6	231.7
140.4	223.3	490.3
156	223.0	
	223.0	145.6

315,000

Loc(in)	V	M
0		
15.6		57.4
31.2		57.4
46.8		57.4
62.4		57.4
78		57.4
93.6		57.4
109.2	57.4	57.3
124.8	57.4	57.3
140.4	57.4	57.3
156	57.4	
	57.4	57.3

Cooper Alt Load

Loc(in)	V	M
0		
15.6		262.0
31.2		123.8
46.8		77.8
62.4		71.9
78		68.4
93.6		65.2
109.2	99.2	64.5
124.8	99.1	102.6
140.4	98.9	217.2
156	98.8	
	98.8	64.5

Results - Girder 1

Resistance

Loc(in)	V(k)	M(k-in)
0	407.83	20849
54	407.83	20849
108	407.83	26966
162	407.83	32902
216	407.83	32902
270	407.83	32902
324	407.83	32902
378	407.83	32902
432	407.83	26966
486	407.83	20849
540	407.83	20849

Length(ft)	45	540
Proportion	1	
Impact	0.4158	

	V	M
263,000	**254.5%**	**120.0%**
286,000	**239.3%**	**112.8%**
315,000	**225.2%**	**104.9%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
54		2184.22
108		4298.11
162		5797.4
216		6665.96
270		7442.6
324	14.28	6665.96
378	15.88	5797.4
432	41.24	4298.11
486	42.64	2184.22
540	44.04	0

E-Ratings

263,000	**49.1**	**50.5**
286,000	**53.4**	**54.9**
315,000	**58.3**	**60.2**
Cooper E-Loc	**182.2**	**68.8**
Cooper E-Lane	**273.4**	**108.3**
Cooper Alt	**159.6**	**64.4**

Bridge #4-TPG-Girder 1

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	4137.53
108	0	8275.11
162	11.56	10989.15
216	11.56	12533.54
270	44.23	14105.29
324	44.23	12570.96
378	44.23	11036.63
432	82.09	8275.11
486	82.09	4137.52
540	82.09	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
54	0.00E+00	76.97
108	0.00E+00	153.94
162	1.20E-01	201.78
216	1.20E-01	228.26
270	0.67	261.55
324	0.67	223.13
378	0.67	190.39
432	1.41	142.2
486	1.41	71.1
540	1.41	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	4499.37
108	0	8998.81
162	12.57	11950.2
216	12.57	13629.66
270	48.1	15338.86
324	48.1	13670.35
378	48.1	12001.85
432	89.27	8998.81
486	89.27	4499.37
540	89.27	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
54		47.55
108		95.1
162		128.32
216		147.22
270	0.33	166.1
324	0.33	147.22
378	0.33	128.32
432	0.94	95.1
486	0.94	47.55
540	0.94	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	4884.33
108	0	9768.73
162	13.53	13130.31
216	13.53	14969.14
270	52.48	16894.17
324	52.48	14995.57
378	52.48	13096.98
432	96.82	9759.54
486	96.82	4879.74
540	96.82	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
54	0.00E+00	81.12
108	0.00E+00	162.24
162	2.30E-01	215.61
216	0.23	244.73
270	0.9	279.16
324	0.9	244.73
378	0.9	215.61
432	1.61	162.24
486	1.61	81.12
540	1.61	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	5857.915
108	0	11715.9
162	16.36665	15558.44
216	16.36665	17744.99
270	62.62083	19970.27
324	62.62083	17797.97
378	62.62083	15625.66
432	116.223	11715.9
486	116.223	5857.901
540	116.223	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	108.9741
108	0	217.9483
162	0.169896	285.6801
216	0.169896	323.1705
270	0.948586	370.3025
324	0.948586	315.9075
378	0.948586	269.5542
432	1.996278	201.3268
486	1.996278	100.6634
540	1.996278	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	6370.208
108	0	12740.52
162	17.79661	16919.09
216	17.79661	19296.87
270	68.09998	21716.76
324	68.09998	19354.48
378	68.09998	16992.22
432	126.3885	12740.52
486	126.3885	6370.208
540	126.3885	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
54		67.32129
108		134.6426
162		181.6755
216		208.4341
270		235.1644
324	0.467214	208.4341
378	0.467214	181.6755
432	1.330852	134.6426
486	1.330852	67.32129
540	1.330852	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	6915.234
108	0	13830.57
162	19.15577	18589.89
216	19.15577	21193.31
270	74.30118	23918.77
324	74.30118	21230.73
378	74.30118	18542.7
432	137.0778	13817.56
486	137.0778	6908.736
540	137.0778	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	114.8497
108	0	229.6994
162	0.325634	305.2606
216	0.325634	346.4887
270	1.27422	395.2347
324	1.27422	346.4887
378	1.27422	305.2606
432	2.279438	229.6994
486	2.279438	114.8497
540	2.279438	0

Strength

263,000		
Loc(in)	V	M
0		
54		259.2%
108		168.4%
162		154.1%
216		134.8%
270		120.0%
324	530.3%	134.5%
378	519.5%	153.6%
432	259.0%	168.4%
486	256.7%	259.2%
540	254.5%	
	254.5%	120.0%
286,000		
Loc(in)	V	M
0		
54		243.7%
108		158.3%
162		144.8%
216		126.7%
270		112.8%
324	495.1%	126.4%
378	485.6%	144.4%
432	243.3%	158.3%
486	241.3%	243.7%
540	239.3%	
	239.3%	112.8%
315,000		
Loc(in)	V	M
0		
54		229.1%
108		148.7%
162		134.9%
216		118.1%
270		104.9%
324	460.4%	117.9%
378	452.2%	135.2%
432	228.7%	148.9%
486	226.9%	229.3%
540	225.2%	
	225.2%	104.9%

E-Ratings

263,000

Loc(in)	V	M
0		
54		51.0
108		51.0
162	50.3	51.0
216	50.3	51.2
270	49.1	50.5
324	49.1	51.4
378	49.1	51.2
432	51.0	51.0
486	51.0	51.0
540	51.0	
	49.1	50.5

Cooper E1-Locomotive

Loc(in)	V	M
0		
54		171.3
108		104.0
162		94.9
216		81.2
270		68.8
324	414.9	83.0
378	413.2	100.6
432	183.6	112.6
486	182.9	185.4
540	182.2	
	182.2	68.8

286,000

Loc(in)	V	M
0		
54		55.5
108		55.5
162	54.7	55.4
216	54.7	55.7
270	53.4	54.9
324	53.4	55.9
378	53.4	55.7
432	55.4	55.5
486	55.4	55.5
540	55.4	
	53.4	54.9

Cooper E1-Lane

Loc(in)	V	M
0		
54		277.2
108		168.4
162		149.2
216		125.9
270		108.3
324	842.3	125.9
378	838.9	149.2
432	275.5	168.4
486	274.4	277.2
540	273.4	
	273.4	108.3

315,000

Loc(in)	V	M
0		
54		60.2
108		60.2
162	58.8	60.9
216	58.8	61.2
270	58.3	60.5
324	58.3	61.3
378	58.3	60.7
432	60.1	60.2
486	60.1	60.2
540	60.1	
	58.3	60.2

Cooper Alt Load

Loc(in)	V	M
0		
54		162.5
108		98.7
162		88.8
216		75.7
270		64.4
324	308.9	75.7
378	307.6	88.8
432	160.8	98.7
486	160.2	162.5
540	159.6	
	159.6	64.4

Results - Girder 4

Resistance

Loc(in)	V(k)	M(k-in)
0	407.83	25352
54	407.83	34360
108	407.83	52100
162	407.83	60988
216	407.83	60988
270	407.83	60988
324	407.83	60988
378	407.83	60988
432	407.83	52100
486	407.83	34360
540	407.83	25352

Length(ft)	45	540
Proportion	1	
Impact	0.4158	

	V	M
263,000	**236.5%**	**207.1%**
286,000	**225.5%**	**197.4%**
315,000	**215.0%**	**186.4%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	76.32	0
54	74.04	3789.06
108	71.76	7463.31
162	27.45	10066.65
216	24.85	11572.71
270	22.24	12928.8
324	24.85	11572.72
378	27.45	10066.65
432	71.76	7463.31
486	74.04	3789.05
540	76.32	0

E-Ratings

263,000	**49.4**	**50.6**
286,000	**53.8**	**55.0**
315,000	**58.7**	**60.2**
Cooper E-Loc	**200.1**	**156.9**
Cooper E-Lane	**300.2**	**246.7**
Cooper Alt	**176.1**	**147.1**

Bridge #4-TPG-Girder 4

Live Loads

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
54	0	3422.77	54	0.00E+00	63.66
108	0	6845.53	108	0.00E+00	127.33
162	9.56	9090.74	162	1.00E-01	166.9
216	9.56	10368.32	216	1.00E-01	188.82
270	36.59	11668.52	270	0.55	216.35
324	36.59	10399.27	324	0.55	184.56
378	36.59	9130.03	378	0.55	157.49
432	67.91	6845.53	432	1.17	117.63
486	67.91	3422.77	486	1.17	58.81
540	67.91	0	540	1.17	0
286,000			**Cooper E1-Lane**		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0.78	0
54	0	3722.09	54	0.78	39.39
108	0	7444.17	108	0.78	78.78
162	10.4	9885.72	162	2.70E-01	106.31
216	10.4	11275.03	216	2.70E-01	121.96
270	39.79	12688.94	270	0.27	137.6
324	39.79	11308.69	324	2.70E-01	121.96
378	39.79	9928.45	378	2.70E-01	106.31
432	73.85	7444.17	432	0.78	78.78
486	73.85	3722.09	486	0.78	39.39
540	73.85	0	540	0.78	0
315,000			**Cooper Alt Load**		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
54	0	4040.57	54	0.00E+00	67.08
108	0	8081.13	108	0.00E+00	134.16
162	11.19	10861.99	162	1.90E-01	178.29
216	11.19	12383.15	216	0.19	202.37
270	43.41	13975.6	270	0.74	230.83
324	43.41	12405.01	324	0.74	202.37
378	43.41	10834.43	378	0.74	178.29
432	80.09	8073.52	432	1.33	134.16
486	80.09	4036.77	486	1.33	67.08
540	80.09	0	540	1.33	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	4845.958
108	0	9691.901
162	13.53505	12870.67
216	13.53505	14679.47
270	51.80412	16520.29
324	51.80412	14723.29
378	51.80412	12926.3
432	96.14698	9691.901
486	96.14698	4845.958
540	96.14698	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	90.12983
108	0	180.2738
162	0.14158	236.297
216	0.14158	267.3314
270	0.77869	306.3083
324	0.77869	261.3
378	0.77869	222.9743
432	1.656486	166.5406
486	1.656486	83.2632
540	1.656486	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	5269.735
108	0	10539.46
162	14.72432	13996.2
216	14.72432	15963.19
270	56.33468	17965
324	56.33468	16010.84
378	56.33468	14056.7
432	104.5568	10539.46
486	104.5568	5269.735
540	104.5568	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
54		55.76836
108		111.5367
162		150.5137
216		172.671
270		194.8141
324	0.382266	172.671
378	0.382266	150.5137
432	1.104324	111.5367
486	1.104324	55.76836
540	1.104324	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	5720.639
108	0	11441.26
162	15.8428	15378.41
216	15.8428	17532.06
270	61.45988	19786.65
324	61.45988	17563.01
378	61.45988	15339.39
432	113.3914	11430.49
486	113.3914	5715.259
540	113.3914	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
54	0	94.97186
108	0	189.9437
162	0.269002	252.423
216	0.269002	286.5154
270	1.047692	326.8091
324	1.047692	286.5154
378	1.047692	252.423
432	1.883014	189.9437
486	1.883014	94.97186
540	1.883014	0

Strength

263,000		
Loc(in)	V	M
0		
54		397.9%
108		303.7%
162		265.9%
216		232.3%
270		207.1%
324	532.0%	231.9%
378	514.6%	265.2%
432	242.9%	303.7%
486	239.6%	397.9%
540	236.5%	
	236.5%	207.1%
286,000		
Loc(in)	V	M
0		
54		379.3%
108		289.4%
162		253.5%
216		221.5%
270		197.4%
324	502.3%	221.1%
378	486.8%	252.8%
432	231.3%	289.4%
486	228.4%	379.3%
540	225.5%	
	225.5%	197.4%
315,000		
Loc(in)	V	M
0		
54		361.3%
108		275.6%
162		239.7%
216		209.5%
270		186.4%
324	472.5%	209.3%
378	458.7%	240.1%
432	220.3%	275.8%
486	217.6%	361.5%
540	215.0%	
	215.0%	186.4%

E-Ratings

263,000

Loc(in)	V	M
0		
54		51.0
108		51.0
162	50.3	51.0
216	50.3	51.2
270	49.4	50.6
324	49.4	51.4
378	49.4	51.2
432	51.1	51.0
486	51.1	51.0
540	51.1	
	49.4	50.6

286,000

Loc(in)	V	M
0		
54		55.5
108		55.5
162	54.7	55.4
216	54.7	55.7
270	53.8	55.0
324	53.8	55.9
378	53.8	55.7
432	55.5	55.5
486	55.5	55.5
540	55.5	
	53.8	55.0

315,000

Loc(in)	V	M
0		
54		60.2
108		60.2
162	58.9	60.9
216	58.9	61.2
270	58.7	60.5
324	58.7	61.3
378	58.7	60.8
432	60.2	60.2
486	60.2	60.2
540	60.2	
	58.7	60.2

Cooper E1-Locomotive

Loc(in)	V	M
0		
54		339.2
108		247.6
162		215.5
216		184.8
270		156.9
324	491.8	189.1
378	488.5	228.4
432	202.9	268.0
486	201.5	367.2
540	200.1	
	200.1	156.9

Cooper E1-Lane

Loc(in)	V	M
0		
54		548.2
108		400.2
162		338.3
216		286.2
270		246.7
324	1001.9	286.2
378	995.1	338.3
432	304.3	400.2
486	302.3	548.2
540	300.2	
	300.2	246.7

Cooper Alt Load

Loc(in)	V	M
0		
54		321.9
108		235.0
162		201.7
216		172.5
270		147.1
324	365.5	172.5
378	363.1	201.7
432	178.5	235.0
486	177.3	321.9
540	176.1	
	176.1	147.1

Results - Stringer

Resistance

Loc(in)	V(k)	M(k-in)
0	124.5	2857
14.4	124.5	2857
28.8	124.5	2857
43.2	124.5	2857
57.6	124.5	2857
72	124.5	2857
86.4	124.5	2857
100.8	124.5	2857
115.2	124.5	2857
129.6	124.5	2857
144	124.5	2857

Length(ft)	12	144
Proportion	0.621	
Impact	0.4476	

	V	M
263,000	**121.6%**	**98.7%**
286,000	**112.9%**	**91.8%**
315,000	**105.3%**	**87.3%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
14.4		156.53
28.8		278.28
43.2		365.24
57.6		417.42
72		434.81
86.4	2.42	417.42
100.8	4.83	365.24
115.2	7.25	278.28
129.6	9.66	156.53
144	12.08	0

E-Ratings

263,000	**47.6**	**47.6**
286,000	**51.8**	**51.8**
315,000	**54.0**	**54.0**
Cooper E-Loc	**71.5**	**56.1**
Cooper E-Lane	**471.9**	**141.2**
Cooper Alt	**60.1**	**48.1**

Bridge #4-TPG-Stringer

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	6.57	1257.14
28.8	13.15	2135.56
43.2	19.73	2635.26
57.6	26.3	2756.24
72	34.7	2498.5
86.4	47.85	2756.24
100.8	61	2635.26
115.2	74.15	2135.56
129.6	87.3	1257.14
144	100.45	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	1.00E-01	20.88
28.8	2.00E-01	34.08
43.2	3.00E-01	42.48
57.6	4.00E-01	45.12
72	0.5833	48
86.4	0.7833	45.12
100.8	0.9833	42.48
115.2	1.18	34.08
129.6	1.45	20.88
144	1.75	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	7.15	1367.08
28.8	14.3	2322.32
43.2	21.45	2865.72
57.6	28.6	2997.28
72	37.74	2717
86.4	52.04	2997.28
100.8	66.34	2865.72
115.2	80.64	2322.32
129.6	94.94	1367.08
144	109.24	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
14.4		3.82
28.8		7.63
43.2		11.45
57.6		15.26
72	0.265	19.08
86.4	2.65E-01	15.26
100.8	2.65E-01	11.45
115.2	0.265	7.63
129.6	0.265	3.82
144	0.265	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	7.88	1474.2
28.8	15.75	2494.8
43.2	23.63	3061.8
57.6	31.5	3175.2
72	39.38	2835
86.4	55.13	3175.2
100.8	70.88	3061.8
115.2	86.63	2494.8
129.6	102.38	1474.2
144	118.13	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	1.25E-01	24.9
28.8	2.50E-01	42.6
43.2	3.75E-01	53.1
57.6	0.5	56.4
72	0.7292	52.5
86.4	0.9792	56.4
100.8	1.23	53.1
115.2	1.48	42.6
129.6	1.73	24.9
144	2.08	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	5.906165	1130.118
28.8	11.82132	1919.782
43.2	17.73647	2368.992
57.6	23.64264	2477.748
72	31.1939	2246.051
86.4	43.01522	2477.748
100.8	54.83654	2368.992
115.2	66.65785	1919.782
129.6	78.47917	1130.118
144	90.30049	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	0.089896	18.77028
28.8	0.179792	30.63654
43.2	0.269688	38.1878
57.6	0.359584	40.56106
72	0.524363	43.15006
86.4	0.704155	40.56106
100.8	0.883947	38.1878
115.2	1.060772	30.63654
129.6	1.303491	18.77028
144	1.573179	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	6.427561	1228.95
28.8	12.85512	2087.672
43.2	19.28268	2576.167
57.6	25.71024	2694.434
72	33.92674	2442.473
86.4	46.78186	2694.434
100.8	59.63698	2576.167
115.2	72.4921	2087.672
129.6	85.34722	1228.95
144	98.20235	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
14.4		3.434026
28.8		6.859062
43.2		10.29309
57.6		13.71812
72		17.15215
86.4	0.238224	13.71812
100.8	0.238224	10.29309
115.2	0.238224	6.859062
129.6	0.238224	3.434026
144	0.238224	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	7.083802	1325.246
28.8	14.15861	2242.724
43.2	21.24242	2752.435
57.6	28.31723	2854.377
72	35.40103	2548.55
86.4	49.55964	2854.377
100.8	63.71826	2752.435
115.2	77.87687	2242.724
129.6	92.03548	1325.246
144	106.1941	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
14.4	0.11237	22.38409
28.8	0.22474	38.29568
43.2	0.33711	47.73475
57.6	0.44948	50.70132
72	0.655521	47.19538
86.4	0.880261	50.70132
100.8	1.10572	47.73475
115.2	1.33046	38.29568
129.6	1.5552	22.38409
144	1.869836	0

Strength

263,000

Loc(in)	V	M
0		
14.4		222.0%
28.8		130.0%
43.2		104.5%
57.6		98.7%
72		106.6%
86.4	274.0%	98.7%
100.8	208.7%	104.5%
115.2	168.5%	130.0%
129.6	141.3%	222.0%
144	121.6%	
	121.6%	98.7%

286,000

Loc(in)	V	M
0		
14.4		206.2%
28.8		120.8%
43.2		97.1%
57.6		91.8%
72		99.3%
86.4	253.0%	91.8%
100.8	193.1%	97.1%
115.2	156.1%	120.8%
129.6	131.0%	206.2%
144	112.9%	
	112.9%	91.8%

315,000

Loc(in)	V	M
0		
14.4		192.8%
28.8		113.3%
43.2		91.6%
57.6		87.3%
72		95.8%
86.4	239.5%	87.3%
100.8	181.6%	91.6%
115.2	146.3%	113.3%
129.6	122.4%	192.8%
144	105.3%	
	105.3%	87.3%

E-Ratings

263,000

Loc(in)	V	M
0		
14.4	52.6	50.5
28.8	52.6	50.1
43.2	52.6	49.6
57.6	52.6	48.9
72	47.6	47.6
86.4	48.9	48.9
100.8	49.6	49.6
115.2	50.1	50.1
129.6	50.5	50.5
144	48.3	
	47.6	47.6

Cooper E1-Locomotive

Loc(in)	V	M
0		
14.4		143.9
28.8		84.2
43.2		65.3
57.6		60.1
72		56.1
86.4	173.4	60.1
100.8	135.4	65.3
115.2	110.5	84.2
129.6	88.1	143.9
144	71.5	
	71.5	56.1

286,000

Loc(in)	V	M
0		
14.4	57.2	54.9
28.8	57.2	54.5
43.2	57.2	54.0
57.6	57.2	53.1
72	51.8	51.8
86.4	53.1	53.1
100.8	53.9	54.0
115.2	54.5	54.5
129.6	54.9	54.9
144	52.5	
	51.8	51.8

Cooper E1-Lane

Loc(in)	V	M
0		
14.4		786.4
28.8		376.0
43.2		242.1
57.6		177.8
72		141.2
86.4	512.5	177.8
100.8	502.3	242.1
115.2	492.2	376.0
129.6	482.1	786.4
144	471.9	
	471.9	141.2

315,000

Loc(in)	V	M
0		
14.4	63.0	59.2
28.8	63.0	58.6
43.2	63.0	57.7
57.6	63.0	56.3
72	54.0	54.0
86.4	56.3	56.3
100.8	57.6	57.7
115.2	58.5	58.6
129.6	59.2	59.2
144	56.8	
	54.0	54.0

Cooper Alt Load

Loc(in)	V	M
0		
14.4		120.6
28.8		67.3
43.2		52.2
57.6		48.1
72		51.3
86.4	138.7	48.1
100.8	108.2	52.2
115.2	88.1	67.3
129.6	73.8	120.6
144	60.1	
	60.1	48.1

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	557.29	37273
46.8	557.29	37273
93.6	557.29	37273
140.4	557.29	37273
187.2	557.29	37273
234	557.29	37273
280.8	557.29	37273
327.6	557.29	37273
374.4	557.29	37273
421.2	557.29	37273
468	557.29	37273

Length(ft)	39	468
Proportion	0.511	
Impact	0.5722	

	V	**M**
263,000	**317.5%**	**204.8%**
286,000	**293.4%**	**189.4%**
315,000	**272.3%**	**173.0%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0.00
46.8		467.18
93.6		830.54
140.4		1090.08
187.2		1245.81
234		1297.72
280.8	2.21832	1245.81
327.6	4.43664	1090.08
374.4	6.65496	830.54
421.2	8.87328	467.18
468	11.0916	0.00

E-Ratings

263,000	**48.0**	**50.1**
286,000	**52.2**	**54.5**
315,000	**56.6**	**59.8**
Cooper E-Loc	**183.0**	**119.1**
Cooper E-Lane	**348.8**	**196.3**
Cooper Alt	**171.1**	**106.6**

Bridge #5-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	6.58	8237.16
93.6	16.75	14012.64
140.4	29.90	18220.64
187.2	48.55	20861.16
234	70.81	21040.00
280.8	97.11	20861.16
327.6	123.41	18220.64
374.4	149.71	14012.64
421.2	176.01	8237.16
468	204.70	0.00

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	0.1	145.974
93.6	0.271795	247.656
140.4	0.515385	324.264
187.2	0.830769	364.368
234	1.230769	375.9
280.8	1.635897	364.368
327.6	2.085897	324.264
374.4	2.587436	247.656
421.2	3.119102	145.974
468	3.714103	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	7.15	8957.52
93.6	18.21	15238.08
140.4	32.51	19814.08
187.2	52.80	22685.52
234	77.00	22880.00
280.8	105.60	22685.52
327.6	134.20	19814.08
374.4	162.80	15238.08
421.2	191.40	8957.52
468	222.60	0.00

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0.00
46.8		82.10
93.6		145.96
140.4		191.57
187.2		218.94
234		228.06
280.8	0.39	218.94
327.6	0.78	191.57
374.4	1.17	145.96
421.2	1.56	82.10
468	1.95	0.00

315,000

Loc(in)	V(k)	M(k-in)
0	0.00	0.00
46.8	7.88	9802.80
93.6	19.38	16657.20
140.4	35.13	21697.20
187.2	57.48	24922.80
234	83.46	25200.00
280.8	114.96	24922.80
327.6	146.46	21697.20
374.4	177.96	16657.20
421.2	209.46	9802.80
468	240.96	0.00

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0.00	0.00
46.8	0.13	162.60
93.6	0.34	278.40
140.4	0.61	362.40
187.2	0.99	414.60
234	1.47	420.00
280.8	1.97	414.60
327.6	2.47	362.40
374.4	2.97	278.40
421.2	3.47	162.60
468	3.97	0.00

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	5.282317	6617.687
93.6	13.45411	11257.67
140.4	24.01874	14638.36
187.2	39.00787	16759.73
234	56.88649	16903.41
280.8	78.01575	16759.73
327.6	99.14503	14638.36
374.4	120.2743	11257.67
421.2	141.4036	6617.687
468	164.4516	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	0.080339	117.2747
93.6	0.218358	198.9654
140.4	0.414057	260.5118
187.2	0.667435	292.7311
234	0.988793	301.9959
280.8	1.31427	292.7311
327.6	1.675798	260.5118
374.4	2.078731	198.9654
421.2	2.505868	117.2747
468	2.983889	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	5.744269	7196.42
93.6	14.6307	12242.19
140.4	26.11924	15918.52
187.2	42.41921	18225.42
234	61.86135	18381.66
280.8	84.83843	18225.42
327.6	107.8155	15918.52
374.4	130.7926	12242.19
421.2	153.7696	7196.42
468	178.8333	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	0	-7.55E-15
46.8	0	65.95958
93.6	0	117.2615
140.4	0	153.9057
187.2	0	175.8922
234	0	183.221
280.8	0.313198	175.8922
327.6	0.626397	153.9057
374.4	0.939595	117.2615
421.2	1.252794	65.95958
468	1.565992	1.7E-14

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	6.326729	7875.513
93.6	15.57348	13382.3
140.4	28.22695	17431.4
187.2	46.17972	20022.83
234	67.05252	20245.53
280.8	92.3594	20022.83
327.6	117.6663	17431.4
374.4	142.9732	13382.3
421.2	168.2802	7875.513
468	193.5871	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
46.8	0.100424	130.6319
93.6	0.272948	223.6649
140.4	0.491821	291.1501
187.2	0.793094	333.0872
234	1.184491	337.4256
280.8	1.586189	333.0872
327.6	1.987886	291.1501
374.4	2.389583	223.6649
421.2	2.79128	130.6319
468	3.192977	0

Strength		
263,000		
Loc(in)	V	M
0		
46.8		526.1%
93.6		308.3%
140.4		237.0%
187.2		207.0%
234		204.8%
280.8	694.6%	207.0%
327.6	538.0%	237.0%
374.4	439.1%	308.3%
421.2	370.8%	526.1%
468	317.5%	
	317.5%	204.8%
286,000		
Loc(in)	V	M
0		
46.8		486.4%
93.6		285.1%
140.4		219.1%
187.2		191.4%
234		189.4%
280.8	640.1%	191.4%
327.6	496.5%	219.1%
374.4	405.5%	285.1%
421.2	342.6%	486.4%
468	293.4%	
	293.4%	189.4%
315,000		
Loc(in)	V	M
0		
46.8		446.8%
93.6		262.2%
140.4		201.2%
187.2		175.2%
234		173.0%
280.8	589.2%	175.2%
327.6	456.4%	201.2%
374.4	372.4%	262.2%
421.2	314.6%	446.8%
468	272.3%	
	272.3%	173.0%

E-Ratings

263,000

Loc(in)	V	M
0		
46.8	52.6	50.7
93.6	49.3	50.3
140.4	48.8	50.3
187.2	49.2	50.3
234	48.0	50.1
280.8	49.2	50.3
327.6	49.9	50.3
374.4	50.3	50.3
421.2	50.7	50.7
468	51.5	
	48.0	50.1

Cooper E1-Locomotive

Loc(in)	V	M
0		
46.8		313.8
93.6		183.2
140.4		138.9
187.2		123.1
234		119.1
280.8	422.3	123.1
327.6	329.9	138.9
374.4	264.9	183.2
421.2	218.9	313.8
468	183.0	
	183.0	119.1

286,000

Loc(in)	V	M
0		
46.8	57.2	55.1
93.6	53.6	54.7
140.4	53.1	54.7
187.2	53.5	54.7
234	52.2	54.5
280.8	53.5	54.7
327.6	54.2	54.7
374.4	54.7	54.7
421.2	55.1	55.1
468	56.0	
	52.2	54.5

Cooper E1-Lane

Loc(in)	V	M
0		
46.8		558.0
93.6		310.8
140.4		235.1
187.2		204.8
234		196.3
280.8	1772.3	204.8
327.6	882.6	235.1
374.4	586.0	310.8
421.2	437.8	558.0
468	348.8	
	348.8	196.3

315,000

Loc(in)	V	M
0		
46.8	63.0	60.3
93.6	57.1	59.8
140.4	57.4	59.9
187.2	58.2	60.1
234	56.6	60.0
280.8	58.2	60.1
327.6	59.2	59.9
374.4	59.8	59.8
421.2	60.3	60.3
468	60.6	
	56.6	59.8

Cooper Alt Load

Loc(in)	V	M
0		
46.8		281.8
93.6		162.9
140.4		124.3
187.2		108.2
234		106.6
280.8	349.9	108.2
327.6	278.1	124.3
374.4	230.4	162.9
421.2	196.5	281.8
468	171.1	
	171.1	106.6

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	486.37	52757
64.8	486.37	52757
129.6	486.37	52757
194.4	486.37	52757
259.2	486.37	52757
324	486.37	52757
388.8	486.37	52757
453.6	486.37	52757
518.4	486.37	52757
583.2	486.37	52757
648	486.37	52757

Length(ft)	54	648
Proportion	0.5	
Impact	0.5453	

	V	M
263,000	**211.9%**	**170.6%**
286,000	**197.0%**	**159.0%**
315,000	**204.0%**	**149.0%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
64.8		1793.52
129.6		3188.47
194.4		4184.87
259.2		4782.71
324		4981.99
388.8	6.15	4782.71
453.6	12.3	4184.87
518.4	18.45	3188.47
583.2	24.6	1793.52
648	30.75	0

E-Ratings

263,000	**48.7**	**49.5**
286,000	**53.0**	**53.8**
315,000	**57.2**	**56.9**
Cooper E-Loc	**125.5**	**91.5**
Cooper E-Lane	**218.4**	**141.4**
Cooper Alt	**138.4**	**95.9**

Bridge #6-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	6.57	13789.09
129.6	19.4	23359.66
194.4	37.26	29605.91
259.2	61.37	32843.44
324	87.67	33565.38
388.8	113.97	32843.44
453.6	140.53	29605.91
518.4	173.41	23359.66
583.2	212.79	13789.09
648	257.22	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	1.07E-01	259.4
129.6	3.22E-01	452.14
194.4	6.44E-01	586.54
259.2	1.04E+00	663.74
324	1.5	675.9
388.8	2.04	663.74
453.6	2.64	586.54
518.4	3.31	452.14
583.2	4	259.4
648	4.7	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	7.15	14994.98
129.6	21.1	25402.52
194.4	40.52	32195.02
259.2	66.73	35715.68
324	95.33	36500.75
388.8	123.93	35715.68
453.6	152.82	32195.02
518.4	188.57	25402.52
583.2	231.4	14994.98
648	279.71	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
64.8		157.46
129.6		279.94
194.4		367.42
259.2		419.9
324		437.4
388.8	5.40E-01	419.9
453.6	1.08E+00	367.42
518.4	1.62	279.94
583.2	2.16	157.46
648	2.7	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	7.88	14905.8
129.6	22.75	25729.2
194.4	44.14	33604.2
259.2	72.53	38530.8
324	104.03	39375
388.8	135.53	38530.8
453.6	167.03	33604.2
518.4	198.53	25729.2
583.2	230.03	14905.8
648	268.82	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	1.34E-01	243.6
129.6	3.84E-01	422.4
194.4	7.59E-01	551.4
259.2	1.26	630.6
324	1.76	645
388.8	2.26	630.6
453.6	2.76	551.4
518.4	3.26	422.4
583.2	3.76	243.6
648	4.26	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	5.076311	10654.14
129.6	14.98941	18048.84
194.4	28.78894	22875.01
259.2	47.41753	25376.48
324	67.73823	25934.29
388.8	88.05892	25376.48
453.6	108.5805	22875.01
518.4	133.9852	18048.84
583.2	164.4122	10654.14
648	198.741	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	0.082983	200.4254
129.6	0.248948	349.346
194.4	0.497896	453.1901
259.2	0.803556	512.8387
324	1.158975	522.2341
388.8	1.576206	512.8387
453.6	2.039796	453.1901
518.4	2.557472	349.346
583.2	3.0906	200.4254
648	3.631455	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	5.524448	11585.87
129.6	16.30292	19627.26
194.4	31.30778	24875.48
259.2	51.55893	27595.72
324	73.65672	28202.3
388.8	95.75451	27595.72
453.6	118.0764	24875.48
518.4	145.6986	19627.26
583.2	178.7912	11585.87
648	216.1179	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
64.8		121.6615
129.6		216.2956
194.4		283.8871
259.2		324.4357
324		337.9571
388.8	0.417231	324.4357
453.6	0.834462	283.8871
518.4	1.251693	216.2956
583.2	1.668924	121.6615
648	2.086155	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	6.088482	11516.97
129.6	17.57779	19879.67
194.4	34.10477	25964.29
259.2	56.0403	29770.82
324	80.37878	30423.09
388.8	104.7173	29770.82
453.6	129.0557	25964.29
518.4	153.3942	19879.67
583.2	177.7327	11516.97
648	207.7038	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
64.8	0.103767	188.2175
129.6	0.296929	326.3674
194.4	0.586673	426.0392
259.2	0.973539	487.2331
324	1.359864	498.3593
388.8	1.746189	487.2331
453.6	2.132514	426.0392
518.4	2.518839	326.3674
583.2	2.905164	188.2175
648	3.291489	0

Strength

263,000		
Loc(in)	V	M
0		
64.8		423.8%
129.6		248.4%
194.4		195.0%
259.2		174.9%
324		170.6%
388.8	516.3%	174.9%
453.6	402.4%	195.0%
518.4	319.1%	248.4%
583.2	257.3%	423.8%
648	211.9%	
	211.9%	170.6%

286,000		
Loc(in)	V	M
0		
64.8		394.3%
129.6		231.2%
194.4		181.5%
259.2		162.9%
324		159.0%
388.8	477.3%	162.9%
453.6	373.1%	181.5%
518.4	296.3%	231.2%
583.2	239.1%	394.3%
648	197.0%	
	197.0%	159.0%

315,000		
Loc(in)	V	M
0		
64.8		396.4%
129.6		228.7%
194.4		175.0%
259.2		152.7%
324		149.0%
388.8	438.7%	152.7%
453.6	344.1%	175.0%
518.4	283.0%	228.7%
583.2	240.4%	396.4%
648	204.0%	
	204.0%	149.0%

E-Ratings

263,000

Loc(in)	V	M
0		
64.8	48.9	53.2
129.6	50.5	51.7
194.4	49.1	50.5
259.2	48.7	49.5
324	49.8	49.7
388.8	50.4	49.5
453.6	50.9	50.5
518.4	52.4	51.7
583.2	53.2	53.2
648	54.7	
	48.7	49.5

Cooper E1-Locomotive

Loc(in)	V	M
0		
64.8		254.3
129.6		141.9
194.4		107.2
259.2		93.5
324		91.5
388.8	304.7	93.5
453.6	232.4	107.2
518.4	183.0	141.9
583.2	149.4	254.3
648	125.5	
	125.5	91.5

286,000

Loc(in)	V	M
0		
64.8	53.2	57.8
129.6	54.9	56.2
194.4	53.4	54.9
259.2	53.0	53.8
324	54.2	54.0
388.8	54.8	53.8
453.6	55.4	54.9
518.4	57.0	56.2
583.2	57.9	57.8
648	59.5	
	53.0	53.8

Cooper E1-Lane

Loc(in)	V	M
0		
64.8		418.9
129.6		229.2
194.4		171.1
259.2		147.9
324		141.4
388.8	1151.0	147.9
453.6	568.1	171.1
518.4	373.8	229.2
583.2	276.7	418.9
648	218.4	
	218.4	141.4

315,000

Loc(in)	V	M
0		
64.8	58.7	57.5
129.6	59.2	56.9
194.4	58.1	57.3
259.2	57.6	58.1
324	59.1	58.3
388.8	60.0	58.1
453.6	60.5	57.3
518.4	60.0	56.9
583.2	57.5	57.5
648	57.2	
	57.2	56.9

Cooper Alt Load

Loc(in)	V	M
0		
64.8		270.8
129.6		151.9
194.4		114.0
259.2		98.5
324		95.9
388.8	275.0	98.5
453.6	222.3	114.0
518.4	185.8	151.9
583.2	158.9	270.8
648	138.4	
	138.4	95.9

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	487.6	61038
96	487.6	61038
192	487.6	79368
288	487.6	99963
384	487.6	99963
480	487.6	99963
576	487.6	99963
672	487.6	99963
768	487.6	79368
864	487.6	61038
960	487.6	61038

Length(ft)	80	960
Proportion	0.5	
Impact	0.48	

	V	**M**
263,000	**164.4%**	**167.2%**
286,000	**152.8%**	**155.8%**
315,000	**157.4%**	**172.3%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
96		3431.81
192		6100.99
288		8007.55
384		9151.49
480		9532.8
576	7.94	9151.49
672	15.89	8007.55
768	23.83	6100.99
864	31.78	3431.81
960	39.72	0

E-Ratings

263,000	**49.3**	**50.6**
286,000	**53.6**	**55.0**
315,000	**57.2**	**48.8**
Cooper E-Loc	**97.5**	**91.0**
Cooper E-Lane	**151.3**	**127.3**
Cooper Alt	**134.5**	**118.1**

Bridge #7-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	8.49	27904.3
192	24.66	48392
288	49.31	61778.7
384	75.61	68064.4
480	103.9	67886.88
576	140.68	68064.4
672	185.47	61778.7
768	238.07	48392
864	290.67	27904.3
960	347.24	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
96	1.38E-01	496.2
192	4.25E-01	858.48
288	8.31E-01	1119.36
384	1.35E+00	1292.88
480	1.96	1342.8
576	2.65	1292.88
672	3.35	1119.36
768	4.1	858.48
864	5.1	496.2
960	6.21	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	9.24	30344.6
192	26.81	52624
288	53.63	67181.4
384	82.22	74016.8
480	112.98	73823.75
576	152.98	74016.8
672	201.69	67181.4
768	258.89	52624
864	316.09	30344.6
960	377.61	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
96		345.6
192		614.4
288		806.4
384		921.6
480		960
576	8.00E-01	921.6
672	1.60E+00	806.4
768	2.4	614.4
864	3.2	345.6
960	4	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	9.84	28980
192	29.2	49266
288	58.41	60984
384	89.91	66024
480	121.41	65520
576	152.91	66024
672	192.28	60984
768	242.16	49266
864	301.88	28980
960	364.88	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
96	1.72E-01	384
192	5.00E-01	672
288	1.00E+00	879
384	1.5	1005
480	2	1035
576	2.5	1005
672	3	879
768	3.5	672
864	4	384
960	4.5	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	6.2826	20649.18
192	18.2484	35810.08
288	36.4894	45716.24
384	55.9514	50367.66
480	76.886	50236.29
576	104.1032	50367.66
672	137.2478	45716.24
768	176.1718	35810.08
864	215.0958	20649.18
960	256.9576	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
96	0.10175	367.188
192	0.3145	635.2752
288	0.615162	828.3264
384	0.999	956.7312
480	1.4504	993.672
576	1.961	956.7312
672	2.479	828.3264
768	3.034	635.2752
864	3.774	367.188
960	4.5954	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	6.8376	22455
192	19.8394	38941.76
288	39.6862	49714.24
384	60.8428	54772.43
480	83.6052	54629.58
576	113.2052	54772.43
672	149.2506	49714.24
768	191.5786	38941.76
864	233.9066	22455
960	279.4314	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
96		255.744
192		454.656
288		596.736
384		681.984
480		710.4
576	0.592	681.984
672	1.184	596.736
768	1.776	454.656
864	2.368	255.744
960	2.96	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
96	7.2816	21445.2
192	21.608	36456.84
288	43.2234	45128.16
384	66.5334	48857.76
480	89.8434	48484.8
576	113.1534	48857.76
672	142.2872	45128.16
768	179.1984	36456.84
864	223.3912	21445.2
960	270.0112	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
96	0.127206	284.16
192	0.37	497.28
288	0.74	650.46
384	1.11	743.7
480	1.48	765.9
576	1.85	743.7
672	2.22	650.46
768	2.59	497.28
864	2.96	284.16
960	3.33	0

Strength

263,000		
Loc(in)	V	M
0		
96		253.5%
192		189.4%
288		186.1%
384		168.0%
480		167.2%
576	435.2%	168.0%
672	318.4%	186.1%
768	243.8%	189.4%
864	197.5%	253.5%
960	164.4%	
	164.4%	167.2%

286,000		
Loc(in)	V	M
0		
96		235.8%
192		176.2%
288		173.2%
384		156.4%
480		155.8%
576	402.5%	156.4%
672	295.3%	173.2%
768	226.4%	176.2%
864	183.5%	235.8%
960	152.8%	
	152.8%	155.8%

315,000		
Loc(in)	V	M
0		
96		245.4%
192		186.5%
288		188.1%
384		172.3%
480		172.3%
576	402.7%	172.3%
672	308.3%	188.1%
768	240.2%	186.5%
864	191.1%	245.4%
960	157.4%	
	157.4%	172.3%

E-Ratings

263,000

Loc(in)	V	M
0		
96	49.4	56.2
192	49.3	56.4
288	49.3	55.2
384	50.4	52.6
480	52.0	50.6
576	53.1	52.6
672	55.4	55.2
768	58.1	56.4
864	57.0	56.2
960	55.9	
	49.3	50.6

Cooper E1-Locomotive

Loc(in)	V	M
0		
96		156.9
192		115.3
288		111.0
384		94.9
480		91.0
576	244.6	94.9
672	190.3	111.0
768	152.9	115.3
864	120.8	156.9
960	97.5	
	97.5	91.0

286,000

Loc(in)	V	M
0		
96	53.8	61.2
192	53.6	61.3
288	53.6	60.0
384	54.8	57.2
480	56.5	55.0
576	57.7	57.2
672	60.2	60.0
768	63.1	61.3
864	62.0	61.2
960	60.8	
	53.6	55.0

Cooper E1-Lane

Loc(in)	V	M
0		
96		225.2
192		161.1
288		154.1
384		133.2
480		127.3
576	810.2	133.2
672	398.4	154.1
768	261.1	161.1
864	192.5	225.2
960	151.3	
	151.3	127.3

315,000

Loc(in)	V	M
0		
96	57.2	58.4
192	58.4	57.4
288	58.4	54.5
384	59.9	51.1
480	60.7	48.8
576	57.7	51.1
672	57.4	54.5
768	59.1	57.4
864	59.2	58.4
960	58.8	
	57.2	48.8

Cooper Alt Load

Loc(in)	V	M
0		
96		202.7
192		147.3
288		141.4
384		122.1
480		118.1
576	259.3	122.1
672	212.5	141.4
768	179.1	147.3
864	154.0	202.7
960	134.5	
	134.5	118.1

Results - Stringer

Resistance

Loc(in)	V(k)	M(k-in)
0	126.36	4851
12.6	126.36	4851
25.2	126.36	4851
37.8	126.36	4851
50.4	126.36	4851
63	126.36	4851
75.6	126.36	4851
88.2	126.36	4851
100.8	126.36	4851
113.4	126.36	4851
126	126.36	4851

Length(ft)	10.5	126
Proportion	0.513	
Impact	0.4481	

	V	**M**
263,000	**155.0%**	**250.8%**
286,000	**144.0%**	**233.7%**
315,000	**134.8%**	**224.2%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
12.6		115.62
25.2		205.54
37.8		269.77
50.4		308.31
63		321.16
75.6	2.04	308.31
88.2	4.08	269.77
100.8	6.12	205.54
113.4	8.16	115.62
126	10.2	0

E-Ratings

263,000	**48.0**	**48.0**
286,000	**52.2**	**52.2**
315,000	**54.7**	**54.7**
Cooper E-Loc	**99.6**	**167.6**
Cooper E-Lane	**297.8**	**368.7**
Cooper Alt	**82.3**	**134.1**

Bridge #8-TPG-Stringer

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	6.57	1044.11
25.2	13.15	1756.84
37.8	19.73	2138.19
50.4	26.3	2188.16
63	32.88	2071.13
75.6	43.42	2188.16
88.2	56.57	2138.19
100.8	69.72	1756.84
113.4	82.87	1044.11
126	96.02	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	1.00E-01	16.68
25.2	2.00E-01	28.32
37.8	3.00E-01	34.92
50.4	4.00E-01	36.48
63	0.5238	34.5
75.6	0.7238	36.48
88.2	0.9238	34.92
100.8	1.12	28.32
113.4	1.32	16.68
126	1.57	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	7.15	1135.42
25.2	14.3	1910.48
37.8	21.45	2325.18
50.4	28.6	2379.52
63	35.75	2252.25
75.6	47.21	2379.52
88.2	61.51	2325.18
100.8	75.81	1910.48
113.4	90.11	1135.42
126	104.41	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
12.6		5.95
25.2		10.58
37.8		13.89
50.4		15.88
63		16.54
75.6	1.05E-01	15.88
88.2	2.10E-01	13.89
100.8	0.315	10.58
113.4	0.42	5.95
126	0.525	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	7.88	1219.05
25.2	15.75	2041.2
37.8	23.63	2466.45
50.4	31.5	2494.8
63	39.38	2480.63
75.6	49.5	2494.8
88.2	65.25	2466.45
100.8	81	2041.2
113.4	96.75	1219.05
126	112.5	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	1.25E-01	20.85
25.2	2.50E-01	35.4
37.8	3.75E-01	43.65
50.4	0.5	45.6
63	0.6548	41.25
75.6	0.9048	45.6
88.2	1.15	43.65
100.8	1.4	35.4
113.4	1.65	20.85
126	1.9	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	4.880691	775.6435
25.2	9.76881	1305.113
37.8	14.65693	1588.409
50.4	19.53762	1625.53
63	24.42574	1538.591
75.6	32.25565	1625.53
88.2	42.02446	1588.409
100.8	51.79327	1305.113
113.4	61.56208	775.6435
126	71.33089	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	0.074288	12.39116
25.2	0.148575	21.03823
37.8	0.222863	25.94121
50.4	0.29715	27.10009
63	0.389118	25.6292
75.6	0.537693	27.10009
88.2	0.686268	25.94121
100.8	0.83202	21.03823
113.4	0.980595	12.39116
126	1.166314	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	5.311558	843.4755
25.2	10.62312	1419.248
37.8	15.93468	1727.319
50.4	21.24623	1767.687
63	26.55779	1673.141
75.6	35.07114	1767.687
88.2	45.69426	1727.319
100.8	56.31738	1419.248
113.4	66.94049	843.4755
126	77.56361	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
12.6		4.420108
25.2		7.859621
37.8		10.31854
50.4		11.79686
63		12.28716
75.6	0.078002	11.79686
88.2	0.156004	10.31854
100.8	0.234006	7.859621
113.4	0.312008	4.420108
126	0.39001	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	5.853857	905.6021
25.2	11.70029	1516.357
37.8	17.55414	1832.265
50.4	23.40057	1853.325
63	29.25443	1842.799
75.6	36.77233	1853.325
88.2	48.47261	1832.265
100.8	60.1729	1516.357
113.4	71.87319	905.6021
126	83.57347	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
12.6	0.092859	15.48895
25.2	0.185719	26.29779
37.8	0.278578	32.42651
50.4	0.371438	33.87511
63	0.486435	30.64361
75.6	0.672154	33.87511
88.2	0.854307	32.42651
100.8	1.040025	26.29779
113.4	1.225744	15.48895
126	1.411463	0

Strength

263,000		
Loc(in)	V	M
0		
12.6		544.3%
25.2		321.1%
37.8		261.1%
50.4		250.8%
63		260.8%
75.6	368.4%	250.8%
88.2	274.1%	261.1%
100.8	218.2%	321.1%
113.4	181.2%	544.3%
126	155.0%	
	155.0%	250.8%
286,000		
Loc(in)	V	M
0		
12.6		505.8%
25.2		298.6%
37.8		242.9%
50.4		233.7%
63		243.2%
75.6	340.5%	233.7%
88.2	253.9%	242.9%
100.8	202.4%	298.6%
113.4	168.3%	505.8%
126	144.0%	
	144.0%	233.7%
315,000		
Loc(in)	V	M
0		
12.6		475.0%
25.2		281.7%
37.8		230.8%
50.4		224.4%
63		224.2%
75.6	325.6%	224.4%
88.2	240.4%	230.8%
100.8	190.6%	281.7%
113.4	157.9%	475.0%
126	134.8%	
	134.8%	224.2%

E-Ratings

263,000

Loc(in)	V	M
0		
12.6	52.6	50.1
25.2	52.6	49.6
37.8	52.6	49.0
50.4	52.6	48.0
63	50.2	50.2
75.6	48.0	48.0
88.2	49.2	49.0
100.8	49.8	49.6
113.4	50.2	50.1
126	50.5	
	48.0	48.0

286,000

Loc(in)	V	M
0		
12.6	57.2	54.5
25.2	57.2	54.0
37.8	57.2	53.3
50.4	57.2	52.2
63	54.6	54.6
75.6	52.2	52.2
88.2	53.5	53.3
100.8	54.2	54.0
113.4	54.6	54.5
126	55.0	
	52.2	52.2

315,000

Loc(in)	V	M
0		
12.6	63.0	58.5
25.2	63.0	57.7
37.8	63.0	56.5
50.4	63.0	54.7
63	60.1	60.1
75.6	54.7	54.7
88.2	56.7	56.5
100.8	57.9	57.7
113.4	58.6	58.5
126	59.2	
	54.7	54.7

Cooper E1-Locomotive

Loc(in)	V	M
0		
12.6		382.2
25.2		220.8
37.8		176.6
50.4		167.6
63		176.7
75.6	231.2	167.6
88.2	178.2	176.6
100.8	144.5	220.8
113.4	120.5	382.2
126	99.6	
	99.6	167.6

Cooper E1-Lane

Loc(in)	V	M
0		
12.6		1071.3
25.2		591.1
37.8		444.0
50.4		385.1
63		368.7
75.6	1593.8	385.1
88.2	783.8	444.0
100.8	513.8	591.1
113.4	378.8	1071.3
126	297.8	
	297.8	368.7

Cooper Alt Load

Loc(in)	V	M
0		
12.6		305.7
25.2		176.6
37.8		141.3
50.4		134.1
63		147.8
75.6	185.0	134.1
88.2	143.1	141.3
100.8	115.6	176.6
113.4	96.4	305.7
126	82.3	
	82.3	134.1

Results - Floorbeam

Resistance

Loc(in)	V(k)	M(k-in)
0	96.33	4893
15.6	96.33	4893
31.2	96.33	4893
46.8	96.33	4893
62.4	96.33	4893
78	96.33	4893
93.6	96.33	4893
109.2	96.33	4893
124.8	96.33	4893
140.4	96.33	4893
156	96.33	4893

Length(ft)	13	156
Proportion	1	
Impact	0.4426	

	V	M
263,000	**88.6%**	**94.3%**
286,000	**82.8%**	**88.1%**
315,000	**76.5%**	**81.4%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
15.6		330.15
31.2		657.61
46.8		982.41
62.4		1010.89
78	0	1012.23
93.6	0.1716	1010.89
109.2	0.1716	982.41
124.8	20.91	657.61
140.4	21.08	330.15
156	21.25	0

E-Ratings

263,000	**49.3**	**49.2**
286,000	**53.6**	**53.5**
315,000	**59.0**	**58.9**
Cooper E-Loc	**49.1**	**53.2**
Cooper E-Lane	**98.1**	**106.2**
Cooper Alt	**42.3**	**45.7**

Bridge #8-TPG-Floorbeam

Live Loads

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0		0	0		0
15.6		926.8	15.6		16.18
31.2		1853.59	31.2		32.35
46.8		2780.39	46.8		48.53
62.4		2865.5	62.4		50.02
78	-0.96	2880.48	78	-0.01692	50.28
93.6	-0.96	2895.46	93.6	-0.01692	50.54
109.2	60.61	2836.55	109.2	1.06	49.52
124.8	60.61	1891.03	124.8	1.06	33.01
140.4	60.61	945.52	140.4	1.06	16.51
156	60.61	0	156	1.06	0
286,000			**Cooper E1-Lane**		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0		0	0		0
15.6		1007.84	15.6		8.11
31.2		2015.69	31.2		16.21
46.8		3023.53	46.8		24.32
62.4		3116.09	62.4		25.07
78	-1.04	3132.38	78	-0.008615	25.2
93.6	-1.04	3148.68	93.6	-8.62E-03	25.33
109.2	65.91	3084.62	109.2	5.30E-01	24.82
124.8	65.91	2056.41	124.8	0.5304	16.55
140.4	65.91	1028.21	140.4	0.5304	8.27
156	65.91	0	156	0.5304	0
315,000			**Cooper Alt Load**		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0		0	0		0
15.6		1110.04	15.6		18.85
31.2		2220.07	31.2		37.7
46.8		3330.11	46.8		56.55
62.4		3432.06	62.4		58.28
78	-1.15	3450	78	-0.01938	58.58
93.6	-1.15	3467.94	93.6	-0.01938	58.89
109.2	72.59	3397.39	109.2	1.23	57.69
124.8	72.59	2264.93	124.8	1.23	38.46
140.4	72.59	1132.46	140.4	1.23	19.23
156	72.59	0	156	1.23	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	1337.002
31.2	0	2673.989
46.8	0	4010.991
62.4	0	4133.77
78	-1.384896	4155.38
93.6	-1.384896	4176.991
109.2	87.43599	4092.007
124.8	87.43599	2728
140.4	87.43599	1364.007
156	87.43599	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	23.34127
31.2	0	46.66811
46.8	0	70.00938
62.4	0	72.15885
78	-0.024409	72.53393
93.6	-0.024409	72.909
109.2	1.529156	71.43755
124.8	1.529156	47.62023
140.4	1.529156	23.81733
156	1.529156	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	1453.91
31.2	0	2907.834
46.8	0	4361.744
62.4	0	4495.271
78	-1.500304	4518.771
93.6	-1.500304	4542.286
109.2	95.08177	4449.873
124.8	95.08177	2966.577
140.4	95.08177	1483.296
156	95.08177	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
15.6		11.69949
31.2		23.38455
46.8		35.08403
62.4		36.16598
78		36.35352
93.6	-0.012428	36.54106
109.2	0.765155	35.80533
124.8	0.765155	23.87503
140.4	0.765155	11.9303
156	0.765155	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	1601.344
31.2	0	3202.673
46.8	0	4804.017
62.4	0	4951.09
78	-1.65899	4976.97
93.6	-1.65899	5002.85
109.2	104.7183	4901.075
124.8	104.7183	3267.388
140.4	104.7183	1633.687
156	104.7183	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
15.6	0	27.19301
31.2	0	54.38602
46.8	0	81.57903
62.4	0	84.07473
78	-0.027958	84.50751
93.6	-0.027958	84.95471
109.2	1.774398	83.22359
124.8	1.774398	55.4824
140.4	1.774398	27.7412
156	1.774398	0

Strength

263,000		
Loc(in)	V	M
0		
15.6		293.5%
31.2		146.9%
46.8		98.0%
62.4		95.1%
78		94.7%
93.6		94.3%
109.2		96.4%
124.8	88.9%	144.5%
140.4	88.8%	288.8%
156	88.6%	
	88.6%	94.3%
286,000		
Loc(in)	V	M
0		
15.6		274.3%
31.2		137.2%
46.8		91.6%
62.4		88.9%
78		88.5%
93.6		88.1%
109.2		90.1%
124.8	83.0%	135.0%
140.4	82.9%	269.8%
156	82.8%	
	82.8%	88.1%
315,000		
Loc(in)	V	M
0		
15.6		253.3%
31.2		126.8%
46.8		84.6%
62.4		82.1%
78		81.7%
93.6		81.4%
109.2		83.2%
124.8	76.7%	124.7%
140.4	76.6%	249.2%
156	76.5%	
	76.5%	81.4%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
15.6		49.2	15.6		195.5
31.2		49.2	31.2		90.8
46.8		49.2	46.8		55.9
62.4		49.2	62.4		53.8
78		49.2	78		53.5
93.6	111.4	49.2	93.6		53.2
109.2	49.3	49.2	109.2	62.9	54.7
124.8	49.3	49.2	124.8	49.3	88.9
140.4	49.3	49.2	140.4	49.2	191.6
156	49.3		156	49.1	
	49.3	49.2		49.1	53.2

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
15.6		53.5	15.6		390.0
31.2		53.5	31.2		181.1
46.8		53.5	46.8		111.5
62.4		53.5	62.4		107.3
78		53.5	78		106.8
93.6	120.7	53.5	93.6		106.2
109.2	53.6	53.5	109.2	125.7	109.2
124.8	53.6	53.5	124.8	98.6	177.4
140.4	53.6	53.5	140.4	98.3	382.5
156	53.6		156	98.1	
	53.6	53.5		98.1	106.2

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
15.6		58.9	15.6		167.8
31.2		58.9	31.2		77.9
46.8		58.9	46.8		47.9
62.4		58.9	62.4		46.2
78		58.9	78		45.9
93.6	133.5	58.9	93.6		45.7
109.2	59.0	58.9	109.2	54.2	47.0
124.8	59.0	58.9	124.8	42.5	76.3
140.4	59.0	58.9	140.4	42.4	164.5
156	59.0		156	42.3	
	59.0	58.9		42.3	45.7

Results - Ext. Girder

Resistance

Loc(in)	V(k)	M(k-in)
0	318.32	10191
25.2	318.32	10191
50.4	318.32	10191
75.6	318.32	10191
100.8	318.32	10191
126	318.32	10191
151.2	318.32	10191
176.4	318.32	10191
201.6	318.32	10191
226.8	318.32	10191
252	318.32	10191

Length(ft)	21	252
Proportion	1	
Impact	0.4426	

	V	M
263,000	**547.9%**	**143.9%**
286,000	**514.1%**	**134.7%**
315,000	**477.0%**	**124.7%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-14.37	0
25.2	-13.62	352.77
50.4	-12.87	686.64
75.6	-12.12	1001.62
100.8	-11.37	1297.71
126	10.63	1574.91
151.2	11.37	1297.71
176.4	12.12	1001.62
201.6	12.87	686.64
226.8	13.62	352.77
252	14.37	0

	E-Ratings	
263,000	**49.2**	**49.2**
286,000	**53.5**	**53.5**
315,000	**58.9**	**58.9**
Cooper E-Loc	**398.3**	**89.6**
Cooper E-Lane	**795.1**	**178.9**
Cooper Alt	**342.0**	**76.9**

Bridge #8-TPG-Ext. Girder

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	-30.31	0
25.2	-30.31	763.69
50.4	-30.31	1527.37
75.6	-30.31	2291.06
100.8	-30.31	3054.74
126	30.31	3818.43
151.2	30.31	3054.74
176.4	30.31	2291.06
201.6	30.31	1527.37
226.8	30.31	763.69
252	30.31	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-0.529	0
25.2	-5.29E-01	13.33
50.4	-5.29E-01	26.66
75.6	-5.29E-01	39.99
100.8	-5.29E-01	53.32
126	0.529	66.65
151.2	0.529	53.32
176.4	0.529	39.99
201.6	0.529	26.66
226.8	0.529	13.33
252	0.529	0

286,000

Loc(in)	V(k)	M(k-in)
0	-32.96	0
25.2	-32.96	830.48
50.4	-32.96	1660.96
75.6	-32.96	2491.44
100.8	-32.96	3321.91
126	32.96	4152.39
151.2	32.96	3321.91
176.4	32.96	2491.44
201.6	32.96	1660.96
226.8	32.96	830.48
252	32.96	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-0.265	0
25.2	-0.265	6.68
50.4	-0.265	13.36
75.6	-2.65E-01	20.03
100.8	-2.65E-01	26.71
126	0.265	33.39
151.2	2.65E-01	26.71
176.4	2.65E-01	20.03
201.6	0.265	13.36
226.8	0.265	6.68
252	0.265	0

315,000

Loc(in)	V(k)	M(k-in)
0	-36.3	0
25.2	-36.3	914.68
50.4	-36.3	1829.37
75.6	-36.3	2744.05
100.8	-36.3	3658.74
126	36.3	4573.42
151.2	36.3	3658.74
176.4	36.3	2744.05
201.6	36.3	1829.37
226.8	36.3	914.68
252	36.3	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-0.616	0
25.2	-6.16E-01	15.52
50.4	-6.16E-01	31.05
75.6	-6.16E-01	46.57
100.8	-0.616	62.09
126	0.616	77.62
151.2	0.616	62.09
176.4	0.616	46.57
201.6	0.616	31.05
226.8	0.616	15.52
252	0.616	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	-43.72521	0
25.2	-43.72521	1101.699
50.4	-43.72521	2203.384
75.6	-43.72521	3305.083
100.8	-43.72521	4406.768
126	43.72521	5508.467
151.2	43.72521	4406.768
176.4	43.72521	3305.083
201.6	43.72521	2203.384
226.8	43.72521	1101.699
252	43.72521	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-0.763135	0
25.2	-0.763135	19.22986
50.4	-0.763135	38.45972
75.6	-0.763135	57.68957
100.8	-0.763135	76.91943
126	0.763135	96.14929
151.2	0.763135	76.91943
176.4	0.763135	57.68957
201.6	0.763135	38.45972
226.8	0.763135	19.22986
252	0.763135	0

286,000

Loc(in)	V(k)	M(k-in)
0	-47.5481	0
25.2	-47.5481	1198.05
50.4	-47.5481	2396.101
75.6	-47.5481	3594.151
100.8	-47.5481	4792.187
126	47.5481	5990.238
151.2	47.5481	4792.187
176.4	47.5481	3594.151
201.6	47.5481	2396.101
226.8	47.5481	1198.05
252	47.5481	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
25.2		9.636568
50.4		19.27314
75.6		28.89528
100.8		38.53185
126		48.16841
151.2	0.382289	38.53185
176.4	0.382289	28.89528
201.6	0.382289	19.27314
226.8	0.382289	9.636568
252	0.382289	0

315,000

Loc(in)	V(k)	M(k-in)
0	-52.36638	0
25.2	-52.36638	1319.517
50.4	-52.36638	2639.049
75.6	-52.36638	3958.567
100.8	-52.36638	5278.098
126	52.36638	6597.616
151.2	52.36638	5278.098
176.4	52.36638	3958.567
201.6	52.36638	2639.049
226.8	52.36638	1319.517
252	52.36638	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-0.888642	0
25.2	-0.888642	22.38915
50.4	-0.888642	44.79273
75.6	-0.888642	67.18188
100.8	-0.888642	89.57103
126	0.888642	111.9746
151.2	0.888642	89.57103
176.4	0.888642	67.18188
201.6	0.888642	44.79273
226.8	0.888642	22.38915
252	0.888642	0

Strength

263,000		
Loc(in)	V	M
0		
25.2		700.7%
50.4		352.6%
75.6		236.6%
100.8		178.6%
126		143.9%
151.2	577.8%	178.6%
176.4	570.0%	236.6%
201.6	562.5%	352.6%
226.8	555.1%	700.7%
252	547.9%	
	547.9%	143.9%

286,000		
Loc(in)	V	M
0		
25.2		657.1%
50.4		330.6%
75.6		221.7%
100.8		167.3%
126		134.7%
151.2	540.3%	167.3%
176.4	533.5%	221.7%
201.6	526.9%	330.6%
226.8	520.4%	657.1%
252	514.1%	
	514.1%	134.7%

315,000		
Loc(in)	V	M
0		
25.2		609.4%
50.4		306.4%
75.6		205.5%
100.8		155.0%
126		124.7%
151.2	499.4%	155.0%
176.4	493.6%	205.5%
201.6	487.9%	306.4%
226.8	482.4%	609.4%
252	477.0%	
	477.0%	124.7%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.2	57.3	49.2	25.2		511.6
50.4	57.3	49.2	50.4		247.1
75.6	57.3	49.2	75.6		159.3
100.8	57.3	49.2	100.8		115.6
126	49.2	49.2	126		89.6
151.2	49.2	49.2	151.2	402.2	115.6
176.4	49.2	49.2	176.4	401.2	159.3
201.6	49.2	49.2	201.6	400.3	247.1
226.8	49.2	49.2	226.8	399.3	511.6
252	49.2		252	398.3	
	49.2	49.2		398.3	89.6

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.2	62.3	53.5	25.2		1020.9
50.4	62.3	53.5	50.4		493.1
75.6	62.3	53.5	75.6		318.0
100.8	62.3	53.5	100.8		230.8
126	53.5	53.5	126		178.9
151.2	53.5	53.5	151.2	802.9	230.8
176.4	53.5	53.5	176.4	801.0	318.0
201.6	53.5	53.5	201.6	799.0	493.1
226.8	53.5	53.5	226.8	797.0	1020.9
252	53.5		252	795.1	
	53.5	53.5		795.1	178.9

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.2	68.6	58.9	25.2		439.4
50.4	68.6	58.9	50.4		212.2
75.6	68.6	58.9	75.6		136.8
100.8	68.6	58.9	100.8		99.3
126	58.9	58.9	126		76.9
151.2	58.9	58.9	151.2	345.4	99.3
176.4	58.9	58.9	176.4	344.6	136.8
201.6	58.9	58.9	201.6	343.7	212.2
226.8	58.9	58.9	226.8	342.9	439.4
252	58.9		252	342.0	
	58.9	58.9		342.0	76.9

Results - Int. Girder

Resistance

Loc(in)	V(k)	M(k-in)
0	181.91	16043
25.2	181.91	16043
50.4	181.91	16043
75.6	181.91	16043
100.8	181.91	16043
126	181.91	16043
151.2	181.91	16043
176.4	181.91	16043
201.6	181.91	16043
226.8	181.91	16043
252	181.91	16043

Length(ft)	21	252
Proportion	1	
Impact	0.4426	

	V	M
263,000	**293.6%**	**211.9%**
286,000	**276.9%**	**199.5%**
315,000	**258.3%**	**185.7%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-19.11	0
25.2	-18.36	472.17
50.4	-17.61	925.4
75.6	-16.86	1359.69
100.8	-16.11	1775.03
126	15.35	2171.42
151.2	16.11	1775.03
176.4	16.86	1359.69
201.6	17.61	925.4
226.8	18.36	472.17
252	19.11	0

E-Ratings

263,000	**49.2**	**49.2**
286,000	**53.5**	**53.5**
315,000	**58.9**	**58.9**
Cooper E-Loc	**217.7**	**147.2**
Cooper E-Lane	**434.0**	**293.5**
Cooper Alt	**186.8**	**126.4**

Bridge #8-TPG-Int. Girder

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	-29.7	0
25.2	-29.7	748.57
50.4	-29.7	1497.13
75.6	-29.7	2245.7
100.8	-29.7	2994.26
126	29.7	3742.83
151.2	29.7	2994.26
176.4	29.7	2245.7
201.6	29.7	1497.13
226.8	29.7	748.57
252	29.7	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-0.5185	0
25.2	-5.19E-01	13.07
50.4	-5.19E-01	26.13
75.6	-5.19E-01	39.2
100.8	-5.19E-01	52.26
126	0.5185	65.33
151.2	0.5185	52.26
176.4	0.5185	39.2
201.6	0.5185	26.13
226.8	0.5185	13.07
252	0.5185	0

286,000

Loc(in)	V(k)	M(k-in)
0	-32.3	0
25.2	-32.3	814.02
50.4	-32.3	1628.05
75.6	-32.3	2442.07
100.8	-32.3	3256.09
126	32.3	4070.11
151.2	32.3	3256.09
176.4	32.3	2442.07
201.6	32.3	1628.05
226.8	32.3	814.02
252	32.3	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-0.26	0
25.2	-0.26	6.55
50.4	-0.26	13.1
75.6	-2.60E-01	19.66
100.8	-2.60E-01	26.21
126	0.26	32.76
151.2	2.60E-01	26.21
176.4	2.60E-01	19.66
201.6	0.26	13.1
226.8	0.26	6.55
252	0.26	0

315,000

Loc(in)	V(k)	M(k-in)
0	-35.58	0
25.2	-35.58	896.57
50.4	-35.58	1793.13
75.6	-35.58	2689.7
100.8	-35.58	3586.26
126	35.58	4482.83
151.2	35.58	3586.26
176.4	35.58	2689.7
201.6	35.58	1793.13
226.8	35.58	896.57
252	35.58	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-0.604	0
25.2	-6.04E-01	15.22
50.4	-6.04E-01	30.44
75.6	-6.04E-01	45.66
100.8	-0.604	60.88
126	0.604	76.1
151.2	0.604	60.88
176.4	0.604	45.66
201.6	0.604	30.44
226.8	0.604	15.22
252	0.604	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	-42.84522	0
25.2	-42.84522	1079.887
50.4	-42.84522	2159.76
75.6	-42.84522	3239.647
100.8	-42.84522	4319.519
126	42.84522	5399.407
151.2	42.84522	4319.519
176.4	42.84522	3239.647
201.6	42.84522	2159.76
226.8	42.84522	1079.887
252	42.84522	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-0.747988	0
25.2	-0.747988	18.85478
50.4	-0.747988	37.69514
75.6	-0.747988	56.54992
100.8	-0.747988	75.39028
126	0.747988	94.24506
151.2	0.747988	75.39028
176.4	0.747988	56.54992
201.6	0.747988	37.69514
226.8	0.747988	18.85478
252	0.747988	0

286,000

Loc(in)	V(k)	M(k-in)
0	-46.59598	0
25.2	-46.59598	1174.305
50.4	-46.59598	2348.625
75.6	-46.59598	3522.93
100.8	-46.59598	4697.235
126	46.59598	5871.541
151.2	46.59598	4697.235
176.4	46.59598	3522.93
201.6	46.59598	2348.625
226.8	46.59598	1174.305
252	46.59598	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
25.2		9.44903
50.4		18.89806
75.6		28.36152
100.8		37.81055
126		47.25958
151.2	0.375076	37.81055
176.4	0.375076	28.36152
201.6	0.375076	18.89806
226.8	0.375076	9.44903
252	0.375076	0

315,000

Loc(in)	V(k)	M(k-in)
0	-51.32771	0
25.2	-51.32771	1293.392
50.4	-51.32771	2586.769
75.6	-51.32771	3880.161
100.8	-51.32771	5173.539
126	51.32771	6466.931
151.2	51.32771	5173.539
176.4	51.32771	3880.161
201.6	51.32771	2586.769
226.8	51.32771	1293.392
252	51.32771	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-0.87133	0
25.2	-0.87133	21.95637
50.4	-0.87133	43.91274
75.6	-0.87133	65.86912
100.8	-0.87133	87.82549
126	0.87133	109.7819
151.2	0.87133	87.82549
176.4	0.87133	65.86912
201.6	0.87133	43.91274
226.8	0.87133	21.95637
252	0.87133	0

Strength

263,000		
Loc(in)	V	M
0		
25.2		1033.7%
50.4		520.0%
75.6		348.8%
100.8		263.2%
126		211.9%
151.2	308.6%	263.2%
176.4	304.7%	348.8%
201.6	300.9%	520.0%
226.8	297.2%	1033.7%
252	293.6%	
	293.6%	211.9%

286,000		
Loc(in)	V	M
0		
25.2		974.4%
50.4		490.0%
75.6		328.6%
100.8		247.9%
126		199.5%
151.2	290.1%	247.9%
176.4	286.7%	328.6%
201.6	283.3%	490.0%
226.8	280.1%	974.4%
252	276.9%	
	276.9%	199.5%

315,000		
Loc(in)	V	M
0		
25.2		908.7%
50.4		456.8%
75.6		306.2%
100.8		230.9%
126		185.7%
151.2	269.7%	230.9%
176.4	266.8%	306.2%
201.6	263.9%	456.8%
226.8	261.0%	908.7%
252	258.3%	
	258.3%	185.7%

E-Ratings

263,000

Loc(in)	V	M
0		
25.2	57.3	49.2
50.4	57.3	49.2
75.6	57.3	49.2
100.8	57.3	49.2
126	49.2	49.2
151.2	49.2	49.2
176.4	49.2	49.2
201.6	49.2	49.2
226.8	49.2	49.2
252	49.2	
	49.2	49.2

286,000

Loc(in)	V	M
0		
25.2	62.3	53.5
50.4	62.3	53.5
75.6	62.3	53.5
100.8	62.3	53.5
126	53.5	53.5
151.2	53.5	53.5
176.4	53.5	53.5
201.6	53.5	53.5
226.8	53.5	53.5
252	53.5	
	53.5	53.5

315,000

Loc(in)	V	M
0		
25.2	68.6	58.9
50.4	68.6	58.9
75.6	68.6	58.9
100.8	68.6	58.9
126	58.9	58.9
151.2	58.9	58.9
176.4	58.9	58.9
201.6	58.9	58.9
226.8	58.9	58.9
252	58.9	
	58.9	58.9

Cooper E1-Locomotive

Loc(in)	V	M
0		
25.2		825.8
50.4		401.0
75.6		259.7
100.8		189.3
126		147.2
151.2	221.7	189.3
176.4	220.7	259.7
201.6	219.7	401.0
226.8	218.7	825.8
252	217.7	
	217.7	147.2

Cooper E1-Lane

Loc(in)	V	M
0		
25.2		1647.9
50.4		800.0
75.6		517.7
100.8		377.4
126		293.5
151.2	442.0	377.4
176.4	440.0	517.7
201.6	438.0	800.0
226.8	436.0	1647.9
252	434.0	
	434.0	293.5

Cooper Alt Load

Loc(in)	V	M
0		
25.2		709.2
50.4		344.3
75.6		222.9
100.8		162.5
126		126.4
151.2	190.3	162.5
176.4	189.4	222.9
201.6	188.6	344.3
226.8	187.7	709.2
252	186.8	
	186.8	126.4

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	2698.5	182315
38.7	2698.5	182315
77.4	2698.5	182315
116.1	2698.5	182315
154.8	2698.5	182315
193.5	2698.5	182315
232.2	2698.5	182315
270.9	2698.5	182315
309.6	2698.5	182315
348.3	2698.5	182315
387	2698.5	182315

Length(ft)	32.25	387
Proportion	1	
Impact	0.4324	

	V	M
263,000	**336.0%**	**246.6%**
286,000	**326.3%**	**240.2%**
315,000	**315.8%**	**232.6%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
38.7		18513.7
77.4		32913.23
116.1		43198.62
154.8		49369.85
193.5		51426.93
232.2	106.31	49369.85
270.9	212.62	43198.62
309.6	318.93	32913.23
348.3	425.24	18513.7
387	531.54	0

E-Ratings

263,000	**48.0**	**49.3**
286,000	**52.2**	**53.6**
315,000	**55.0**	**58.9**
Cooper E-Loc	**446.3**	**326.6**
Cooper E-Lane	**939.6**	**585.7**
Cooper Alt	**402.3**	**286.7**

Bridge #9-SST

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	6.57	6319.89
77.4	14.75	10604.16
116.1	27.9	13747.01
154.8	42.2	15748.44
193.5	61.93	15714.25
232.2	84.4	15748.44
270.9	110.7	13747.01
309.6	137	10604.16
348.3	163.3	6319.89
387	189.6	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	1.00E-01	109.37
77.4	2.45E-01	182.81
116.1	4.45E-01	241.95
154.8	7.35E-01	266.76
193.5	1.07	279.75
232.2	1.47	266.76
270.9	1.87	241.95
309.6	2.33	182.81
348.3	2.83	109.37
387	3.39	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	7.15	6872.58
77.4	16.04	11531.52
116.1	30.34	14949.22
154.8	45.89	17125.68
193.5	67.34	17088.5
232.2	91.79	17125.68
270.9	120.39	14949.22
309.6	148.99	11531.52
348.3	177.59	6872.58
387	206.19	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-	0
38.7		56.16
77.4		99.85
116.1		131.05
154.8		149.77
193.5		156.01
232.2	3.23E-01	149.77
270.9	6.45E-01	131.05
309.6	0.9675	99.85
348.3	1.29	56.16
387	1.61	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	7.88	7506.45
77.4	16.85	12574.8
116.1	32.6	16339.05
154.8	49.73	18799.2
193.5	73.36	18821.25
232.2	99.47	18799.2
270.9	130.97	16339.05
309.6	162.47	12574.8
348.3	193.97	7506.45
387	225.47	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	1.25E-01	126.15
77.4	3.06E-01	213.6
116.1	5.56E-01	277.35
154.8	0.8798	317.4
193.5	1.26	318.75
232.2	1.76	317.4
270.9	2.26	277.35
309.6	2.76	213.6
348.3	3.26	126.15
387	3.76	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	9.410868	9052.61
77.4	21.1279	15189.4
116.1	39.96396	19691.22
154.8	60.44728	22558.07
193.5	88.70853	22509.09
232.2	120.8946	22558.07
270.9	158.5667	19691.22
309.6	196.2388	15189.4
348.3	233.9109	9052.61
387	271.583	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	0.14324	156.6616
77.4	0.350938	261.857
116.1	0.637418	346.5692
154.8	1.052671	382.107
193.5	1.532668	400.7139
232.2	2.105628	382.107
270.9	2.678588	346.5692
309.6	3.337492	261.857
348.3	4.053692	156.6616
387	4.855836	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	10.24166	9844.284
77.4	22.9757	16517.75
116.1	43.45902	21413.26
154.8	65.73284	24530.82
193.5	96.45782	24477.57
232.2	131.48	24530.82
270.9	172.4466	21413.26
309.6	213.4133	16517.75
348.3	254.3799	9844.284
387	295.3466	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
38.7		80.44358
77.4		143.0251
116.1		187.716
154.8		214.5305
193.5		223.4687
232.2	0.461949	214.5305
270.9	0.923898	187.716
309.6	1.385847	143.0251
348.3	1.847796	80.44358
387	2.306164	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	11.28731	10752.24
77.4	24.13594	18012.14
116.1	46.69624	23404.06
154.8	71.23325	26927.97
193.5	105.0809	26959.56
232.2	142.4808	26927.97
270.9	187.6014	23404.06
309.6	232.722	18012.14
348.3	277.8426	10752.24
387	322.9632	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
38.7	0.17905	180.6973
77.4	0.438601	305.9606
116.1	0.796701	397.2761
154.8	1.260226	454.6438
193.5	1.804824	456.5775
232.2	2.521024	454.6438
270.9	3.237224	397.2761
309.6	3.953424	305.9606
348.3	4.669624	180.6973
387	5.385824	0

Strength

263,000		
Loc(in)	V	M
0		
38.7		661.4%
77.4		379.0%
116.1		289.9%
154.8		253.5%
193.5		246.6%
232.2	1187.7%	253.5%
270.9	727.0%	289.9%
309.6	523.8%	379.0%
348.3	409.4%	661.4%
387	336.0%	
	336.0%	246.6%
286,000		
Loc(in)	V	M
0		
38.7		642.9%
77.4		368.8%
116.1		282.2%
154.8		246.7%
193.5		240.2%
232.2	1134.8%	246.7%
270.9	700.8%	282.2%
309.6	506.9%	368.8%
348.3	397.1%	642.9%
387	326.3%	
	326.3%	240.2%
315,000		
Loc(in)	V	M
0		
38.7		623.0%
77.4		358.0%
116.1		273.7%
154.8		239.0%
193.5		232.6%
232.2	1084.6%	239.0%
270.9	674.3%	273.7%
309.6	489.2%	358.0%
348.3	383.8%	623.0%
387	315.8%	
	315.8%	232.6%

E-Ratings

263,000

Loc(in)	V	M
0		
38.7	52.6	50.1
77.4	48.2	49.6
116.1	50.2	49.6
154.8	48.0	49.6
193.5	49.2	49.3
232.2	48.0	49.6
270.9	49.0	49.6
309.6	49.6	49.6
348.3	50.1	50.1
387	50.4	
	48.0	49.3

Cooper E1-Locomotive

Loc(in)	V	M
0		
38.7		1045.6
77.4		570.5
116.1		401.4
154.8		347.9
193.5		326.6
232.2	1231.1	347.9
270.9	928.1	401.4
309.6	713.0	570.5
348.3	560.8	1045.6
387	446.3	
	446.3	326.6

286,000

Loc(in)	V	M
0		
38.7	57.2	54.5
77.4	52.4	54.0
116.1	54.5	53.9
154.8	52.2	54.0
193.5	53.4	53.6
232.2	52.2	54.0
270.9	53.3	53.9
309.6	54.0	54.0
348.3	54.5	54.5
387	54.8	
	52.2	53.6

Cooper E1-Lane

Loc(in)	V	M
0		
38.7		2036.2
77.4		1044.6
116.1		741.1
154.8		619.7
193.5		585.7
232.2	5611.4	619.7
270.9	2690.6	741.1
309.6	1717.1	1044.6
348.3	1230.3	2036.2
387	939.6	
	939.6	585.7

315,000

Loc(in)	V	M
0		
38.7	63.0	59.5
77.4	55.0	58.9
116.1	58.6	58.9
154.8	56.5	59.2
193.5	58.2	59.0
232.2	56.5	59.2
270.9	58.0	58.9
309.6	58.9	58.9
348.3	59.5	59.5
387	60.0	
	55.0	58.9

Cooper Alt Load

Loc(in)	V	M
0		
38.7		906.5
77.4		488.3
116.1		350.2
154.8		292.4
193.5		286.7
232.2	1028.2	292.4
270.9	767.9	350.2
309.6	601.9	488.3
348.3	486.8	906.5
387	402.3	
	402.3	286.7

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	314.74	22224
49.8	314.74	24701
99.6	314.74	28609
149.4	314.74	34928
199.2	314.74	34928
249	314.74	34928
298.8	314.74	34928
348.6	314.74	34928
398.4	314.74	28609
448.2	314.74	24701
498	314.74	22224

Length(ft)	41.5	498
Proportion	0.467	
Impact	0.4237	

	V	M
263,000	**140.8%**	**136.6%**
286,000	**133.4%**	**129.8%**
315,000	**128.1%**	**122.1%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
49.8		3698.67
99.6		6575.42
149.4		8630.23
199.2		9863.12
249		10274.08
298.8	16.51	9863.12
348.6	33.01	8630.23
398.4	49.51	6575.42
448.2	66.02	3698.67
498	82.52	0

E-Ratings

263,000	**47.7**	**50.3**
286,000	**51.8**	**54.7**
315,000	**56.1**	**60.1**
Cooper E-Loc	**86.9**	**85.5**
Cooper E-Lane	**167.9**	**143.5**
Cooper Alt	**86.5**	**81.1**

Bridge #10-TPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	6.57	8947.26
99.6	17.32	15275.04
149.4	30.66	19877.54
199.2	50.38	22754.76
249	74.46	23012.5
298.8	100.76	22754.76
348.6	127.06	19877.54
398.4	153.36	15275.04
448.2	179.66	8947.26
498	212.17	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	1.00E-01	167.65
99.6	2.80E-01	288.14
149.4	5.39E-01	370.32
199.2	8.77E-01	416.81
249	1.28	433.58
298.8	1.7	416.81
348.6	2.2	370.32
398.4	2.76	288.14
448.2	3.37	167.65
498	4.02	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	7.15	9729.72
99.6	18.84	16610.88
149.4	33.34	21615.88
199.2	54.79	24744.72
249	80.98	25025
298.8	109.58	24744.72
348.6	138.18	21615.88
398.4	166.78	16610.88
448.2	195.38	9729.72
498	230.72	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
49.8		93
99.6		165.34
149.4		217
199.2		248
249	0	258.34
298.8	4.15E-01	248
348.6	8.30E-01	217
398.4	1.25	165.34
448.2	1.66	93
498	2.08	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	7.88	10653.3
99.6	20.11	18169.2
149.4	36.09	23681.7
199.2	59.71	27190.8
249	87.92	27562.5
298.8	119.42	27190.8
348.6	150.92	23681.7
398.4	182.42	18169.2
448.2	213.92	10653.3
498	245.42	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	1.25E-01	176.1
99.6	3.49E-01	302.4
149.4	6.43E-01	393.9
199.2	1.04	450.6
249	1.54	457.5
298.8	2.04	450.6
348.6	2.54	393.9
398.4	3.04	302.4
448.2	3.54	176.1
498	4.04	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	4.368182	5948.746
99.6	11.51551	10155.88
149.4	20.38485	13215.94
199.2	33.49604	15128.91
249	49.50606	15300.27
298.8	66.99209	15128.91
348.6	84.47812	13215.94
398.4	101.9641	10155.88
448.2	119.4502	5948.746
498	141.065	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	0.066487	111.4651
99.6	0.185831	191.575
149.4	0.358098	246.2139
199.2	0.583156	277.1236
249	0.851031	288.2734
298.8	1.130275	277.1236
348.6	1.462709	246.2139
398.4	1.835035	191.575
448.2	2.240605	111.4651
498	2.672769	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	4.753805	6468.979
99.6	12.52611	11044.04
149.4	22.1667	14371.7
199.2	36.42811	16451.97
249	53.841	16638.32
298.8	72.85622	16451.97
348.6	91.87145	14371.7
398.4	110.8867	11044.04
448.2	129.9019	6468.979
498	153.3983	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	0	61.83271
99.6	0	109.9293
149.4	0	144.2763
199.2	0	164.8872
249	0	171.762
298.8	0.27592	164.8872
348.6	0.55184	144.2763
398.4	0.831085	109.9293
448.2	1.103681	61.83271
498	1.382925	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	5.239159	7083.037
99.6	13.37049	12080.12
149.4	23.99508	15745.2
199.2	39.69926	18078.29
249	58.45519	18325.42
298.8	79.39852	18078.29
348.6	100.3419	15745.2
398.4	121.2852	12080.12
448.2	142.2285	7083.037
498	163.1719	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
49.8	0.083108	117.0832
99.6	0.232305	201.0561
149.4	0.427577	261.8915
199.2	0.691463	299.5895
249	1.023897	304.1771
298.8	1.356331	299.5895
348.6	1.688764	261.8915
398.4	2.021198	201.0561
448.2	2.353632	117.0832
498	2.686066	0

Strength

263,000		
Loc(in)	V	M
0		
49.8		256.0%
99.6		171.0%
149.4		159.9%
199.2		139.8%
249		136.6%
298.8	376.9%	139.8%
348.6	267.9%	159.9%
398.4	207.8%	171.0%
448.2	169.7%	256.0%
498	140.8%	
	140.8%	136.6%
286,000		
Loc(in)	V	M
0		
49.8		242.9%
99.6		162.4%
149.4		151.8%
199.2		132.7%
249		129.8%
298.8	352.2%	132.7%
348.6	252.0%	151.8%
398.4	196.2%	162.4%
448.2	160.6%	242.9%
498	133.4%	
	133.4%	129.8%
315,000		
Loc(in)	V	M
0		
49.8		229.1%
99.6		153.4%
149.4		143.3%
199.2		125.0%
249		122.1%
298.8	328.2%	125.0%
348.6	236.0%	143.3%
398.4	184.3%	153.4%
448.2	151.1%	229.1%
498	128.1%	
	128.1%	122.1%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
49.8	52.6	50.8	49.8		188.4
99.6	49.6	50.5	99.6		115.0
149.4	47.7	50.5	149.4		106.8
199.2	48.4	50.5	199.2		90.4
249	48.4	50.3	249		85.5
298.8	49.4	50.5	298.8	263.9	90.4
348.6	50.0	50.5	348.6	192.6	106.8
398.4	50.4	50.5	398.4	144.5	115.0
448.2	50.8	50.8	448.2	111.0	188.4
498	52.5		498	86.9	
	47.7	50.3		86.9	85.5

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
49.8	57.2	55.3	49.8		339.7
99.6	53.9	54.9	99.6		200.4
149.4	51.8	54.9	149.4		182.3
199.2	52.7	54.9	199.2		152.0
249	52.6	54.7	249		143.5
298.8	53.7	54.9	298.8	1080.9	152.0
348.6	54.4	54.9	348.6	510.5	182.3
398.4	54.9	54.9	398.4	319.1	200.4
448.2	55.2	55.3	448.2	225.4	339.7
498	57.1		498	167.9	
	51.8	54.7		167.9	143.5

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
49.8	63.0	60.5	49.8		179.4
99.6	57.6	60.1	99.6		109.6
149.4	56.1	60.1	149.4		100.4
199.2	57.4	60.3	199.2		83.7
249	57.1	60.2	249		81.1
298.8	58.5	60.3	298.8	219.9	83.7
348.6	59.4	60.1	348.6	166.8	100.4
398.4	60.0	60.1	398.4	131.2	109.6
448.2	60.4	60.5	448.2	105.7	179.4
498	60.7		498	86.5	
	56.1	60.1		86.5	81.1

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	173.25	14116.6
34.404	173.25	14116.6
68.808	173.25	14116.6
103.212	173.25	14116.6
137.616	173.25	14116.6
172.02	173.25	14116.6
206.424	173.25	14116.6
240.828	173.25	14116.6
275.232	173.25	14116.6
309.636	173.25	14116.6
344.04	173.25	14116.6

Length(ft)	28.67	344.04
Proportion	0.5	
Impact	0.5846	

	V	M
263,000	**115.5%**	**129.4%**
286,000	**106.6%**	**119.5%**
315,000	**98.0%**	**109.4%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
34.404		217.493
68.808		386.6542
103.212		507.4836
137.616		579.9813
172.02		604.1471
206.424	1.40483	579.9813
240.828	2.80966	507.4836
275.232	4.21449	386.6542
309.636	5.61932	217.493
344.04	7.02415	0

E-Ratings

263,000	**47.2**	**48.6**
286,000	**51.3**	**52.9**
315,000	**55.9**	**58.1**
Cooper E-Loc	**67.2**	**74.8**
Cooper E-Lane	**146.7**	**138.4**
Cooper Alt	**58.3**	**64.3**

Bridge #11-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	6.57	5302.08
68.808	13.3	8794.72
103.212	26.45	11372.12
137.616	39.6	13034.28
172.02	57.34	12887
206.424	77.07	13034.28
240.828	101.53	11372.12
275.232	127.83	8794.72
309.636	154.13	5302.08
344.04	180.43	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	1.00E-01	90
68.808	2.26E-01	148.16
103.212	4.26E-01	196.8
137.616	6.77E-01	222.24
172.02	0.9767	228
206.424	1.35	222.24
240.828	1.75	196.8
275.232	2.15	148.16
309.636	2.62	90
344.04	3.12	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	7.15	5765.76
68.808	14.47	9563.84
103.212	28.77	12366.64
137.616	43.07	14174.16
172.02	62.35	14014
206.424	83.8	14174.16
240.828	110.41	12366.64
275.232	139.01	9563.84
309.636	167.61	5765.76
344.04	196.21	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
34.404		44.38
68.808		78.89
103.212		103.54
137.616		118.34
172.02		123.27
206.424	2.87E-01	118.34
240.828	5.73E-01	103.54
275.232	0.86	78.89
309.636	1.15	44.38
344.04	1.43	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	7.88	6287.4
68.808	15.75	10407.6
103.212	30.77	13494.6
137.616	46.52	15548.4
172.02	67.76	15435
206.424	91.39	15548.4
240.828	119.77	13494.6
275.232	151.27	10407.6
309.636	182.77	6287.4
344.04	214.27	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	1.25E-01	106.8
68.808	2.82E-01	179.2
103.212	5.32E-01	232.2
137.616	0.8023	265.8
172.02	1.18	265
206.424	1.6	265.8
240.828	2.1	232.2
275.232	2.6	179.2
309.636	3.1	106.8
344.04	3.6	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	5.205411	4200.838
68.808	10.53759	6968.057
103.212	20.95634	9010.131
137.616	31.37508	10327.06
172.02	45.43048	10210.37
206.424	61.06256	10327.06
240.828	80.44222	9010.131
275.232	101.2797	6968.057
309.636	122.1172	4200.838
344.04	142.9547	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	0.07923	71.307
68.808	0.178743	117.3872
103.212	0.337203	155.9246
137.616	0.536149	176.0808
172.02	0.773839	180.6444
206.424	1.069605	176.0808
240.828	1.386525	155.9246
275.232	1.703445	117.3872
309.636	2.075826	71.307
344.04	2.471976	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	5.664945	4568.212
68.808	11.46458	7577.43
103.212	22.79447	9798.089
137.616	34.12436	11230.19
172.02	49.39991	11103.29
206.424	66.39474	11230.19
240.828	87.47784	9798.089
275.232	110.1376	7577.43
309.636	132.7974	4568.212
344.04	155.4572	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
34.404		35.16227
68.808		62.50455
103.212		82.03474
137.616		93.76078
172.02		97.66682
206.424	0.227152	93.76078
240.828	0.454226	82.03474
275.232	0.681378	62.50455
309.636	0.911145	35.16227
344.04	1.132989	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	6.243324	4981.507
68.808	12.47873	8245.941
103.212	24.37907	10691.77
137.616	36.8578	12319
172.02	53.68625	12229.15
206.424	72.4083	12319
240.828	94.89377	10691.77
275.232	119.8512	8245.941
309.636	144.8087	4981.507
344.04	169.7661	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
34.404	0.099038	84.61764
68.808	0.223429	141.9802
103.212	0.421504	183.9721
137.616	0.635662	210.5933
172.02	0.934914	209.9595
206.424	1.26768	210.5933
240.828	1.66383	183.9721
275.232	2.05998	141.9802
309.636	2.45613	84.61764
344.04	2.85228	0

Strength

263,000

Loc(in)	V	M
0		
34.404		319.5%
68.808		191.9%
103.212		148.3%
137.616		129.4%
172.02		130.5%
206.424	277.3%	129.4%
240.828	208.1%	148.3%
275.232	164.2%	191.9%
309.636	135.6%	319.5%
344.04	115.5%	
	115.5%	129.4%

286,000

Loc(in)	V	M
0		
34.404		295.0%
68.808		177.3%
103.212		137.0%
137.616		119.5%
172.02		120.6%
206.424	255.5%	119.5%
240.828	191.9%	137.0%
275.232	151.5%	177.3%
309.636	125.2%	295.0%
344.04	106.6%	
	106.6%	119.5%

315,000

Loc(in)	V	M
0		
34.404		271.5%
68.808		163.5%
103.212		126.0%
137.616		109.4%
172.02		110.0%
206.424	234.7%	109.4%
240.828	177.3%	126.0%
275.232	139.6%	163.5%
309.636	115.2%	271.5%
344.04	98.0%	
	98.0%	109.4%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
34.404	52.6	49.6	34.404		194.9
68.808	47.2	49.1	68.808		117.0
103.212	49.7	49.0	103.212		87.3
137.616	49.4	49.0	137.616		76.9
172.02	48.6	48.6	172.02		74.8
206.424	48.2	49.0	206.424	160.7	76.9
240.828	48.3	49.0	240.828	122.9	87.3
275.232	49.2	49.1	275.232	99.2	117.0
309.636	49.7	49.6	309.636	80.8	194.9
344.04	50.1		344.04	67.2	
	47.2	48.6		67.2	74.8

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
34.404	57.2	54.0	34.404		395.3
68.808	51.3	53.4	68.808		219.7
103.212	54.1	53.3	103.212		165.9
137.616	53.7	53.3	137.616		144.4
172.02	52.8	52.9	172.02		138.4
206.424	52.4	53.3	206.424	756.5	144.4
240.828	52.6	53.3	240.828	375.2	165.9
275.232	53.5	53.4	275.232	248.1	219.7
309.636	54.1	54.0	309.636	184.0	395.3
344.04	54.5		344.04	146.7	
	51.3	52.9		146.7	138.4

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
34.404	63.0	58.9	34.404		164.3
68.808	55.9	58.1	68.808		96.7
103.212	57.8	58.1	103.212		74.0
137.616	58.0	58.5	137.616		64.3
172.02	57.4	58.2	172.02		64.4
206.424	57.1	58.5	206.424	135.6	64.3
240.828	57.0	58.1	240.828	102.4	74.0
275.232	58.2	58.1	275.232	82.1	96.7
309.636	59.0	58.9	309.636	68.2	164.3
344.04	59.5		344.04	58.3	
	55.9	58.1		58.3	64.3

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	600.95	53547
84.6	600.95	53547
169.2	600.95	53547
253.8	600.95	83676
338.4	600.95	83676
423	600.95	83676
507.6	600.95	83676
592.2	600.95	83676
676.8	600.95	53547
761.4	600.95	53547
846	600.95	53547

Length(ft)	70.5	846
Proportion	0.5	
Impact	0.5068	

	V	M
263,000	**217.4%**	**156.8%**
286,000	**202.0%**	**145.9%**
315,000	**211.3%**	**157.1%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
84.6		2769.82
169.2		4924.13
253.8		6462.92
338.4		7386.19
423		7693.95
507.6	7.28	7386.19
592.2	14.55	6462.92
676.8	21.83	4924.13
761.4	29.1	2769.82
846	36.38	0

	E-Ratings	
263,000	**48.6**	**48.9**
286,000	**52.8**	**53.1**
315,000	**56.1**	**50.8**
Cooper E-Loc	**134.8**	**93.2**
Cooper E-Lane	**212.3**	**135.3**
Cooper Alt	**169.2**	**111.1**

Bridge #12-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	7.87	22507.54
169.2	22.66	38797.76
253.8	45.33	49186.26
338.4	71.63	53673.04
423	97.93	52863
507.6	128.62	53673.04
592.2	167.19	49186.26
676.8	213.45	38797.76
761.4	266.05	22507.54
846	318.65	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	1.29E-01	387.83
169.2	3.87E-01	678.19
253.8	7.75E-01	897.13
338.4	1.23E+00	1032.96
423	1.79	1081.72
507.6	2.45	1032.96
592.2	3.14	897.13
676.8	3.84	678.19
761.4	4.58	387.83
846	5.56	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	8.55	24475.88
169.2	24.64	42190.72
253.8	49.29	53487.72
338.4	77.89	58366.88
423	106.49	57486
507.6	139.87	58366.88
592.2	181.81	53487.72
676.8	232.11	42190.72
761.4	289.31	24475.88
846	346.51	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
84.6		268.39
169.2		477.14
253.8		626.25
338.4		715.72
423		745.54
507.6	7.05E-01	715.72
592.2	1.41E+00	626.25
676.8	2.12	477.14
761.4	2.82	268.39
846	3.53	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	9.05	22883.18
169.2	26.77	38707.2
253.8	53.54	48601.35
338.4	85.04	53499.6
423	116.54	54967.5
507.6	148.04	53499.6
592.2	179.93	48601.35
676.8	220.87	38707.2
761.4	270.49	22883.18
846	329.15	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	1.61E-01	332.7
169.2	4.66E-01	580.8
253.8	9.33E-01	759.3
338.4	1.43	868.2
423	1.93	892.5
507.6	2.43	868.2
592.2	2.93	759.3
676.8	3.43	580.8
761.4	3.93	332.7
846	4.43	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	5.929258	16957.18
169.2	17.07204	29230.23
253.8	34.15162	37056.93
338.4	53.96604	40437.27
423	73.78046	39826.98
507.6	96.90231	40437.27
592.2	125.9609	37056.93
676.8	160.8132	29230.23
761.4	200.4421	16957.18
846	240.0709	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	0.097264	292.1911
169.2	0.291716	510.9483
253.8	0.583508	675.8977
338.4	0.926682	778.2321
423	1.348586	814.9678
507.6	1.84583	778.2321
592.2	2.365676	675.8977
676.8	2.893056	510.9483
761.4	3.450572	292.1911
846	4.188904	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	6.44157	18440.13
169.2	18.56378	31786.49
253.8	37.13509	40297.65
338.4	58.68233	43973.61
423	80.22957	43309.95
507.6	105.3781	43973.61
592.2	136.9757	40297.65
676.8	174.8717	31786.49
761.4	217.9662	18440.13
846	261.0606	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
84.6		202.205
169.2		359.4773
253.8		471.8168
338.4		539.2234
423		561.6898
507.6	0.531147	539.2234
592.2	1.062294	471.8168
676.8	1.597208	359.4773
761.4	2.124588	202.205
846	2.659502	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	6.81827	17240.19
169.2	20.16852	29162
253.8	40.33704	36616.26
338.4	64.06914	40306.6
423	87.80124	41412.51
507.6	111.5333	40306.6
592.2	135.5593	36616.26
676.8	166.4035	29162
761.4	203.7872	17240.19
846	247.9816	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
84.6	0.121523	250.6562
169.2	0.35131	437.5747
253.8	0.702621	572.0566
338.4	1.077362	654.1019
423	1.454062	672.4095
507.6	1.830762	654.1019
592.2	2.207462	572.0566
676.8	2.584162	437.5747
761.4	2.960862	250.6562
846	3.337562	0

Strength

263,000		
Loc(in)	V	M
0		
84.6		271.4%
169.2		156.8%
253.8		192.3%
338.4		175.0%
423		176.1%
507.6	576.8%	175.0%
592.2	427.7%	192.3%
676.8	329.0%	156.8%
761.4	261.8%	271.4%
846	217.4%	
	217.4%	156.8%
286,000		
Loc(in)	V	M
0		
84.6		252.5%
169.2		145.9%
253.8		178.9%
338.4		162.9%
423		164.1%
507.6	533.4%	162.9%
592.2	396.6%	178.9%
676.8	305.5%	145.9%
761.4	243.2%	252.5%
846	202.0%	
	202.0%	145.9%
315,000		
Loc(in)	V	M
0		
84.6		267.6%
169.2		157.1%
253.8		194.2%
338.4		175.4%
423		170.4%
507.6	505.8%	175.4%
592.2	400.3%	194.2%
676.8	319.3%	157.1%
761.4	258.0%	267.6%
846	211.3%	
	211.3%	157.1%

E-Ratings

263,000

Loc(in)	V	M
0		
84.6	48.8	58.0
169.2	48.6	57.2
253.8	48.6	54.8
338.4	50.1	52.0
423	50.7	48.9
507.6	52.5	52.0
592.2	53.2	54.8
676.8	55.6	57.2
761.4	58.1	58.0
846	57.3	
	48.6	48.9

286,000

Loc(in)	V	M
0		
84.6	53.0	63.1
169.2	52.8	62.2
253.8	52.9	59.6
338.4	54.5	56.5
423	55.2	53.1
507.6	57.1	56.5
592.2	57.9	59.6
676.8	60.4	62.2
761.4	63.2	63.1
846	62.3	
	52.8	53.1

315,000

Loc(in)	V	M
0		
84.6	56.1	59.0
169.2	57.4	57.1
253.8	57.4	54.2
338.4	59.5	51.8
423	60.4	50.8
507.6	60.4	51.8
592.2	57.3	54.2
676.8	57.5	57.1
761.4	59.1	59.0
846	59.2	
	56.1	50.8

Cooper E1-Locomotive

Loc(in)	V	M
0		
84.6		173.8
169.2		95.2
253.8		114.2
338.4		98.0
423		93.2
507.6	321.6	98.0
592.2	247.9	114.2
676.8	200.2	95.2
761.4	165.7	173.8
846	134.8	
	134.8	93.2

Cooper E1-Lane

Loc(in)	V	M
0		
84.6		251.1
169.2		135.3
253.8		163.7
338.4		141.5
423		135.3
507.6	1117.7	141.5
592.2	552.0	163.7
676.8	362.6	135.3
761.4	269.2	251.1
846	212.3	
	212.3	135.3

Cooper Alt Load

Loc(in)	V	M
0		
84.6		202.6
169.2		111.1
253.8		135.0
338.4		116.6
423		113.0
507.6	324.3	116.6
592.2	265.6	135.0
676.8	224.1	111.1
761.4	193.1	202.6
846	169.2	
	169.2	111.1

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	580.388	88678
117.6	580.388	88678
235.2	580.388	115724
352.8	580.388	144734
470.4	580.388	144734
588	580.388	144734
705.6	580.388	144734
823.2	580.388	144734
940.8	580.388	115724
1058.4	580.388	88678
1176	580.388	88678

Length(ft)	98	1176
Proportion	0.5	
Impact	0.4482	

	V	M
263,000	**165.0%**	**158.4%**
286,000	**153.8%**	**147.9%**
315,000	**161.7%**	**166.6%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
117.6		6285.63
235.2		11174.45
352.8		14666.46
470.4		16761.67
588		17460.07
705.6	11.88	16761.67
823.2	23.76	14666.46
940.8	35.63	11174.45
1058.4	47.51	6285.63
1176	59.39	0

E-Ratings

263,000	**48.1**	**52.4**
286,000	**52.3**	**56.9**
315,000	**55.6**	**48.7**
Cooper E-Loc	**96.7**	**92.5**
Cooper E-Lane	**146.8**	**122.0**
Cooper Alt	**156.8**	**134.7**

Bridge #13-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	9.35	39739.3
235.2	28.45	68485.2
352.8	54.75	87026.7
470.4	82.13	98651.3
588	118.86	102109.8
705.6	166.43	98651.3
823.2	219.03	87026.7
940.8	273.8	68485.2
1058.4	337.92	39739.3
1176	403.67	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	1.49E-01	735.94
235.2	4.94E-01	1272.72
352.8	9.52E-01	1662.38
470.4	1.54E+00	1870.39
588	2.23	1900.2
705.6	2.93	1870.39
823.2	3.8	1662.38
940.8	4.89	1272.72
1058.4	6.1	735.94
1176	7.44	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	10.17	43214.6
235.2	30.93	74474.4
352.8	59.53	94637.4
470.4	89.31	107278.6
588	129.26	111039.5
705.6	180.99	107278.6
823.2	238.19	94637.4
940.8	297.75	74474.4
1058.4	367.47	43214.6
1176	438.97	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
117.6		518.62
235.2		921.98
352.8		1210.1
470.4		1382.98
588		1440.6
705.6	9.80E-01	1382.98
823.2	1.96E+00	1210.1
940.8	2.94	921.98
1058.4	3.92	518.62
1176	4.9	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	10.93	41227.2
235.2	33.54	71038.8
352.8	65.04	89560.8
470.4	96.54	96793.2
588	128.04	92610
705.6	170.46	96793.2
823.2	224.57	89560.8
940.8	287.57	71038.8
1058.4	350.57	41227.2
1176	413.57	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	1.86E-01	481.2
235.2	5.92E-01	844.8
352.8	1.09E+00	1105.8
470.4	1.59	1264.2
588	2.09	1305
705.6	2.59	1264.2
823.2	3.09	1105.8
940.8	3.59	844.8
1058.4	4.09	481.2
1176	4.59	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	6.770335	28775.23
235.2	20.60065	49590.13
352.8	39.64448	63016.03
470.4	59.47033	71433.41
588	86.06653	73937.67
705.6	120.512	71433.41
823.2	158.5996	63016.03
940.8	198.2586	49590.13
1058.4	244.6879	28775.23
1176	292.2974	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	0.107891	532.8942
235.2	0.357633	921.5766
352.8	0.689054	1203.729
470.4	1.115114	1354.349
588	1.614743	1375.935
705.6	2.121613	1354.349
823.2	2.75158	1203.729
940.8	3.540849	921.5766
1058.4	4.41701	532.8942
1176	5.387304	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	7.364097	31291.69
235.2	22.39641	53926.91
352.8	43.10567	68526.94
470.4	64.66937	77680.43
588	93.59717	80403.7
705.6	131.0549	77680.43
823.2	172.4734	68526.94
940.8	215.6008	53926.91
1058.4	266.085	31291.69
1176	317.8582	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
117.6		375.5327
235.2		667.6057
352.8		876.2334
470.4		1001.416
588		1043.138
705.6	0.709618	1001.416
823.2	1.419236	876.2334
940.8	2.128854	667.6057
1058.4	2.838472	375.5327
1176	3.54809	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	7.914413	29852.62
235.2	24.28631	51439.2
352.8	47.09546	64850.98
470.4	69.90461	70087.96
588	92.71376	67058.9
705.6	123.4301	70087.96
823.2	162.6111	64850.98
940.8	208.2294	51439.2
1058.4	253.8477	29852.62
1176	299.466	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
117.6	0.134827	348.4369
235.2	0.428522	611.7197
352.8	0.789269	800.7098
470.4	1.151319	915.4072
588	1.513369	944.9505
705.6	1.875419	915.4072
823.2	2.237469	800.7098
940.8	2.599519	611.7197
1058.4	2.961569	348.4369
1176	3.323619	0

Strength

263,000		
Loc(in)	V	M
0		
117.6		252.9%
235.2		190.4%
352.8		186.3%
470.4		164.1%
588		158.4%
705.6	438.4%	164.1%
823.2	318.3%	186.3%
940.8	248.1%	190.4%
1058.4	198.6%	252.9%
1176	165.0%	
	165.0%	158.4%
286,000		
Loc(in)	V	M
0		
117.6		236.0%
235.2		177.8%
352.8		174.0%
470.4		153.3%
588		147.9%
705.6	406.1%	153.3%
823.2	295.8%	174.0%
940.8	231.0%	177.8%
1058.4	185.1%	236.0%
1176	153.8%	
	153.8%	147.9%
315,000		
Loc(in)	V	M
0		
117.6		245.4%
235.2		184.8%
352.8		182.0%
470.4		166.6%
588		171.2%
705.6	428.9%	166.6%
823.2	311.4%	182.0%
940.8	238.0%	184.8%
1058.4	192.6%	245.4%
1176	161.7%	
	161.7%	166.6%

E-Ratings

263,000

Loc(in)	V	M
0		
117.6	50.2	54.0
235.2	48.1	53.8
352.8	50.2	52.4
470.4	51.7	52.7
588	53.3	53.7
705.6	56.8	52.7
823.2	57.6	52.4
940.8	56.0	53.8
1058.4	55.4	54.0
1176	54.3	
	48.1	52.4

Cooper E1-Locomotive

Loc(in)	V	M
0		
117.6		154.6
235.2		113.4
352.8		108.1
470.4		94.5
588		92.5
705.6	268.0	94.5
823.2	202.3	108.1
940.8	153.8	113.4
1058.4	120.6	154.6
1176	96.7	
	96.7	92.5

286,000

Loc(in)	V	M
0		
117.6	54.6	58.7
235.2	52.3	58.5
352.8	54.6	56.9
470.4	56.2	57.4
588	58.0	58.4
705.6	61.8	57.4
823.2	62.7	56.9
940.8	60.9	58.5
1058.4	60.2	58.7
1176	59.0	
	52.3	56.9

Cooper E1-Lane

Loc(in)	V	M
0		
117.6		219.4
235.2		156.6
352.8		148.4
470.4		127.8
588		122.0
705.6	801.1	127.8
823.2	392.2	148.4
940.8	255.9	156.6
1058.4	187.7	219.4
1176	146.8	
	146.8	122.0

315,000

Loc(in)	V	M
0		
117.6	58.7	56.0
235.2	56.7	55.8
352.8	59.7	53.9
470.4	60.7	51.8
588	57.4	48.7
705.6	58.2	51.8
823.2	59.1	53.9
940.8	58.8	55.8
1058.4	57.5	56.0
1176	55.6	
	55.6	48.7

Cooper Alt Load

Loc(in)	V	M
0		
117.6		236.5
235.2		170.9
352.8		162.4
470.4		139.8
588		134.7
705.6	303.1	139.8
823.2	248.8	162.4
940.8	209.6	170.9
1058.4	179.9	236.5
1176	156.8	
	156.8	134.7

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	487.6	37357
91.2	487.6	37357
182.4	487.6	48266
273.6	487.6	60056
364.8	487.6	60056
456	487.6	60056
547.2	487.6	60056
638.4	487.6	60056
729.6	487.6	48266
820.8	487.6	37357
912	487.6	37357

Length(ft)	76	912
Proportion	0.25	
Impact	0.4917	

	V	M
263,000	**330.1%**	**213.2%**
286,000	**307.4%**	**199.0%**
315,000	**316.8%**	**215.1%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
91.2		1890.14
182.4		3360.25
273.6		4410.32
364.8		5040.37
456		5250.38
547.2	4.61	5040.37
638.4	9.21	4410.32
729.6	13.82	3360.25
820.8	18.42	1890.14
912	23.03	0

E-Ratings

263,000	**49.1**	**49.4**
286,000	**53.3**	**53.7**
315,000	**56.8**	**49.4**
Cooper E-Loc	**209.4**	**119.5**
Cooper E-Lane	**327.8**	**169.6**
Cooper Alt	**278.7**	**150.7**

Bridge #14-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	8.25	25631.98
182.4	23.88	44352.32
273.6	47.76	56476.62
364.8	74.06	62004.88
456	100.72	60785.88
547.2	135.62	62004.88
638.4	177.91	56476.62
729.6	228.45	44352.32
820.8	281.05	25631.98
912	334.37	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	1.34E-01	448.25
182.4	4.05E-01	777.55
273.6	8.05E-01	1024.61
364.8	1.30E+00	1177.27
456	1.89	1230
547.2	2.57	1177.27
638.4	3.27	1024.61
729.6	3.96	777.55
820.8	4.88	448.25
912	5.95	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	8.97	27873.56
182.4	25.97	48231.04
273.6	51.93	61415.64
364.8	80.53	67427.36
456	109.52	66101.75
547.2	147.48	67427.36
638.4	193.47	61415.64
729.6	248.43	48231.04
820.8	305.63	27873.56
912	363.62	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
91.2		311.9
182.4		554.5
273.6		727.78
364.8		831.74
456		866.4
547.2	7.60E-01	831.74
638.4	1.52E+00	727.78
729.6	2.28	554.5
820.8	3.04	311.9
912	3.8	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	9.53	26258.4
182.4	28.25	44528.4
273.6	56.51	55150.2
364.8	88.01	60580.8
456	119.51	60795
547.2	151.01	60580.8
638.4	186.86	55150.2
729.6	232.24	44528.4
820.8	287.92	26258.4
912	350.92	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	1.68E-01	362.4
182.4	4.87E-01	633.6
273.6	9.74E-01	828.6
364.8	1.47	947.4
456	1.97	975
547.2	2.47	947.4
638.4	2.97	828.6
729.6	3.47	633.6
820.8	3.97	362.4
912	4.47	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	3.076631	9558.806
182.4	8.905449	16540.09
273.6	17.8109	21061.54
364.8	27.61883	23123.17
456	37.56101	22668.57
547.2	50.57609	23123.17
638.4	66.34709	21061.54
729.6	85.19472	16540.09
820.8	104.8106	9558.806
912	124.6949	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	0.050047	167.1636
182.4	0.151147	289.9678
273.6	0.300317	382.1027
364.8	0.484803	439.0334
456	0.704828	458.6978
547.2	0.958417	439.0334
638.4	1.219465	382.1027
729.6	1.476783	289.9678
820.8	1.819874	167.1636
912	2.218904	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	3.345137	10394.75
182.4	9.684862	17986.56
273.6	19.366	22903.43
364.8	30.03165	25145.35
456	40.84275	24651
547.2	54.99898	25145.35
638.4	72.1498	22903.43
729.6	92.64576	17986.56
820.8	113.9771	10394.75
912	135.603	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
91.2		116.3153
182.4		206.7869
273.6		271.4074
364.8		310.1766
456		323.1022
547.2	0.283423	310.1766
638.4	0.566846	271.4074
729.6	0.850269	206.7869
820.8	1.133692	116.3153
912	1.417115	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	3.553975	9792.414
182.4	10.53513	16605.75
273.6	21.07399	20566.89
364.8	32.82113	22592.09
456	44.56827	22671.98
547.2	56.3154	22592.09
638.4	69.68477	20566.89
729.6	86.6081	16605.75
820.8	107.3726	9792.414
912	130.8668	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
91.2	0.062577	135.148
182.4	0.18154	236.2853
273.6	0.363117	309.0057
364.8	0.5482	353.3091
456	0.734662	363.6019
547.2	0.921125	353.3091
638.4	1.107587	309.0057
729.6	1.29405	236.2853
820.8	1.480512	135.148
912	1.666975	0

Strength

263,000		
Loc(in)	V	M
0		
91.2		326.3%
182.4		242.5%
273.6		235.8%
364.8		213.2%
456		215.1%
547.2	883.6%	213.2%
638.4	645.3%	235.8%
729.6	492.5%	242.5%
820.8	395.7%	326.3%
912	330.1%	
	330.1%	213.2%

286,000		
Loc(in)	V	M
0		
91.2		304.1%
182.4		226.1%
273.6		219.9%
364.8		199.0%
456		200.8%
547.2	818.0%	199.0%
638.4	599.3%	219.9%
729.6	458.0%	226.1%
820.8	368.3%	304.1%
912	307.4%	
	307.4%	199.0%

315,000		
Loc(in)	V	M
0		
91.2		319.8%
182.4		241.7%
273.6		240.4%
364.8		217.3%
456		215.1%
547.2	800.3%	217.3%
638.4	618.0%	240.4%
729.6	485.5%	241.7%
820.8	387.6%	319.8%
912	316.8%	
	316.8%	215.1%

E-Ratings

263,000

Loc(in)	V	M
0		
91.2	49.2	57.2
182.4	49.1	57.0
273.6	49.1	55.1
364.8	50.4	52.7
456	51.1	49.4
547.2	52.8	52.7
638.4	54.4	55.1
729.6	57.7	57.0
820.8	57.6	57.2
912	56.2	
	49.1	49.4

Cooper E1-Locomotive

Loc(in)	V	M
0		
91.2		212.2
182.4		154.9
273.6		145.6
364.8		125.3
456		119.5
547.2	503.9	125.3
638.4	392.3	145.6
729.6	320.8	154.9
820.8	257.8	212.2
912	209.4	
	209.4	119.5

286,000

Loc(in)	V	M
0		
91.2	53.5	62.2
182.4	53.3	62.0
273.6	53.3	59.9
364.8	54.8	57.3
456	55.6	53.7
547.2	57.4	57.3
638.4	59.2	59.9
729.6	62.7	62.0
820.8	62.6	62.2
912	61.1	
	53.3	53.7

Cooper E1-Lane

Loc(in)	V	M
0		
91.2		304.9
182.4		217.2
273.6		205.0
364.8		177.4
456		169.6
547.2	1704.1	177.4
638.4	844.0	205.0
729.6	557.2	217.2
820.8	413.9	304.9
912	327.8	
	327.8	169.6

315,000

Loc(in)	V	M
0		
91.2	56.8	58.6
182.4	58.0	57.3
273.6	58.0	53.8
364.8	59.9	51.5
456	60.7	49.4
547.2	58.8	51.5
638.4	57.1	53.8
729.6	58.6	57.3
820.8	59.0	58.6
912	59.0	
	56.8	49.4

Cooper Alt Load

Loc(in)	V	M
0		
91.2		262.4
182.4		190.0
273.6		180.1
364.8		155.7
456		150.7
547.2	524.3	155.7
638.4	431.9	180.1
729.6	366.1	190.0
820.8	316.9	262.4
912	278.7	
	278.7	150.7

Bridge #15-DTR-RESULTS						
		Strength			E-Ratings	
Members	**263**	**286**	**315**	**Cooper E**	**E-Lane**	**Alt E**
Bottom-7&15	177%	166%	172%	112	158	173
Bottom-9&13	134%	126%	132%	80	107	119
Bottom-11	114%	107%	121%	66	84	95
Diagonal-27&36	172%	162%	167%	108	152	167
Diagonal-28&35	200%	188%	193%	131	190	185
Diagonal-29&34	188%	177%	184%	124	194	156
Diagonal-30&33	207%	194%	204%	138	269	155
Diagonal-31&32	259%	240%	243%	154	670	160
Vertical-1&6	500%	464%	435%	349	1046	279
Vertical-2,3,4,5	277%	258%	238%	182	365	154
Top-8&21	573%	527%	479%	194	792	297
Top-10&20	246%	226%	223%	143	221	164
Top-12&19	310%	285%	286%	278	267	219
Top-14&18	298%	274%	287%	390	242	208
Top-16&17	262%	241%	246%	301	227	173
Critical Values	114%	107%	121%	66	84	95

Results-Bottom Chord 11

Resistance

Loc(in)	Tensile
0	294.57
60	294.57
120	294.57
180	294.57
240	294.57

Length(ft)	100	1200
Proportion	0.33	
Impact	0.1743	

Axial Capacity

263,000	**176.7%**
286,000	**166.3%**
315,000	**172.4%**

Dead Load

Loc(in)	P(k)	V(k)	M(k-in)
0	46.76	-0.61	0.00
60	46.76	-0.30	27.28
120	46.76	0.00	36.38
180	46.76	0.30	27.28
240	46.76	0.61	0.00

E-Ratings

263,000	**54.3**
286,000	**59.0**
315,000	**56.1**
Cooper E-Loc	**112.1**
Cooper E-Lane	**157.5**
Cooper Alt	**172.9**

Bridge#15-DTR

Live Loads

263,000				**Cooper E1-Locomotive**			
Frame	Loc(in)	P(k)	M(k-in)	Frame	Loc(in)	P(k)	M(k-in)
7,15	0	309.47	0.00	7,15	0	5.70	0.00
7,15	60	309.47	0.00	7,15	60	5.70	0.00
7,15	120	309.47	0.00	7,15	120	5.70	0.00
7,15	180	309.47	0.00	7,15	180	5.70	0.00
7,15	240	309.47	0.00	7,15	240	5.70	0.00

	286,000				**Cooper E1-Lane**		
Frame	Loc(in)	P(k)	M(k-in)	Frame	Loc(in)	P(k)	M(k-in)
7,15	0	336.53	0.00	7,15	0	4.059988	0
7,15	60	336.53	0.00	7,15	60	4.059988	0
7,15	120	336.53	0.00	7,15	120	4.059988	0
7,15	180	336.53	0.00	7,15	180	4.059988	0
7,15	240	336.53	0.00	7,15	240	4.059988	0

	315,000				**Cooper Alt Load**		
Frame	Loc(in)	P(k)	M(k-in)	Frame	Loc(in)	P(k)	M(k-in)
7,15	0	320.21	0.00	7,15	0	3.70	0.00
7,15	60	320.21	0.00	7,15	60	3.70	0.00
7,15	120	320.21	0.00	7,15	120	3.70	0.00
7,15	180	320.21	0.00	7,15	180	3.70	0.00
7,15	240	320.21	0.00	7,15	240	3.70	0.00

Live Load with Proportion and Impact

263,000

Loc(in)	P(k)	M(k-in)
0	119.9255	0
60	119.9255	0
120	119.9255	0
180	119.9255	0
240	119.9255	0

Cooper E1-Locomotive

Loc(in)	P(k)	M(k-in)
0	2.210257	0
60	2.210257	0
120	2.210257	0
180	2.210257	0
240	2.210257	0

286,000

Loc(in)	P(k)	M(k-in)
0	130.4132	0
60	130.4132	0
120	130.4132	0
180	130.4132	0
240	130.4132	0

Cooper E1-Lane

Loc(in)	P(k)	M(k-in)
0	1.573322	0
60	1.573322	0
120	1.573322	0
180	1.573322	0
240	1.573322	0

315,000

Loc(in)	P(k)	M(k-in)
0	124.0877	0
60	124.0877	0
120	124.0877	0
180	124.0877	0
240	124.0877	0

Cooper Alt Load

Loc(in)	P(k)	M(k-in)
0	1.433529	0
60	1.433529	0
120	1.433529	0
180	1.433529	0
240	1.433529	0

Strength

263,000		
Loc(in)	P	M
0	176.7%	
60	176.7%	
120	176.7%	
180	176.7%	
240	176.7%	
	176.7%	
286,000		
Loc(in)	P	M
0	166.3%	0.0%
60	166.3%	0.0%
120	166.3%	0.0%
180	166.3%	0.0%
240	166.3%	0.0%
	166.3%	
315,000		
Loc(in)	P	M
0	172.4%	0.0%
60	172.4%	0.0%
120	172.4%	0.0%
180	172.4%	0.0%
240	172.4%	0.0%
	172.4%	

E-Ratings

263,000		Cooper E1-Locomotive	
Loc(in)	P	Loc(in)	P
0	54.3	0	112.1
60	54.3	60	112.1
120	54.3	120	112.1
180	54.3	180	112.1
240	54.3	240	112.1
	54.3		112.1
286,000		Cooper E1-Lane	
Loc(in)	P	Loc(in)	P
0	59.0	0	157.5
60	59.0	60	157.5
120	59.0	120	157.5
180	59.0	180	157.5
240	59.0	240	157.5
	59.0		157.5
315,000		Cooper Alt Load	
Loc(in)	P	Loc(in)	P
0	56.1	0	172.9
60	56.1	60	172.9
120	56.1	120	172.9
180	56.1	180	172.9
240	56.1	240	172.9
	56.1		172.9

Results-Stringer

Resistance

Loc(in)	V(k)	M(k-in)
0	214.4	5379
15.2	214.4	5379
30.4	214.4	5379
45.6	214.4	5379
60.8	214.4	5379
76	214.4	5379
91.2	214.4	5379
106.4	214.4	5379
121.6	214.4	5379
136.8	214.4	5379
152	214.4	5379

Length(ft)	12.666667	152
Proportion	0.5	
Impact	0.597	

	V	M
263,000	**247.8%**	**212.2%**
286,000	**228.6%**	**196.0%**
315,000	**211.7%**	**184.9%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
15.2		49.64
30.4		88.26
45.6		115.84
60.8		132.39
76		137.9
91.2	0.7258	132.39
106.4	1.45	115.84
121.6	2.18	88.26
136.8	2.9	49.64
152	3.63	0

E-Ratings

263,000	**47.8**	**46.0**
286,000	**52.0**	**50.1**
315,000	**54.8**	**52.5**
Cooper E-Loc	**145.0**	**121.5**
Cooper E-Lane	**416.8**	**272.7**
Cooper Alt	**121.6**	**107.4**

Bridge #16-TTR-Stringer

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	6.57	1351.82
30.4	13.15	2303.88
45.6	19.73	2856.18
60.8	26.3	3008.72
76	36.34	2761.5
91.2	49.49	3008.72
106.4	62.64	2856.18
121.6	75.79	2303.88
136.8	88.94	1351.82
152	103.82	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	1.00E-01	23.04
30.4	2.00E-01	36.96
45.6	3.00E-01	45.84
60.8	4.05E-01	49.44
76	0.6053	54
91.2	0.8053	49.44
106.4	1.01	45.84
121.6	1.22	36.96
136.8	1.52	23.04
152	1.82	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	7.15	1470.04
30.4	14.3	2505.36
45.6	21.45	3105.96
60.8	28.6	3271.84
76	39.51	3003
91.2	53.81	3271.84
106.4	68.11	3105.96
121.6	82.41	2505.36
136.8	96.71	1470.04
152	112.89	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
15.2		8.66
30.4		15.4
45.6		20.22
60.8		23.1
76		24.07
91.2	1.27E-01	23.1
106.4	2.53E-01	20.22
121.6	0.38	15.4
136.8	0.5067	8.66
152	0.6333	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	7.88	1587.6
30.4	15.75	2696.4
45.6	23.63	3326.4
60.8	31.5	3477.6
76	41.45	3150
91.2	57.2	3477.6
106.4	72.95	3326.4
121.6	88.7	2696.4
136.8	104.45	1587.6
152	122.27	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	1.25E-01	27.3
30.4	2.50E-01	45.8
45.6	3.75E-01	57.3
60.8	0.5066	61.2
76	0.7566	60
91.2	1.01	61.2
106.4	1.26	57.3
121.6	1.51	45.8
136.8	1.8	27.3
152	2.17	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	5.246145	1079.428
30.4	10.50028	1839.648
45.6	15.75441	2280.66
60.8	21.00055	2402.463
76	29.01749	2205.058
91.2	39.51777	2402.463
106.4	50.01804	2280.66
121.6	60.51832	1839.648
136.8	71.01859	1079.428
152	82.90027	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	5.709275	1173.827
30.4	11.41855	2000.53
45.6	17.12783	2480.109
60.8	22.8371	2612.564
76	31.54874	2397.896
91.2	42.96729	2612.564
106.4	54.38584	2480.109
121.6	65.80439	2000.53
136.8	77.22294	1173.827
152	90.14267	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	6.29218	1267.699
30.4	12.57638	2153.075
45.6	18.86856	2656.13
60.8	25.15275	2776.864
76	33.09783	2515.275
91.2	45.6742	2776.864
106.4	58.25058	2656.13
121.6	70.82695	2153.075
136.8	83.40333	1267.699
152	97.6326	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	0.07985	18.39744
30.4	0.1597	29.51256
45.6	0.23955	36.60324
60.8	0.323632	39.47784
76	0.483332	43.119
91.2	0.643032	39.47784
106.4	0.806485	36.60324
121.6	0.97417	29.51256
136.8	1.21372	18.39744
152	1.45327	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
15.2		6.91501
30.4		12.2969
45.6		16.14567
60.8		18.44535
76		19.2199
91.2	0.10117	18.44535
106.4	0.20226	16.14567
121.6	0.30343	12.2969
136.8	0.4046	6.91501
152	0.50569	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
15.2	0.099813	21.79905
30.4	0.199625	36.5713
45.6	0.299438	45.75405
60.8	0.40452	48.8682
76	0.604145	47.91
91.2	0.806485	48.8682
106.4	1.00611	45.75405
121.6	1.205735	36.5713
136.8	1.4373	21.79905
152	1.732745	0

Strength

263,000		
Loc(in)	V	M
0		
15.2		476.4%
30.4		279.0%
45.6		224.5%
60.8		212.2%
76		229.6%
91.2	532.8%	212.2%
106.4	416.6%	224.5%
121.6	342.0%	279.0%
136.8	290.0%	476.4%
152	247.8%	
	247.8%	212.2%

286,000		
Loc(in)	V	M
0		
15.2		439.7%
30.4		257.5%
45.6		207.2%
60.8		196.0%
76		212.1%
91.2	490.7%	196.0%
106.4	384.0%	207.2%
121.6	315.4%	257.5%
136.8	267.6%	439.7%
152	228.6%	
	228.6%	196.0%

315,000		
Loc(in)	V	M
0		
15.2		408.3%
30.4		240.0%
45.6		194.0%
60.8		184.9%
76		202.7%
91.2	462.1%	184.9%
106.4	359.1%	194.0%
121.6	293.7%	240.0%
136.8	248.4%	408.3%
152	211.7%	
	211.7%	184.9%

E-Ratings

263,000

Loc(in)	V	M
0		
15.2	52.6	49.5
30.4	52.6	50.3
45.6	52.6	49.8
60.8	51.9	49.2
76	48.0	46.0
91.2	49.0	49.2
106.4	49.7	49.8
121.6	50.2	50.3
136.8	49.4	49.5
152	47.8	
	47.8	46.0

Cooper E1-Locomotive

Loc(in)	V	M
0		
15.2		289.7
30.4		179.3
45.6		143.8
60.8		132.9
76		121.5
91.2	332.3	132.9
106.4	264.0	143.8
121.6	217.8	179.3
136.8	174.3	289.7
152	145.0	
	145.0	121.5

286,000

Loc(in)	V	M
0		
15.2	57.2	53.8
30.4	57.2	54.7
45.6	57.2	54.2
60.8	56.5	53.5
76	52.2	50.1
91.2	53.3	53.5
106.4	54.1	54.2
121.6	54.6	54.7
136.8	53.7	53.8
152	52.0	
	52.0	50.1

Cooper E1-Lane

Loc(in)	V	M
0		
15.2		770.7
30.4		430.2
45.6		326.0
60.8		284.4
76		272.7
91.2	2112.0	284.4
106.4	1052.9	326.0
121.6	699.4	430.2
136.8	522.7	770.7
152	416.8	
	416.8	272.7

315,000

Loc(in)	V	M
0		
15.2	63.0	58.2
30.4	63.0	58.9
45.6	63.0	58.1
60.8	62.2	56.8
76	54.8	52.5
91.2	56.6	56.8
106.4	57.9	58.1
121.6	58.7	58.9
136.8	58.0	58.2
152	56.3	
	54.8	52.5

Cooper Alt Load

Loc(in)	V	M
0		
15.2		244.5
30.4		144.7
45.6		115.0
60.8		107.4
76		109.4
91.2	264.9	107.4
106.4	211.7	115.0
121.6	176.0	144.7
136.8	147.2	244.5
152	121.6	
	121.6	107.4

Results-Floorbeam

Resistance

Loc(in)	V(k)	M(k-in)
0	438.55	14676.82
19.9	438.55	14676.82
39.8	438.55	14676.82
59.7	438.55	14676.82
79.6	438.55	14676.82
99.5	438.55	14676.82
119.4	438.55	14676.82
139.3	438.55	14676.82
159.2	438.55	14676.82
179.1	438.55	14676.82
199	438.55	14676.82

Length(ft)	16.583333	199
Proportion	1	
Impact	0.3092	

	V	M
263,000	**450.0%**	**217.9%**
286,000	**417.0%**	**201.8%**
315,000	**381.6%**	**184.6%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0.00
19.9		177.55
39.8		347.74
59.7		510.57
79.6		592.74
99.5		596.42
119.4	0.37	592.74
139.3	8.00	510.57
159.2	8.37	347.74
179.1	8.74	177.55
199	9.11	0.00

E-Ratings

263,000	**47.7**	**47.7**
286,000	**51.9**	**51.9**
315,000	**57.1**	**57.1**
Cooper E-Loc	**271.0**	**127.8**
Cooper E-Lane	**517.9**	**244.3**
Cooper Alt	**231.9**	**109.4**

Bridge #16-TTR-Floorbeam

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0		0
19.9		1342.857
39.8		2685.714
59.7		4028.571
79.6		4689.877
99.5		4689.877
119.4	0	4689.877
139.3	67.48025	4028.571
159.2	67.48025	2685.714
179.1	67.48025	1342.857
199	67.48025	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0		0
19.9		24.08995
39.8		48.17989
59.7		72.26984
79.6		84.13323
99.5		84.13323
119.4	0	84.13323
139.3	1.21055	72.26984
159.2	1.21055	48.17989
179.1	1.21055	24.08995
199	1.21055	0

286,000

Loc(in)	V(k)	M(k-in)
0		0
19.9		1460.294
39.8		2920.588
59.7		4380.882
79.6		5100.021
99.5		5100.021
119.4	0	5100.021
139.3	73.3816	4380.882
159.2	73.3816	2920.588
179.1	73.3816	1460.294
199	73.3816	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
19.9		12.60367
39.8		25.20733
59.7		37.811
79.6		44.01783
99.5		44.01783
119.4	0.00E+00	44.01783
139.3	6.33E-01	37.811
159.2	0.63335	25.20733
179.1	0.63335	12.60367
199	0.63335	0

315,000

Loc(in)	V(k)	M(k-in)
0		0
19.9		1608.365
39.8		3216.73
59.7		4825.094
79.6		5617.153
99.5		5617.153
119.4	0	5617.153
139.3	80.82235	4825.094
159.2	80.82235	3216.73
179.1	80.82235	1608.365
199	80.82235	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0		0
19.9		28.14756
39.8		56.29511
59.7		84.44267
79.6		98.30428
99.5		98.30428
119.4	0	98.30428
139.3	1.41445	84.44267
159.2	1.41445	56.29511
179.1	1.41445	28.14756
199	1.41445	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
19.9	0	1758.068
39.8	0	3516.137
59.7	0	5274.205
79.6	0	6139.987
99.5	0	6139.987
119.4	0	6139.987
139.3	88.34514	5274.205
159.2	88.34514	3516.137
179.1	88.34514	1758.068
199	88.34514	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
19.9	0	31.53856
39.8	0	63.07711
59.7	0	94.61567
79.6	0	110.1472
99.5	0	110.1472
119.4	0	110.1472
139.3	1.584852	94.61567
159.2	1.584852	63.07711
179.1	1.584852	31.53856
199	1.584852	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
19.9	0	1911.817
39.8	0	3823.633
59.7	0	5735.45
79.6	0	6676.948
99.5	0	6676.948
119.4	0	6676.948
139.3	96.07119	5735.45
159.2	96.07119	3823.633
179.1	96.07119	1911.817
199	96.07119	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
19.9		16.50072
39.8		33.00144
59.7		49.50215
79.6		57.62814
99.5		57.62814
119.4	0	57.62814
139.3	0.829182	49.50215
159.2	0.829182	33.00144
179.1	0.829182	16.50072
199	0.829182	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
19.9	0	2105.671
39.8	0	4211.342
59.7	0	6317.013
79.6	0	7353.977
99.5	0	7353.977
119.4	0	7353.977
139.3	105.8126	6317.013
159.2	105.8126	4211.342
179.1	105.8126	2105.671
199	105.8126	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
19.9	0	36.85078
39.8	0	73.70156
59.7	0	110.5523
79.6	0	128.7
99.5	0	128.7
119.4	0	128.7
139.3	1.851798	110.5523
159.2	1.851798	73.70156
179.1	1.851798	36.85078
199	1.851798	0

Strength

263,000		
Loc(in)	V	M
0		
19.9		758.2%
39.8		379.8%
59.7		253.7%
79.6		218.0%
99.5		217.9%
119.4	118588.5%	218.0%
139.3	455.2%	253.7%
159.2	453.5%	379.8%
179.1	451.7%	758.2%
199	450.0%	
	450.0%	217.9%
286,000		
Loc(in)	V	M
0		
19.9		702.5%
39.8		351.8%
59.7		235.0%
79.6		201.9%
99.5		201.8%
119.4	118588.5%	201.9%
139.3	421.4%	235.0%
159.2	419.9%	351.8%
179.1	418.4%	702.5%
199	417.0%	
	417.0%	201.8%
315,000		
Loc(in)	V	M
0		
19.9		642.8%
39.8		321.9%
59.7		215.0%
79.6		184.7%
99.5		184.6%
119.4	118588.5%	184.7%
139.3	385.3%	215.0%
159.2	384.1%	321.9%
179.1	382.8%	642.8%
199	381.6%	
	381.6%	184.6%

E-Ratings

263,000

Loc(in)	V	M
0		
19.9		47.7
39.8		47.7
59.7		47.7
79.6		47.7
99.5		47.7
119.4		47.7
139.3	47.7	47.7
159.2	47.7	47.7
179.1	47.7	47.7
199	47.7	
	47.7	47.7

286,000

Loc(in)	V	M
0		
19.9		51.9
39.8		51.9
59.7		51.9
79.6		51.9
99.5		51.9
119.4		51.9
139.3	51.9	51.9
159.2	51.9	51.9
179.1	51.9	51.9
199	51.9	
	51.9	51.9

315,000

Loc(in)	V	M
0		
19.9		57.1
39.8		57.1
59.7		57.1
79.6		57.1
99.5		57.1
119.4		57.1
139.3	57.1	57.1
159.2	57.1	57.1
179.1	57.1	57.1
199	57.1	
	57.1	57.1

Cooper E1-Locomotive

Loc(in)	V	M
0		
19.9		459.7
39.8		227.2
59.7		149.7
79.6		127.9
99.5		127.8
119.4		127.9
139.3	271.7	149.7
159.2	271.4	227.2
179.1	271.2	459.7
199	271.0	
	271.0	127.8

Cooper E1-Lane

Loc(in)	V	M
0		
19.9		878.7
39.8		434.2
59.7		286.2
79.6		244.4
99.5		244.3
119.4		244.4
139.3	519.2	286.2
159.2	518.8	434.2
179.1	518.4	878.7
199	517.9	
	517.9	244.3

Cooper Alt Load

Loc(in)	V	M
0		
19.9		393.5
39.8		194.4
59.7		128.1
79.6		109.4
99.5		109.4
119.4		109.4
139.3	232.5	128.1
159.2	232.3	194.4
179.1	232.1	393.5
199	231.9	
	231.9	109.4

Results

	Gravity	E1+GR.	E1ALT+GR.	E1Lane+GR.	263+GR.	286+GR.	315+GR.
Max Comp. Stress (psi) From Finite Element Model	287.31	287.62	287.48	287.36	301.3	302.52	302
Allowable Comp. Stress (psi)- (AREA)	400	400	400	400	400	400	400
Strength %	**139.22%**	**139.07%**	**139.14%**	**139.20%**	**132.76%**	**132.22%**	**132.45%**
E1 Rating		364	663	2254	45	49	47

Bridge # 17-MAR

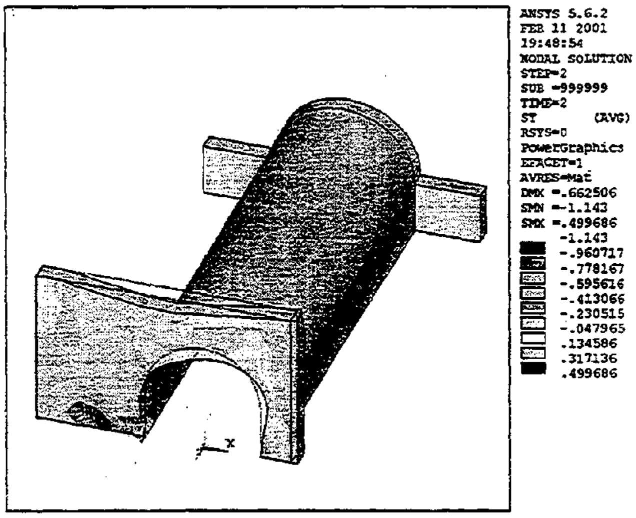
Compressive Strength		E-Ratings	
		263,000	**45**
263,000	**132.76%**	**286,000**	**49**
286,000	**132.22%**	**315,000**	**47**
315,000	**132.45%**	**Cooper E-Loc**	**364**
		Cooper E-Lane	**663**
		Cooper Alt	**2254**

Bridge # 17-MAR

RESULTS-BRIDGE #18

For a moderate tensile strength of125psi, spandrel wall of the bridge collapsed for all three car-loadings. Below are the illustration and list of results for the collapse on the spandrel wall, created by 315,000-pound car.

Collapse of Spandrel Wall



Results- (f_t=125psi)							
	Gravity	**E1+GR.**	**E1ALT+GR.**	**E1Lane+GR.**	**263+GR.**	**286+GR.**	**315+GR.**
Strength %	**100%++**	**120.00%**	**118.00%**	**135.00%**	**40.00%**	**35.00%**	**35.00%**
E1 Rating		20	18	35			
Bridge # 18-MAR							

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	29.83	1211
10.8	29.83	1211
21.6	29.83	1211
32.4	29.83	1211
43.2	29.83	1211
54	29.83	1211
64.8	29.83	1211
75.6	29.83	1211
86.4	29.83	1211
97.2	29.83	1211
108	29.83	1211

Length(ft)	9	108
Proportion	0.5	
Impact	0	

	V	**M**
263,000	**64.3%**	**131.0%**
286,000	**59.2%**	**120.9%**
315,000	**55.4%**	**110.1%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0.000
10.8		13.209
21.6		23.484
32.4		30.822
43.2		35.225
54		36.693
64.8	0.272	35.225
75.6	0.544	30.822
86.4	0.815	23.484
97.2	1.087	13.209
108	1.359	0.000

E-Ratings

263,000	**47.8**	**48.0**
286,000	**52.0**	**52.2**
315,000	**54.5**	**54.7**
Cooper E-Loc	**39.5**	**84.5**
Cooper E-Lane	**126.5**	**193.3**
Cooper Alt	**31.5**	**67.6**

Bridge #19-TST

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	6.57	831.08
21.6	13.15	1378.12
32.4	19.73	1641.12
43.2	26.3	1704.24
54	32.88	1775.25
64.8	39.45	1704.24
75.6	50.65	1641.12
86.4	63.8	1378.12
97.2	76.95	831.08
108	90.1	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	1.00E-01	13.44
21.6	2.00E-01	22.56
32.4	3.00E-01	27.36
43.2	4.00E-01	27.84
54	0.5	27
64.8	0.6444	27.84
75.6	0.8444	27.36
86.4	1.04	22.56
97.2	1.24	13.44
108	1.44	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	7.15	903.76
21.6	14.3	1498.64
32.4	21.45	1784.64
43.2	28.6	1853.28
54	35.75	1930.5
64.8	42.9	1853.28
75.6	55.08	1784.64
86.4	69.38	1498.64
97.2	83.68	903.76
108	97.98	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-0.45	0
10.8	-0.36	4.37
21.6	-0.27	7.78
32.4	-1.80E-01	10.21
43.2	-9.00E-02	11.66
54	0	12.15
64.8	9.00E-02	11.66
75.6	1.80E-01	10.21
86.4	0.27	7.78
97.2	0.36	4.37
108	0.45	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	7.88	963.9
21.6	15.75	1587.6
32.4	23.63	1871.1
43.2	31.5	2041.2
54	39.38	2126.25
64.8	47.25	2041.2
75.6	57.75	1871.1
86.4	73.5	1587.6
97.2	89.25	963.9
108	105	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	1.25E-01	16.8
21.6	2.50E-01	28.2
32.4	3.75E-01	34.2
43.2	0.5	34.8
54	0.625	33.75
64.8	0.8056	34.8
75.6	1.06	34.2
86.4	1.31	28.2
97.2	1.56	16.8
108	1.81	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	3.285	415.54
21.6	6.575	689.06
32.4	9.865	820.56
43.2	13.15	852.12
54	16.44	887.625
64.8	19.725	852.12
75.6	25.325	820.56
86.4	31.9	689.06
97.2	38.475	415.54
108	45.05	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	0.05	6.72
21.6	0.1	11.28
32.4	0.15	13.68
43.2	0.2	13.92
54	0.25	13.5
64.8	0.3222	13.92
75.6	0.4222	13.68
86.4	0.52	11.28
97.2	0.62	6.72
108	0.72	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	3.575	451.88
21.6	7.15	749.32
32.4	10.725	892.32
43.2	14.3	926.64
54	17.875	965.25
64.8	21.45	926.64
75.6	27.54	892.32
86.4	34.69	749.32
97.2	41.84	451.88
108	48.99	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
10.8		2.185
21.6		3.89
32.4		5.105
43.2		5.83
54		6.075
64.8	0.045	5.83
75.6	0.09	5.105
86.4	0.135	3.89
97.2	0.18	2.185
108	0.225	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	3.94	481.95
21.6	7.875	793.8
32.4	11.815	935.55
43.2	15.75	1020.6
54	19.69	1063.125
64.8	23.625	1020.6
75.6	28.875	935.55
86.4	36.75	793.8
97.2	44.625	481.95
108	52.5	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
10.8	0.0625	8.4
21.6	0.125	14.1
32.4	0.1875	17.1
43.2	0.25	17.4
54	0.3125	16.875
64.8	0.4028	17.4
75.6	0.53	17.1
86.4	0.655	14.1
97.2	0.78	8.4
108	0.905	0

Strength

263,000		
Loc(in)	V	M
0		
10.8		282.4%
21.6		170.0%
32.4		142.2%
43.2		136.5%
54		131.0%
64.8	149.2%	136.5%
75.6	115.3%	142.2%
86.4	91.2%	170.0%
97.2	75.4%	282.4%
108	64.3%	
	64.3%	131.0%

286,000		
Loc(in)	V	M
0		
10.8		260.4%
21.6		156.7%
32.4		131.2%
43.2		125.9%
54		120.9%
64.8	137.3%	125.9%
75.6	106.2%	131.2%
86.4	84.0%	156.7%
97.2	69.5%	260.4%
108	59.2%	
	59.2%	120.9%

315,000		
Loc(in)	V	M
0		
10.8		244.6%
21.6		148.2%
32.4		125.3%
43.2		114.7%
54		110.1%
64.8	124.8%	114.7%
75.6	101.4%	125.3%
86.4	79.4%	148.2%
97.2	65.3%	244.6%
108	55.4%	
	55.4%	110.1%

E-Ratings

263,000

Loc(in)	V	M
0		
10.8	52.6	49.5
21.6	52.6	48.9
32.4	52.6	48.0
43.2	52.6	49.0
54	52.6	52.6
64.8	49.0	49.0
75.6	47.8	48.0
86.4	48.7	48.9
97.2	49.3	49.5
108	49.8	
	47.8	48.0

Cooper E1-Locomotive

Loc(in)	V	M
0		
10.8		178.2
21.6		105.3
32.4		86.3
43.2		84.5
54		87.0
64.8	91.7	84.5
75.6	69.4	86.3
86.4	55.8	105.3
97.2	46.4	178.2
108	39.5	
	39.5	84.5

286,000

Loc(in)	V	M
0		
10.8	57.2	53.8
21.6	57.2	53.1
32.4	57.2	52.2
43.2	57.2	53.3
54	57.2	57.2
64.8	53.3	53.3
75.6	52.0	52.2
86.4	53.0	53.1
97.2	53.6	53.8
108	54.1	
	52.0	52.2

Cooper E1-Lane

Loc(in)	V	M
0		
10.8		548.2
21.6		305.3
32.4		231.2
43.2		201.7
54		193.3
64.8	656.8	201.7
75.6	325.4	231.2
86.4	214.9	305.3
97.2	159.7	548.2
108	126.5	
	126.5	193.3

315,000

Loc(in)	V	M
0		
10.8	63.0	57.4
21.6	63.0	56.3
32.4	63.0	54.7
43.2	63.0	58.7
54	63.0	63.0
64.8	58.7	58.7
75.6	54.5	54.7
86.4	56.1	56.3
97.2	57.2	57.4
108	58.0	
	54.5	54.7

Cooper Alt Load

Loc(in)	V	M
0		
10.8		142.6
21.6		84.2
32.4		69.0
43.2		67.6
54		69.6
64.8	73.4	67.6
75.6	55.3	69.0
86.4	44.3	84.2
97.2	36.8	142.6
108	31.5	
	31.5	67.6

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	142.76	7279.5
8.4	142.76	7279.5
16.8	142.76	7279.5
25.2	142.76	7279.5
33.6	142.76	7279.5
42	142.76	7279.5
50.4	142.76	7279.5
58.8	142.76	7279.5
67.2	142.76	7279.5
75.6	142.76	7279.5
84	142.76	7279.5

Length(ft)	7	84
Proportion	1	
Impact	0.6	

	V	M
263,000	**121.7%**	**288.6%**
286,000	**112.8%**	**268.0%**
315,000	**108.0%**	**246.0%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0.000
8.4		112.852
16.8		200.626
25.2		263.321
33.6		300.938
42		313.478
50.4	2.986	300.938
58.8	5.971	263.321
67.2	8.957	200.626
75.6	11.942	112.852
84	14.928	0.000

E-Ratings

263,000	**47.4**	**47.5**
286,000	**51.5**	**51.7**
315,000	**54.6**	**54.7**
Cooper E-Loc	**73.9**	**207.3**
Cooper E-Lane	**228.3**	**592.3**
Cooper Alt	**59.1**	**165.9**

Bridge #20-CSB

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	6.57	547.04
16.8	13.15	883.68
25.2	19.73	1159.83
33.6	26.3	1325.52
42	32.88	1380.75
50.4	39.45	1325.52
58.8	46.03	1159.83
67.2	52.6	883.68
75.6	65.12	547.04
84	78.27	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	1.00E-01	9.12
16.8	2.00E-01	14.88
25.2	3.00E-01	17.64
33.6	4.00E-01	20.16
42	0.5	21
50.4	0.6	20.16
58.8	0.7	17.64
67.2	0.8857	14.88
75.6	1.09	9.12
84	1.29	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	7.15	594.88
16.8	14.3	960.96
25.2	21.45	1261.26
33.6	28.6	1441.44
42	35.75	1501.5
50.4	42.9	1441.44
58.8	50.05	1261.26
67.2	57.2	960.96
75.6	70.82	594.88
84	85.12	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
8.4		2.65
16.8		4.7
25.2		6.17
33.6		7.06
42		7.35
50.4	7.00E-02	7.06
58.8	1.40E-01	6.17
67.2	0.21	4.7
75.6	0.28	2.65
84	0.35	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	7.88	623.7
16.8	15.75	1058.4
25.2	23.63	1389.15
33.6	31.5	1587.6
42	39.38	1653.75
50.4	47.25	1587.6
58.8	55.13	1389.15
67.2	63	1058.4
75.6	74.25	623.7
84	90	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	1.25E-01	11.4
16.8	2.50E-01	18.6
25.2	3.75E-01	22.05
33.6	0.5	25.2
42	0.625	26.25
50.4	0.75	25.2
58.8	0.875	22.05
67.2	1.11	18.6
75.6	1.36	11.4
84	1.61	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	10.512	875.264
16.8	21.04	1413.888
25.2	31.568	1855.728
33.6	42.08	2120.832
42	52.608	2209.2
50.4	63.12	2120.832
58.8	73.648	1855.728
67.2	84.16	1413.888
75.6	104.192	875.264
84	125.232	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	0.16	14.592
16.8	0.32	23.808
25.2	0.48	28.224
33.6	0.64	32.256
42	0.8	33.6
50.4	0.96	32.256
58.8	1.12	28.224
67.2	1.41712	23.808
75.6	1.744	14.592
84	2.064	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	11.44	951.808
16.8	22.88	1537.536
25.2	34.32	2018.016
33.6	45.76	2306.304
42	57.2	2402.4
50.4	68.64	2306.304
58.8	80.08	2018.016
67.2	91.52	1537.536
75.6	113.312	951.808
84	136.192	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
8.4		4.24
16.8		7.52
25.2		9.872
33.6		11.296
42		11.76
50.4	0.112	11.296
58.8	0.224	9.872
67.2	0.336	7.52
75.6	0.448	4.24
84	0.56	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	12.608	997.92
16.8	25.2	1693.44
25.2	37.808	2222.64
33.6	50.4	2540.16
42	63.008	2646
50.4	75.6	2540.16
58.8	88.208	2222.64
67.2	100.8	1693.44
75.6	118.8	997.92
84	144	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
8.4	0.2	18.24
16.8	0.4	29.76
25.2	0.6	35.28
33.6	0.8	40.32
42	1	42
50.4	1.2	40.32
58.8	1.4	35.28
67.2	1.776	29.76
75.6	2.176	18.24
84	2.576	0

Strength

263,000		
Loc(in)	V	M
0		
8.4		736.7%
16.8		450.9%
25.2		343.5%
33.6		300.6%
42		288.6%
50.4	216.0%	300.6%
58.8	179.3%	343.5%
67.2	153.3%	450.9%
75.6	122.9%	736.7%
84	101.9%	
	101.9%	288.6%
286,000		
Loc(in)	V	M
0		
8.4		683.7%
16.8		418.8%
25.2		319.1%
33.6		279.2%
42		268.0%
50.4	199.3%	279.2%
58.8	165.9%	319.1%
67.2	142.1%	418.8%
75.6	114.0%	683.7%
84	94.5%	
	94.5%	268.0%
315,000		
Loc(in)	V	M
0		
8.4		655.4%
16.8		384.3%
25.2		292.8%
33.6		256.2%
42		246.0%
50.4	181.7%	256.2%
58.8	151.6%	292.8%
67.2	130.1%	384.3%
75.6	109.2%	655.4%
84	89.8%	
	89.8%	246.0%

E-Ratings

263,000

Loc(in)	V	M
0		
8.4	52.6	48.0
16.8	52.6	47.5
25.2	52.6	52.6
33.6	52.6	52.6
42	52.6	52.6
50.4	52.6	52.6
58.8	52.6	52.6
67.2	47.4	47.5
75.6	47.9	48.0
84	48.6	
	47.4	47.5

Cooper E1-Locomotive

Loc(in)	V	M
0		
8.4		491.1
16.8		297.3
25.2		248.6
33.6		216.3
42		207.3
50.4	145.6	216.3
58.8	122.1	248.6
67.2	94.4	297.3
75.6	75.0	491.1
84	61.9	
	61.9	207.3

286,000

Loc(in)	V	M
0		
8.4	57.2	52.2
16.8	57.2	51.7
25.2	57.2	57.2
33.6	57.2	57.2
42	57.2	57.2
50.4	57.2	57.2
58.8	57.2	57.2
67.2	51.5	51.7
75.6	52.1	52.2
84	52.9	
	51.5	51.7

Cooper E1-Lane

Loc(in)	V	M
0		
8.4		1690.2
16.8		941.3
25.2		710.7
33.6		617.8
42		592.3
50.4	1248.0	617.8
58.8	610.7	710.7
67.2	398.2	941.3
75.6	292.0	1690.2
84	228.3	
	228.3	592.3

315,000

Loc(in)	V	M
0		
8.4	63.0	54.7
16.8	63.0	56.9
25.2	63.0	63.0
33.6	63.0	63.0
42	63.0	63.0
50.4	63.0	63.0
58.8	63.0	63.0
67.2	56.8	56.9
75.6	54.6	54.7
84	55.9	
	54.6	54.7

Cooper Alt Load

Loc(in)	V	M
0		
8.4		392.9
16.8		237.9
25.2		198.9
33.6		173.1
42		165.9
50.4	116.5	173.1
58.8	97.7	198.9
67.2	75.3	237.9
75.6	60.1	392.9
84	49.6	
	49.6	165.9

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	348.35	28307
51	348.35	28307
102	348.35	35102
153	348.35	41927
204	348.35	41927
255	348.35	41927
306	348.35	41927
357	348.35	41927
408	348.35	35102
459	348.35	28307
510	348.35	28307

Length(ft)	42.5	510
Proportion	0.52	
Impact	0.4195	

	V	**M**
263,000	**152.7%**	**158.7%**
286,000	**144.0%**	**150.0%**
315,000	**138.4%**	**140.3%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-69.42	0
51	-55.54	3186.55
102	-41.65	5664.98
153	-27.77	7435.28
204	-13.88	8497.47
255	0	8851.53
306	13.88	8497.47
357	27.77	7435.28
408	41.65	5664.98
459	55.54	3186.55
510	69.42	0

E-Ratings

263,000	**47.9**	**50.4**
286,000	**52.1**	**54.8**
315,000	**56.4**	**60.2**
Cooper E-Loc	**92.4**	**99.1**
Cooper E-Lane	**177.4**	**165.4**
Cooper Alt	**93.1**	**94.8**

Bridge #21-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	6.57	9283.9
102	17.53	15780
153	31.33	20540.3
204	51.05	23512.2
255	75.81	23801.5
306	102.11	23512.2
357	128.41	20540.3
408	154.71	15780
459	182.04	9283.9
510	214.91	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
51	1.00E-01	174.45
102	2.82E-01	300.24
153	5.47E-01	384.55
204	8.94E-01	434.64
255	1.29	452.02
306	1.73	434.64
357	2.24	384.55
408	2.81	300.24
459	3.42	174.45
510	4.09	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	7.15	10095.8
102	19.07	17160
153	34.07	22336.6
204	55.52	25568.4
255	82.44	25883
306	111.04	25568.4
357	139.64	22336.6
408	168.24	17160
459	197.96	10095.8
510	233.71	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-2.13	0
51	-1.7	97.54
102	-1.28	173.4
153	-8.50E-01	227.59
204	-4.25E-01	260.1
255	0	270.94
306	4.25E-01	260.1
357	8.50E-01	227.59
408	1.28	173.4
459	1.7	97.54
510	2.13	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	7.88	10993.5
102	20.38	18774
153	36.9	24475.5
204	60.53	28098
255	89.56	28507.5
306	121.06	28098
357	152.56	24475.5
408	184.06	18774
459	215.56	10993.5
510	247.06	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
51	1.25E-01	181.5
102	3.53E-01	312
153	6.54E-01	406.5
204	1.06	465
255	1.56	472.5
306	2.06	465
357	2.56	406.5
408	3.06	312
459	3.56	181.5
510	4.06	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	4.84958	6852.818
102	12.93959	11647.85
153	23.12593	15161.62
204	37.68205	17355.3
255	55.95839	17568.84
306	75.37148	17355.3
357	94.78456	15161.62
408	114.1976	11647.85
459	134.371	6852.818
510	158.6337	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
51	0.073814	128.7685
102	0.208451	221.6192
153	0.403836	283.8517
204	0.659971	320.8252
255	0.952201	333.654
306	1.276982	320.8252
357	1.653434	283.8517
408	2.074173	221.6192
459	2.524439	128.7685
510	3.018993	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	5.277701	7452.114
102	14.07633	12666.48
153	25.14843	16487.54
204	40.98153	18873.06
255	60.85226	19105.28
306	81.96307	18873.06
357	103.0739	16487.54
408	124.1847	12666.48
459	146.1222	7452.114
510	172.5107	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
51		71.99818
102		127.9935
153		167.9933
204		191.9902
255		199.9917
306	0.31371	191.9902
357	0.627419	167.9933
408	0.944819	127.9935
459	1.254838	71.99818
510	1.572238	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
51	5.816543	8114.742
102	15.04329	13857.84
153	27.23737	18066.35
204	44.67961	20740.26
255	66.10782	21042.53
306	89.35923	20740.26
357	112.6106	18066.35
408	135.862	13857.84
459	159.1135	8114.742
510	182.3649	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
51	0.092268	133.9724
102	0.26049	230.2997
153	0.483039	300.0539
204	0.782428	343.2351
255	1.151498	348.7712
306	1.520568	343.2351
357	1.889638	300.0539
408	2.258708	230.2997
459	2.627778	133.9724
510	2.996848	0

Strength

263,000		
Loc(in)	V	M
0		
51		282.0%
102		202.8%
153		185.5%
204		162.2%
255		158.7%
306	390.3%	162.2%
357	284.2%	185.5%
408	223.5%	202.8%
459	183.4%	282.0%
510	152.7%	
	152.7%	158.7%

286,000		
Loc(in)	V	M
0		
51		266.1%
102		191.5%
153		175.3%
204		153.2%
255		150.0%
306	363.5%	153.2%
357	266.2%	175.3%
408	210.1%	191.5%
459	172.7%	266.1%
510	144.0%	
	144.0%	150.0%

315,000		
Loc(in)	V	M
0		
51		250.5%
102		179.8%
153		164.4%
204		143.4%
255		140.3%
306	337.4%	143.4%
357	248.1%	164.4%
408	196.2%	179.8%
459	162.3%	250.5%
510	138.4%	
	138.4%	140.3%

E-Ratings

263,000

Loc(in)	V	M
0		
51	52.6	51.2
102	49.7	50.6
153	47.9	50.5
204	48.2	50.6
255	48.6	50.4
306	49.6	50.6
357	50.2	50.5
408	50.6	50.6
459	51.1	51.2
510	52.5	
	47.9	50.4

Cooper E1-Locomotive

Loc(in)	V	M
0		
51		195.1
102		132.8
153		121.5
204		104.2
255		99.1
306	261.9	104.2
357	193.9	121.5
408	147.9	132.8
459	116.0	195.1
510	92.4	
	92.4	99.1

286,000

Loc(in)	V	M
0		
51	57.2	55.6
102	54.0	55.0
153	52.1	54.9
204	52.4	55.0
255	52.8	54.8
306	53.9	55.0
357	54.5	54.9
408	55.0	55.0
459	55.6	55.6
510	57.1	
	52.1	54.8

Cooper E1-Lane

Loc(in)	V	M
0		
51		348.9
102		230.0
153		205.3
204		174.1
255		165.4
306	1066.2	174.1
357	511.0	205.3
408	324.6	230.0
459	233.3	348.9
510	177.4	
	177.4	165.4

315,000

Loc(in)	V	M
0		
51	63.0	60.6
102	57.8	60.2
153	56.4	60.2
204	57.1	60.4
255	57.4	60.3
306	58.8	60.4
357	59.6	60.2
408	60.2	60.2
459	60.6	60.6
510	60.4	
	56.4	60.2

Cooper Alt Load

Loc(in)	V	M
0		
51		187.5
102		127.8
153		115.0
204		97.4
255		94.8
306	220.0	97.4
357	169.7	115.0
408	135.8	127.8
459	111.4	187.5
510	93.1	
	93.1	94.8

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	738.16	104502
106.1	738.16	104502
212.2	738.16	148394
318.3	738.16	148394
424.4	738.16	187700
530.5	738.16	187700
636.6	738.16	187700
742.7	738.16	148394
848.8	738.16	148394
954.9	738.16	104502
1061	738.16	104502

Length(ft)	88.416667	1061
Proportion	0.51	
Impact	0.3265	

	V	M
263,000	**137.9%**	**130.5%**
286,000	**132.4%**	**125.8%**
315,000	**135.5%**	**129.4%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-280.8025	0
106.1	-224.642	27573.69
212.2	-168.4815	49019.9
318.3	-112.321	64338.61
424.4	-56.1605	73529.84
530.5	0	76593.59
636.6	56.1605	73529.84
742.7	112.321	64338.61
848.8	168.4815	49019.9
954.9	224.642	27573.69
1061	280.8025	0

E-Ratings

263,000	**47.6**	**52.2**
286,000	**51.8**	**56.8**
315,000	**56.5**	**48.2**
Cooper E-Loc	**99.4**	**91.8**
Cooper E-Lane	**153.0**	**126.1**
Cooper Alt	**148.6**	**126.1**

Bridge #22-DPG

Live Loads

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
106.1	8.94	33033.46	106.1	1.43E-01	602.59
212.2	26.06	57086.78	212.2	4.61E-01	1041.14
318.3	52.13	72935.16	318.3	8.89E-01	1353.56
424.4	78.43	81553.67	424.4	1.44E+00	1546.33
530.5	110.37	83206.63	530.5	2.1	1593.26
636.6	152.15	81553.67	636.6	2.79	1546.33
742.7	202.86	72935.16	742.7	3.49	1353.56
848.8	255.46	57086.78	848.8	4.46	1041.14
954.9	311.34	33033.46	954.9	5.57	602.59
1061	376.16	0	1061	6.8	0

286,000			Cooper E1-Lane		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0		0
106.1	9.72	35922.32	106.1		422.15
212.2	28.34	62079.16	212.2		750.48
318.3	56.69	79313.52	318.3		985.01
424.4	85.29	88685.74	424.4		1125.72
530.5	120.02	90483.25	530.5		1172.63
636.6	165.45	88685.74	636.6	8.84E-01	1125.72
742.7	220.61	79313.52	742.7	1.77E+00	985.01
848.8	277.81	62079.16	848.8	2.65	750.48
954.9	338.57	35922.32	954.9	3.54	422.15
1061	409.05	0	1061	4.42	0

315,000			Cooper Alt Load		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
106.1	10.41	34706.7	106.1	1.79E-01	429.45
212.2	30.92	59446.8	212.2	5.48E-01	752.8
318.3	61.84	74346.3	318.3	1.05E+00	985.05
424.4	93.34	79405.2	424.4	1.55	1126.2
530.5	124.84	76761.56	530.5	2.05	1161.25
636.6	159.95	79405.2	636.6	2.55	1126.2
742.7	205.96	74346.3	742.7	3.05	985.05
848.8	264.11	59446.8	848.8	3.55	752.8
954.9	327.11	34706.7	954.9	4.05	429.45
1061	390.11	0	1061	4.55	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.1	6.048044	22347.63
212.2	17.62998	38620.06
318.3	35.26673	49341.73
424.4	53.05907	55172.28
530.5	74.66696	56290.53
636.6	102.9318	55172.28
742.7	137.2378	49341.73
848.8	172.8225	38620.06
954.9	210.6262	22347.63
1061	254.4779	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
106.1	0.097012	407.6612
212.2	0.31167	704.3468
318.3	0.601625	915.7036
424.4	0.974182	1046.115
530.5	1.420682	1077.864
636.6	1.887477	1046.115
742.7	2.361037	915.7036
848.8	3.017257	704.3468
954.9	3.768189	407.6612
1061	4.600302	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.1	6.575726	24301.99
212.2	19.17244	41997.48
318.3	38.35164	53656.79
424.4	57.69996	59997.23
530.5	81.19533	61213.28
636.6	111.9294	59997.23
742.7	149.246	53656.79
848.8	187.9426	41997.48
954.9	229.0477	24301.99
1061	276.7285	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
106.1		285.5908
212.2		507.711
318.3		666.374
424.4		761.5665
530.5		793.3018
636.6	0.598175	761.5665
742.7	1.197432	666.374
848.8	1.792765	507.711
954.9	2.394863	285.5908
1061	2.990196	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
106.1	7.042521	23479.6
212.2	20.91784	40216.65
318.3	41.83569	50296.39
424.4	63.14591	53718.81
530.5	84.45613	51930.35
636.6	108.2086	53718.81
742.7	139.335	50296.39
848.8	178.6744	40216.65
954.9	221.2948	23479.6
1061	263.9153	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
106.1	0.121299	290.5294
212.2	0.37046	509.2805
318.3	0.710341	666.4011
424.4	1.048598	761.8912
530.5	1.386856	785.603
636.6	1.725113	761.8912
742.7	2.063371	666.4011
848.8	2.401628	509.2805
954.9	2.739886	290.5294
1061	3.078143	0

Strength

263,000		
Loc(in)	V	M
0		
106.1		209.3%
212.2		169.3%
318.3		130.5%
424.4		145.8%
530.5		141.3%
636.6	464.0%	145.8%
742.7	295.8%	130.5%
848.8	216.3%	169.3%
954.9	169.6%	209.3%
1061	137.9%	
	137.9%	130.5%
286,000		
Loc(in)	V	M
0		
106.1		201.4%
212.2		163.0%
318.3		125.8%
424.4		140.6%
530.5		136.2%
636.6	439.1%	140.6%
742.7	282.2%	125.8%
848.8	207.1%	163.0%
954.9	162.7%	201.4%
1061	132.4%	
	132.4%	125.8%
315,000		
Loc(in)	V	M
0		
106.1		204.7%
212.2		166.3%
318.3		129.4%
424.4		147.5%
530.5		146.0%
636.6	449.1%	147.5%
742.7	293.3%	129.4%
848.8	212.6%	166.3%
954.9	165.5%	204.7%
1061	135.5%	
	135.5%	129.4%

E-Ratings

263,000

Loc(in)	V	M
0		
106.1	49.9	54.8
212.2	47.6	54.8
318.3	49.6	53.9
424.4	50.6	52.7
530.5	52.6	52.2
636.6	54.5	52.7
742.7	58.1	53.9
848.8	57.3	54.8
954.9	55.9	54.8
1061	55.3	
	47.6	52.2

Cooper E1-Locomotive

Loc(in)	V	M
0		
106.1		188.7
212.2		141.1
318.3		91.8
424.4		109.1
530.5		103.1
636.6	361.3	109.1
742.7	265.1	91.8
848.8	188.8	141.1
954.9	136.3	188.7
1061	99.4	
	99.4	91.8

286,000

Loc(in)	V	M
0		
106.1	54.2	59.6
212.2	51.8	59.6
318.3	54.0	58.6
424.4	55.0	57.4
530.5	57.2	56.8
636.6	59.3	57.4
742.7	63.2	58.6
848.8	62.3	59.6
954.9	60.8	59.6
1061	60.2	
	51.8	56.8

Cooper E1-Lane

Loc(in)	.V	M
0		
106.1		269.4
212.2		195.7
318.3		126.1
424.4		149.9
530.5		140.1
636.6	1140.1	149.9
742.7	522.7	126.1
848.8	317.8	195.7
954.9	214.4	269.4
1061	153.0	
	153.0	126.1

315,000

Loc(in)	V	M
0		
106.1	58.1	57.6
212.2	56.5	57.1
318.3	58.9	54.9
424.4	60.2	51.4
530.5	59.4	48.2
636.6	57.3	51.4
742.7	59.0	54.9
848.8	59.2	57.1
954.9	58.7	57.6
1061	57.4	
	56.5	48.2

Cooper Alt Load

Loc(in)	V	M
0		
106.1		264.8
212.2		195.1
318.3		126.1
424.4		149.9
530.5		141.4
636.6	395.3	149.9
742.7	303.3	126.1
848.8	237.2	195.1
954.9	187.4	264.8
1061	148.6	
	148.6	126.1

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	389.8	25833
70.5	389.8	35263
141	389.8	35263
211.5	389.8	52417
282	389.8	52417
352.5	389.8	52417
423	389.8	52417
493.5	389.8	52417
564	389.8	35263
634.5	389.8	35263
705	389.8	25833

Length(ft)	58.75	705
Proportion	0.5	
Impact	0.5353	

	V	M
263,000	**162.5%**	**146.4%**
286,000	**150.8%**	**136.1%**
315,000	**159.1%**	**136.4%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
70.5		1717.05
141		3052.53
211.5		4006.44
282		4578.79
352.5		4769.58
423	5.41	4578.79
493.5	10.82	4006.44
564	16.24	3052.53
634.5	21.65	1717.05
705	27.06	0

E-Ratings

263,000	**47.4**	**48.9**
286,000	**51.5**	**53.2**
315,000	**54.9**	**55.3**
Cooper E-Loc	**96.8**	**79.4**
Cooper E-Lane	**160.7**	**119.9**
Cooper Alt	**109.4**	**86.7**

Bridge #23-DPG

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.5	6.81	16046.29
141	19.96	27391.45
211.5	39.03	34328.07
282	64.91	38240.2
352.5	91.21	38250.06
423	117.51	38240.2
493.5	147.77	34328.07
564	184.85	27391.45
634.5	227.61	16046.29
705	277.18	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
70.5	1.15E-01	295.06
141	3.45E-01	515.52
211.5	6.89E-01	675.71
282	1.09E+00	765.66
352.5	1.59	782.06
423	2.15	765.66
493.5	2.8	675.71
564	3.49	515.52
634.5	4.19	295.06
705	4.88	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.5	7.4	17449.57
141	21.7	29786.9
211.5	42.44	37330.15
282	70.59	41584.4
352.5	99.19	41595.13
423	127.79	41584.4
493.5	160.7	37330.15
564	201.01	29786.9
634.5	247.51	17449.57
705	301.42	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
70.5		186.38
141		331.35
211.5		434.9
282		497.03
352.5		517.73
423	5.88E-01	497.03
493.5	1.18E+00	434.9
564	1.76	331.35
634.5	2.35	186.38
705	2.94	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
70.5	7.88	16887.94
141	23.46	28602
211.5	46.3	37374.75
282	76.85	42840
352.5	108.35	43863.75
423	139.85	42840
493.5	171.35	37374.75
564	202.85	28602
634.5	239.55	16887.94
705	283.95	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
70.5	1.44E-01	269.25
141	4.10E-01	468
211.5	8.19E-01	611.25
282	1.32	699
352.5	1.82	716.25
423	2.32	699
493.5	2.82	611.25
564	3.32	468
634.5	3.82	269.25
705	4.32	0

Live Load with Proportion and Impact

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
70.5	5.227697	12317.93	70.5	0.088203	226.5028
141	15.32229	21027.05	141	0.264609	395.7389
211.5	29.96138	26351.94	211.5	0.529218	518.7088
282	49.82816	29355.09	282	0.836739	587.7589
352.5	70.01736	29362.66	352.5	1.220564	600.3484
423	90.20655	29355.09	423	1.650448	587.7589
493.5	113.4356	26351.94	493.5	2.14942	518.7088
564	141.9001	21027.05	564	2.679099	395.7389
634.5	174.7248	12317.93	634.5	3.216454	226.5028
705	212.7772	0	705	3.746132	0

286,000			Cooper E1-Lane		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0		0
70.5	5.68061	13395.16	70.5		143.0746
141	16.65801	22865.91	141		254.3608
211.5	32.57907	28656.49	211.5		333.851
282	54.18841	31922.26	282		381.5451
352.5	76.1432	31930.5	352.5		397.4354
423	98.09799	31922.26	423	0.450994	381.5451
493.5	123.3614	28656.49	493.5	0.905827	333.851
564	154.3053	22865.91	564	1.351064	254.3608
634.5	190.0011	13395.16	634.5	1.803978	143.0746
705	231.3851	0	705	2.256891	0

315,000			Cooper Alt Load		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
70.5	6.049082	12964.03	70.5	0.110235	206.6898
141	18.00907	21956.33	141	0.314429	359.2602
211.5	35.5422	28690.73	211.5	0.628782	469.2261
282	58.9939	32886.13	282	1.013298	536.5874
352.5	83.17488	33672.01	352.5	1.397123	549.8293
423	107.3559	32886.13	423	1.780948	536.5874
493.5	131.5368	28690.73	493.5	2.164773	469.2261
564	155.7178	21956.33	564	2.548598	359.2602
634.5	183.8906	12964.03	634.5	2.932423	206.6898
705	217.9742	0	705	3.316248	0

Strength

263,000		
Loc(in)	V	M
0		
70.5		251.3%
141		146.4%
211.5		172.7%
282		154.5%
352.5		153.6%
423	407.7%	154.5%
493.5	313.7%	172.7%
564	246.5%	146.4%
634.5	198.5%	251.3%
705	162.5%	
	162.5%	146.4%

286,000		
Loc(in)	V	M
0		
70.5		233.3%
141		136.1%
211.5		160.5%
282		143.6%
352.5		142.8%
423	376.6%	143.6%
493.5	290.5%	160.5%
564	228.6%	136.1%
634.5	184.2%	233.3%
705	150.8%	
	150.8%	136.1%

315,000		
Loc(in)	V	M
0		
70.5		240.2%
141		141.0%
211.5		160.3%
282		139.9%
352.5		136.4%
423	345.7%	139.9%
493.5	273.8%	160.3%
564	226.7%	141.0%
634.5	189.6%	240.2%
705	159.1%	
	159.1%	136.4%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
70.5	47.4	54.4	70.5		148.1
141	48.7	53.1	141		81.4
211.5	47.6	50.8	211.5		93.3
282	49.2	49.9	282		81.4
352.5	50.1	48.9	352.5		79.4
423	50.7	49.9	423	232.9	81.4
493.5	52.4	50.8	493.5	176.3	93.3
564	53.0	53.1	564	139.4	81.4
634.5	54.3	54.4	634.5	114.5	148.1
705	56.8		705	96.8	
	47.4	48.9		96.8	79.4

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
70.5	51.5	59.1	70.5		234.5
141	53.0	57.8	141		126.6
211.5	51.8	55.2	211.5		145.0
282	53.5	54.3	282		125.4
352.5	54.5	53.2	352.5		119.9
423	55.1	54.3	423	852.3	125.4
493.5	57.0	55.2	493.5	418.4	145.0
564	57.6	57.8	564	276.5	126.6
634.5	59.1	59.1	634.5	204.1	234.5
705	61.8		705	160.7	
	51.5	53.2		160.7	119.9

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
70.5	54.9	57.2	70.5		162.3
141	57.3	55.5	141		89.7
211.5	56.5	55.3	211.5		103.2
282	58.2	56.0	282		89.2
352.5	59.5	56.1	352.5		86.7
423	60.3	56.0	423	215.8	89.2
493.5	60.8	55.3	493.5	175.1	103.2
564	58.1	55.5	564	146.6	89.7
634.5	57.2	57.2	634.5	125.5	162.3
705	58.2		705	109.4	
	54.9	55.3		109.4	86.7

Results-Stringer

Resistance

Loc(in)	V(k)	M(k-in)
0	143	8040.9
25.8	143	8040.9
51.6	143	8040.9
77.4	143	8040.9
103.2	143	8040.9
129	143	8040.9
154.8	143	8040.9
180.6	143	8040.9
206.4	143	8040.9
232.2	143	8040.9
258	143	8040.9

Length(ft)	21.5	258
Proportion	0.41	
Impact	0.5913	

	V	M
263,000	**138.2%**	**149.9%**
286,000	**127.5%**	**138.3%**
315,000	**117.6%**	**126.0%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
25.8		86.16
51.6		153.18
77.4		201.04
103.2		229.77
129		239.34
154.8	0.7421	229.77
180.6	1.48	201.04
206.4	2.23	153.18
232.2	2.97	86.16
258	3.71	0

E-Ratings

263,000	**48.0**	**46.7**
286,000	**52.2**	**50.8**
315,000	**55.0**	**55.0**
Cooper E-Loc	**82.1**	**85.7**
Cooper E-Lane	**197.7**	**172.4**
Cooper Alt	**68.0**	**73.6**

Bridge #24-TTR-Stringer

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	6.57	3266.46
51.6	13.15	5302.08
77.4	22.12	6622.34
103.2	35.27	7605.96
129	48.42	7857.13
154.8	63.3	7605.96
180.6	83.03	6622.34
206.4	102.75	5302.08
232.2	126.61	3266.46
258	152.91	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	1.00E-01	56.88
51.6	2.00E-01	93.12
77.4	3.67E-01	120.72
103.2	5.67E-01	139.68
129	0.8023	138
154.8	1.1	139.68
180.6	1.4	120.72
206.4	1.8	93.12
232.2	2.2	56.88
258	2.6	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	7.15	3552.12
51.6	14.3	5765.76
77.4	24.06	7201.48
103.2	38.36	8271.12
129	52.66	8544.25
154.8	68.84	8271.12
180.6	90.29	7201.48
206.4	111.74	5765.76
232.2	137.68	3552.12
258	166.28	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
25.8		24.96
51.6		44.38
77.4		58.24
103.2		66.56
129		69.34
154.8	2.15E-01	66.56
180.6	4.30E-01	58.24
206.4	0.645	44.38
232.2	0.86	24.96
258	1.08	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	7.88	3849.3
51.6	15.75	6287.4
77.4	25.27	7805.7
103.2	41.02	9046.8
129	56.77	9410.63
154.8	74.6	9046.8
180.6	98.22	7805.7
206.4	121.85	6287.4
232.2	149.2	3849.3
258	180.7	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	1.25E-01	68.1
51.6	2.50E-01	110.4
77.4	4.59E-01	141.9
103.2	0.7093	162.6
129	0.9593	159.38
154.8	1.32	162.6
180.6	1.69	141.9
206.4	2.14	110.4
232.2	2.64	68.1
258	3.14	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	4.286485	2131.146
51.6	8.579494	3459.252
77.4	14.43182	4320.633
103.2	23.01131	4962.379
129	31.59081	5126.251
154.8	41.29901	4962.379
180.6	54.17151	4320.633
206.4	67.03749	3459.252
232.2	82.60454	2131.146
258	99.76353	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	0.065243	37.11039
51.6	0.130487	60.75456
77.4	0.239704	78.76171
103.2	0.37019	91.13184
129	0.523447	90.03575
154.8	0.717676	91.13184
180.6	0.913406	78.76171
206.4	1.174379	60.75456
232.2	1.435353	37.11039
258	1.696326	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	4.664896	2317.52
51.6	9.329792	3761.772
77.4	15.69754	4698.483
103.2	25.02733	5396.352
129	34.35712	5574.551
154.8	44.91349	5396.352
180.6	58.90818	4698.483
206.4	72.90286	3761.772
232.2	89.82698	2317.52
258	108.4866	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
25.8		16.28473
51.6		28.95498
77.4		37.9977
103.2		43.42594
129		45.2397
154.8	0.140273	43.42594
180.6	0.280546	37.9977
206.4	0.420819	28.95498
232.2	0.561092	16.28473
258	0.704628	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	5.141172	2511.41
51.6	10.27582	4102.107
77.4	16.48698	5092.696
103.2	26.7628	5902.431
129	37.03862	6139.806
154.8	48.6715	5902.431
180.6	64.08197	5092.696
206.4	79.49896	4102.107
232.2	97.343	2511.41
258	117.8946	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
25.8	0.081554	44.43069
51.6	0.163108	72.0286
77.4	0.299662	92.58024
103.2	0.462771	106.0856
129	0.625879	103.9848
154.8	0.861212	106.0856
180.6	1.102612	92.58024
206.4	1.396207	72.0286
232.2	1.722423	44.43069
258	2.04864	0

Strength

263,000		
Loc(in)	V	M
0		
25.8		362.6%
51.6		222.6%
77.4		177.8%
103.2		154.9%
129		149.9%
154.8	340.1%	154.9%
180.6	257.0%	177.8%
206.4	206.4%	222.6%
232.2	167.1%	362.6%
258	138.2%	
	138.2%	149.9%
286,000		
Loc(in)	V	M
0		
25.8		334.5%
51.6		205.4%
77.4		164.1%
103.2		142.9%
129		138.3%
154.8	313.2%	142.9%
180.6	236.8%	164.1%
206.4	190.3%	205.4%
232.2	154.1%	334.5%
258	127.5%	
	127.5%	138.3%
315,000		
Loc(in)	V	M
0		
25.8		309.6%
51.6		189.0%
77.4		151.9%
103.2		131.1%
129		126.0%
154.8	289.4%	131.1%
180.6	218.1%	151.9%
206.4	175.0%	189.0%
232.2	142.6%	309.6%
258	117.6%	
	117.6%	126.0%

E-Ratings

263,000			Cooper E1-Locomotive		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.8	52.6	48.0	25.8		214.4
51.6	52.6	48.0	51.6		129.8
77.4	48.2	46.7	77.4		99.5
103.2	49.7	46.8	103.2		85.7
129	50.5	49.3	129		86.6
154.8	48.0	46.8	154.8	198.2	85.7
180.6	49.1	46.7	180.6	154.9	99.5
206.4	48.0	48.0	206.4	119.9	129.8
232.2	48.0	48.0	232.2	97.6	214.4
258	48.7		258	82.1	
	48.0	46.7		82.1	85.7

286,000			Cooper E1-Lane		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.8	57.2	52.2	25.8		488.5
51.6	57.2	52.2	51.6		272.4
77.4	52.4	50.8	77.4		206.3
103.2	54.1	50.9	103.2		179.9
129	54.9	53.6	129		172.4
154.8	52.2	50.9	154.8	1014.1	179.9
180.6	53.4	50.8	180.6	504.4	206.3
206.4	52.2	52.2	206.4	334.5	272.4
232.2	52.2	52.2	232.2	249.6	488.5
258	53.0		258	197.7	
	52.2	50.8		197.7	172.4

315,000			Cooper Alt Load		
Loc(in)	V	M	Loc(in)	V	M
0			0		
25.8	63.0	56.5	25.8		179.0
51.6	63.0	57.0	51.6		109.5
77.4	55.0	55.0	77.4		84.7
103.2	57.8	55.6	103.2		73.6
129	59.2	59.0	129		75.0
154.8	56.5	55.6	154.8	165.2	73.6
180.6	58.1	55.0	180.6	128.3	84.7
206.4	56.9	57.0	206.4	100.8	109.5
232.2	56.5	56.5	232.2	81.3	179.0
258	57.5		258	68.0	
	55.0	55.0		68.0	73.6

Results-Floorbeam

Resistance

Loc(in)	V(k)	M(k-in)
0	186.76	21286
20.6	186.76	21286
41.2	186.76	21286
61.8	186.76	21286
82.4	186.76	21286
103	186.76	21286
123.6	186.76	21286
144.2	186.76	21286
164.8	186.76	21286
185.4	186.76	21286
206	186.76	21286

Length(ft)	17.16667	206
Proportion	1	
Impact	0.3098	

	V	M
263,000	**133.9%**	**220.0%**
286,000	**124.1%**	**203.9%**
315,000	**113.6%**	**186.7%**

Dead Load

Loc(in)	V(k)	M(k-in)
0	-13.84	0
20.6	-13.25	280.51
41.2	-12.66	548.85
61.8	-4.83	799.06
82.4	-4.23	890.14
103	-3.64	969.04
123.6	4.13	887.91
144.2	4.72	794.61
164.8	12.73	545.78
185.4	13.32	278.98
206	13.91	0

E-Ratings

263,000	**50.2**	**50.3**
286,000	**54.6**	**54.7**
315,000	**60.1**	**60.3**
Cooper E-Loc	**72.1**	**122.5**
Cooper E-Lane	**120.0**	**203.3**
Cooper Alt	**69.1**	**117.4**

Bridge #24-TTR-Floorbeam

Live Loads

263,000

Loc(in)	V(k)	M(k-in)
0	-89.79	0
20.6	-89.79	1975.61
41.2	-89.79	3951.21
61.8	-27.89	5865.3
82.4	-27.89	6256.77
103	-27.89	6648.23
123.6	19	6073.77
144.2	19	5499.3
164.8	95.9	3699.21
185.4	95.9	1849.61
206	95.9	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-1.71	0
20.6	-1.71	37.68
41.2	-1.71	75.36
61.8	-0.53	111.86
82.4	-0.53	119.26
103	-0.53	126.66
123.6	0.36	115.72
144.2	0.36	104.79
164.8	1.83	70.49
185.4	1.83	35.24
206	1.83	0

286,000

Loc(in)	V(k)	M(k-in)
0	-97.64	0
20.6	-97.64	2148.42
41.2	-97.64	4296.85
61.8	-30.33	6378.36
82.4	-30.33	6804.01
103	-30.33	7229.65
123.6	20.66	6604.91
144.2	20.66	5980.16
164.8	104.29	4022.67
185.4	104.29	2011.33
206	104.29	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0	-1.03	0
20.6	-1.03	22.65
41.2	-1.03	45.31
61.8	-0.32	67.25
82.4	-0.32	71.78
103	-0.32	76.31
123.6	0.22	69.71
144.2	0.22	63.11
164.8	1.10	42.45
185.4	1.10	21.23
206	1.10	0

315,000

Loc(in)	V(k)	M(k-in)
0	-107.53	0
20.6	-107.53	2366.24
41.2	-107.53	4732.47
61.8	-33.4	7025.02
82.4	-33.4	7493.79
103	-33.4	7962.56
123.6	22.76	7274.43
144.2	22.76	6586.31
164.8	114.87	4430.41
185.4	114.87	2215.2
206	114.87	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-1.78	0
20.6	-1.78	39.27
41.2	-1.78	78.53
61.8	-0.55	116.58
82.4	-0.55	124.33
103	-0.55	132.07
123.6	0.38	120.67
144.2	0.38	109.26
164.8	1.91	73.49
185.4	1.91	36.75
206	1.91	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	-117.6069	0
20.6	-117.6069	2587.654
41.2	-117.6069	5175.295
61.8	-36.53032	7682.37
82.4	-36.53032	8195.117
103	-36.53032	8707.852
123.6	24.8862	7955.424
144.2	24.8862	7202.983
164.8	125.6098	4845.225
185.4	125.6098	2422.619
206	125.6098	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	-2.239758	0
20.6	-2.239758	49.35326
41.2	-2.239758	98.70653
61.8	-0.695373	146.5142
82.4	-0.695373	156.2067
103	-0.695373	165.8993
123.6	0.470349	151.5701
144.2	0.470349	137.2539
164.8	2.396934	92.3278
185.4	2.396934	46.15735
206	2.396934	0

286,000

Loc(in)	V(k)	M(k-in)
0	-127.8889	0
20.6	-127.8889	2814.001
41.2	-127.8889	5628.014
61.8	-39.72623	8354.376
82.4	-39.72623	8911.892
103	-39.72623	9469.396
123.6	27.06047	8651.111
144.2	27.06047	7832.814
164.8	136.599	5268.893
185.4	136.599	2634.44
206	136.599	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
20.6		29.66697
41.2		59.34704
61.8		88.08405
82.4		94.01744
103		99.95084
123.6	0.287763	91.30616
144.2	0.287763	82.66148
164.8	1.44078	55.60101
185.4	1.44078	27.80705
206	1.44078	0

315,000

Loc(in)	V(k)	M(k-in)
0	-140.8428	0
20.6	-140.8428	3099.301
41.2	-140.8428	6198.589
61.8	-43.74732	9201.371
82.4	-43.74732	9815.366
103	-43.74732	10429.36
123.6	29.81105	9528.048
144.2	29.81105	8626.749
164.8	150.4567	5802.951
185.4	150.4567	2901.469
206	150.4567	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	-2.331444	0
20.6	-2.331444	51.43585
41.2	-2.331444	102.8586
61.8	-0.725367	152.6965
82.4	-0.725367	162.8474
103	-0.725367	172.9853
123.6	0.492747	158.0536
144.2	0.492747	143.1087
164.8	2.501718	96.2572
185.4	2.501718	48.13515
206	2.501718	0

Strength

263,000		
Loc(in)	V	M
0		
20.6		742.1%
41.2		371.9%
61.8		251.0%
82.4		234.3%
103		220.0%
123.6	643.6%	240.7%
144.2	630.8%	266.2%
164.8	135.0%	394.8%
185.4	134.4%	787.9%
206	133.9%	
	133.9%	220.0%

286,000		
Loc(in)	V	M
0		
20.6		687.9%
41.2		344.6%
61.8		232.5%
82.4		217.2%
103		203.9%
123.6	598.8%	223.1%
144.2	587.7%	246.7%
164.8	125.1%	366.1%
185.4	124.6%	730.6%
206	124.1%	
	124.1%	203.9%

315,000		
Loc(in)	V	M
0		
20.6		629.8%
41.2		315.5%
61.8		212.9%
82.4		198.8%
103		186.7%
123.6	550.2%	204.4%
144.2	540.8%	225.9%
164.8	114.4%	335.3%
185.4	114.0%	669.3%
206	113.6%	
	113.6%	186.7%

E-Ratings

263,000

Loc(in)	V	M
0		
20.6	52.5	50.3
41.2	52.5	50.3
61.8	52.5	50.3
82.4	52.5	50.3
103	52.5	50.3
123.6	50.5	50.3
144.2	50.5	50.3
164.8	50.2	50.3
185.4	50.2	50.3
206	50.2	
	50.2	50.3

Cooper E1-Locomotive

Loc(in)	V	M
0		
20.6		425.6
41.2		210.1
61.8		139.8
82.4		130.6
103		122.5
123.6	388.3	134.6
144.2	387.0	149.3
164.8	72.6	224.6
185.4	72.4	455.1
206	72.1	
	72.1	122.5

286,000

Loc(in)	V	M
0		
20.6	57.1	54.7
41.2	57.1	54.7
61.8	57.1	54.7
82.4	57.1	54.7
103	57.1	54.7
123.6	54.9	54.7
144.2	54.9	54.7
164.8	54.6	54.7
185.4	54.6	54.7
206	54.6	
	54.6	54.7

Cooper E1-Lane

Loc(in)	V	M
0		
20.6		708.0
41.2		349.4
61.8		232.6
82.4		216.9
103		203.3
123.6	634.7	223.4
144.2	632.6	247.9
164.8	120.8	373.0
185.4	120.4	755.5
206	120.0	
	120.0	203.3

315,000

Loc(in)	V	M
0		
20.6	62.9	60.3
41.2	62.9	60.3
61.8	62.9	60.3
82.4	62.9	60.3
103	62.9	60.3
123.6	60.5	60.3
144.2	60.5	60.3
164.8	60.1	60.3
185.4	60.1	60.3
206	60.1	
	60.1	60.3

Cooper Alt Load

Loc(in)	V	M
0		
20.6		408.4
41.2		201.6
61.8		134.2
82.4		125.2
103		117.4
123.6	370.6	129.1
144.2	369.4	143.2
164.8	69.6	215.5
185.4	69.3	436.4
206	69.1	
	69.1	117.4

Results - Bridge #24 - TTR - Truss

Section	1	2	3	4	5	6	7	8	9	10	11
263	132.3%	135.2%	189.6%	154.6%	117.0%	159.8%	163.1%	152.2%	147.9%	153.1%	167.6%
286	123.6%	126.3%	176.1%	144.6%	107.6%	149.2%	152.6%	141.7%	136.5%	140.6%	157.0%
315	140.0%	138.1%	161.6%	154.1%	113.3%	160.7%	173.0%	153.1%	144.3%	150.1%	176.3%
Member											
263	58.8	116.3	54.6	97.5	59.3	55.1	120.8	88.7	60.5	74.0	118.1
286	63.9	126.5	59.4	106.0	64.5	60.0	131.3	96.5	65.8	80.4	128.5
315	55.0	113.3	65.4	97.9	61.3	54.7	111.9	88.1	62.1	75.5	110.6
CoopE1	83.3	84.8	110.3	90.8	64.2	95.8	106.4	89.1	90.9	83.5	112.1
Lane	113.6	108.4	177.1	126.4	53814.2	186.5	120.9	173.1	15778.8	13611.4	120.5
AltE1	171.2	168.6	101.8	164.4	69.4	154.3	218.3	143.4	168.0	112.6	221.6

263	**117.0%**
286	**107.6%**
315	**113.3%**
263	**54.6**
286	**59.4**
315	**54.7**
CoopE1	**64.2**
Lane	**108.4**
AltE1	**69.4**

Results

Resistance

Loc(in)	V(k)	M(k-in)
0	485.1	37232
97.6	485.1	47172
195.2	485.1	57027
292.8	485.1	65694
390.4	485.1	65694
488	485.1	65694
585.6	485.1	65694
683.2	485.1	65694
780.8	485.1	57027
878.4	485.1	47172
976	485.1	37232

Length(ft)	81.333333	976
Proportion	0.5	
Impact	0.4769	

	V	M
263,000	**165.1%**	**109.1%**
286,000	**153.3%**	**101.5%**
315,000	**158.1%**	**113.1%**

Dead Load

Loc(in)	V(k)	M(k-in)
0		0
97.6		2997.19
195.2		5328.33
292.8		6993.43
390.4		7992.49
488		8325.51
585.6	6.82	7992.49
683.2	13.65	6993.43
780.8	20.47	5328.33
878.4	27.3	2997.19
976	34.12	0

E-Ratings

263,000	**49.0**	**50.9**
286,000	**53.3**	**55.3**
315,000	**57.4**	**48.6**
Cooper E-Loc	**96.8**	**56.3**
Cooper E-Lane	**150.1**	**78.3**
Cooper Alt	**135.4**	**73.6**

Bridge #25-DPG

Live Loads

263,000			Cooper E1-Locomotive		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
97.6	8.57	28661.74	97.6	1.39E-01	512.18
195.2	24.9	49738.56	195.2	4.31E-01	885.62
292.8	49.8	63546.06	292.8	8.40E-01	1154.3
390.4	76.1	70084.24	390.4	1.36E+00	1331.47
488	104.89	70253.88	488	1.98	1380.4
585.6	142.25	70084.24	585.6	2.67	1331.47
683.2	188.47	63546.06	683.2	3.37	1154.3
780.8	241.07	49738.56	780.8	4.15	885.62
878.4	293.67	28661.74	878.4	5.18	512.18
976	351.65	0	976	6.31	0

286,000			Cooper E1-Lane		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0		0
97.6	9.32	31168.28	97.6		357.22
195.2	27.08	54088.32	195.2		635.05
292.8	54.15	69103.32	292.8		833.5
390.4	82.75	76213.28	390.4		952.58
488	114.06	76397.75	488		992.27
585.6	154.69	76213.28	585.6	8.13E-01	952.58
683.2	204.95	69103.32	683.2	1.63E+00	833.5
780.8	262.15	54088.32	780.8	2.44	635.05
878.4	319.35	31168.28	878.4	3.25	357.22
976	382.41	0	976	4.07	0

315,000			Cooper Alt Load		
Loc(in)	V(k)	M(k-in)	Loc(in)	V(k)	M(k-in)
0	0	0	0	0	0
97.6	9.94	29887.2	97.6	1.73E-01	391.2
195.2	29.5	50878.8	195.2	5.08E-01	684.8
292.8	59	63100.8	292.8	1.01E+00	895.8
390.4	90.5	67838.4	390.4	1.51	1024.2
488	122	67095	488	2.01	1055
585.6	153.5	67838.4	585.6	2.51	1024.2
683.2	194.55	63100.8	683.2	3.01	895.8
780.8	245.42	50878.8	780.8	3.51	684.8
878.4	306.22	29887.2	878.4	4.01	391.2
976	369.22	0	976	4.51	0

Live Load with Proportion and Impact

263,000

Loc(in)	V(k)	M(k-in)
0	0	0
97.6	6.328517	21165.26
195.2	18.38741	36729.44
292.8	36.77481	46925.59
390.4	56.19605	51753.71
488	77.45602	51878.98
585.6	105.0445	51753.71
683.2	139.1757	46925.59
780.8	178.0181	36729.44
878.4	216.8606	21165.26
976	259.6759	0

Cooper E1-Locomotive

Loc(in)	V(k)	M(k-in)
0	0	0
97.6	0.102275	378.2193
195.2	0.318346	653.9861
292.8	0.62015	852.3928
390.4	1.004292	983.224
488	1.462131	1019.356
585.6	1.971662	983.224
683.2	2.488577	852.3928
780.8	3.064568	653.9861
878.4	3.825171	378.2193
976	4.65962	0

286,000

Loc(in)	V(k)	M(k-in)
0	0	0
97.6	6.882354	23016.22
195.2	19.99723	39941.52
292.8	39.98707	51029.35
390.4	61.10674	56279.7
488	84.22761	56415.92
585.6	114.2308	56279.7
683.2	151.3453	51029.35
780.8	193.5847	39941.52
878.4	235.824	23016.22
976	282.3907	0

Cooper E1-Lane

Loc(in)	V(k)	M(k-in)
0		0
97.6		263.7891
195.2		468.9527
292.8		615.4981
390.4		703.4327
488		732.7418
585.6	0.600581	703.4327
683.2	1.203674	615.4981
780.8	1.801818	468.9527
878.4	2.399963	263.7891
976	3.005492	0

315,000

Loc(in)	V(k)	M(k-in)
0	0	0
97.6	7.340193	22070.2
195.2	21.78428	37571.45
292.8	43.56855	46596.79
390.4	66.82973	50095.27
488	90.0909	49546.3
585.6	113.3521	50095.27
683.2	143.6654	46596.79
780.8	181.2304	37571.45
878.4	226.1282	22070.2
976	272.6505	0

Cooper Alt Load

Loc(in)	V(k)	M(k-in)
0	0	0
97.6	0.1279	288.8816
195.2	0.37528	505.6906
292.8	0.745835	661.5035
390.4	1.11506	756.3205
488	1.484285	779.0648
585.6	1.85351	756.3205
683.2	2.222735	661.5035
780.8	2.59196	505.6906
878.4	2.961185	288.8816
976	3.33041	0

Strength

263,000		
Loc(in)	V	M
0		
97.6		195.2%
195.2		135.6%
292.8		121.8%
390.4		110.0%
488		109.1%
585.6	433.6%	110.0%
683.2	317.4%	121.8%
780.8	244.4%	135.6%
878.4	198.7%	195.2%
976	165.1%	
	165.1%	109.1%
286,000		
Loc(in)	V	M
0		
97.6		181.3%
195.2		126.0%
292.8		113.2%
390.4		102.2%
488		101.5%
585.6	400.7%	102.2%
683.2	294.0%	113.2%
780.8	226.6%	126.0%
878.4	184.4%	181.3%
976	153.3%	
	153.3%	101.5%
315,000		
Loc(in)	V	M
0		
97.6		188.2%
195.2		132.9%
292.8		122.6%
390.4		113.1%
488		113.5%
585.6	403.7%	113.1%
683.2	308.4%	122.6%
780.8	240.5%	132.9%
878.4	191.4%	188.2%
976	158.1%	
	158.1%	113.1%

E-Ratings

263,000

Loc(in)	V	M
0		
97.6	49.5	56.0
195.2	49.0	56.2
292.8	49.3	55.1
390.4	50.4	52.6
488	52.2	50.9
585.6	53.3	52.6
683.2	55.9	55.1
780.8	58.1	56.2
878.4	56.7	56.0
976	55.7	
	49.0	50.9

Cooper E1-Locomotive

Loc(in)	V	M
0		
97.6		116.8
195.2		79.1
292.8		68.9
390.4		58.7
488		56.3
585.6	242.6	58.7
683.2	189.4	68.9
780.8	151.6	79.1
878.4	119.7	116.8
976	96.8	
	96.8	56.3

286,000

Loc(in)	V	M
0		
97.6	53.8	60.9
195.2	53.3	61.1
292.8	53.6	59.9
390.4	54.8	57.2
488	56.7	55.3
585.6	57.9	57.2
683.2	60.8	59.9
780.8	63.2	61.1
878.4	61.7	60.9
976	60.6	
	53.3	55.3

Cooper E1-Lane

Loc(in)	V	M
0		
97.6		167.5
195.2		110.2
292.8		95.4
390.4		82.0
488		78.3
585.6	796.4	82.0
683.2	391.7	95.4
780.8	257.9	110.2
878.4	190.8	167.5
976	150.1	
	150.1	78.3

315,000

Loc(in)	V	M
0		
97.6	57.4	58.4
195.2	58.0	57.4
292.8	58.4	54.7
390.4	59.9	51.0
488	60.7	48.6
585.6	57.5	51.0
683.2	57.7	54.7
780.8	59.1	57.4
878.4	59.1	58.4
976	58.5	
	57.4	48.6

Cooper Alt Load

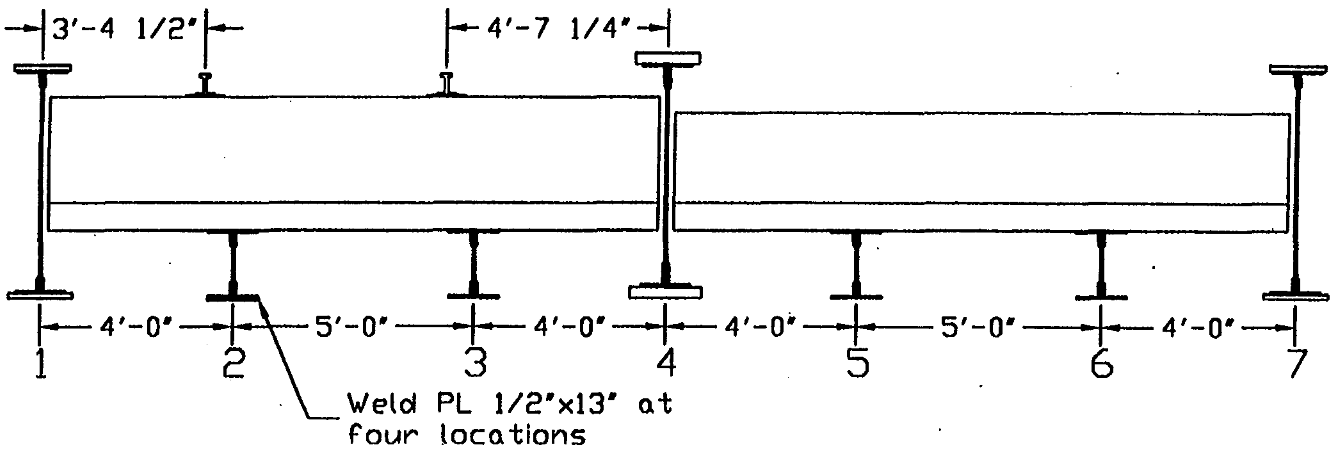
Loc(in)	V	M
0		
97.6		152.9
195.2		102.2
292.8		88.7
390.4		76.3
488		73.6
585.6	258.0	76.3
683.2	212.1	88.7
780.8	179.3	102.2
878.4	154.6	152.9
976	135.4	
	135.4	73.6

APPENDIX F

REPAIR SCHEMES AND COST ANALYSIS FOR FAILING SAMPLE BRIDGES

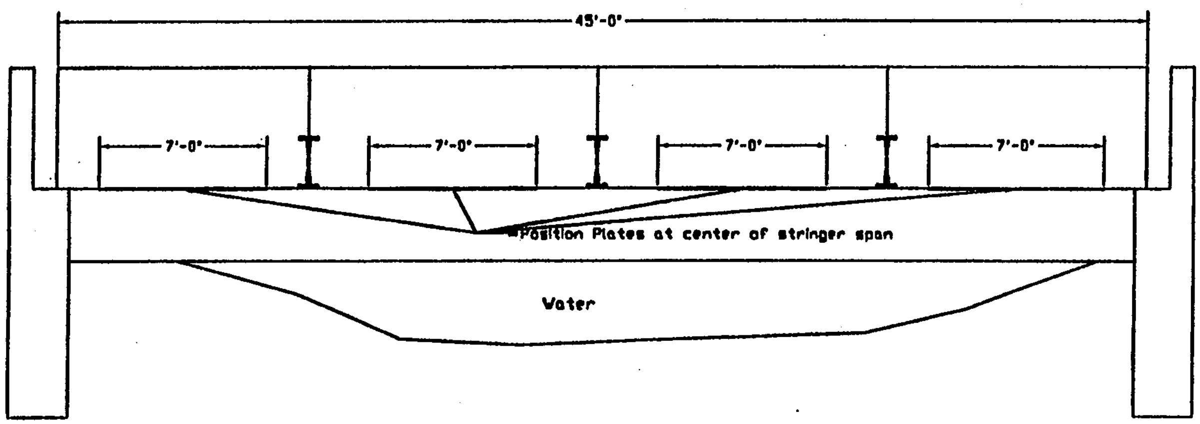
Bridge #4 - Through Plate Girder	1' = 1/4"

Steel Plate Attachment
Transverse Elevation View

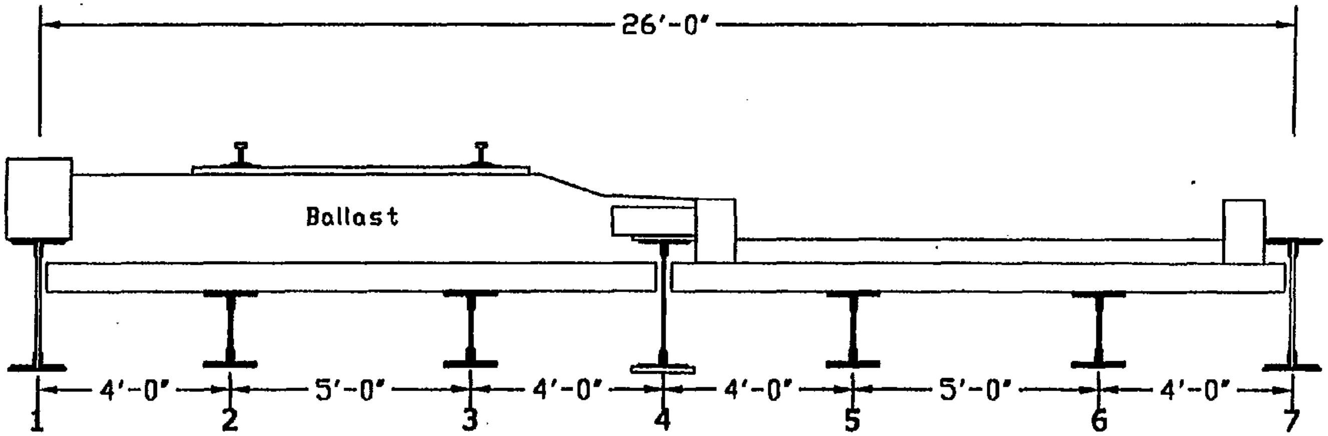


Heavy Axle Study	2-10-01
Bridge #4 - Through Plate Girder	1' = 1/8"

Bridge is located in Bald Eagle, PA
Steel Plate Attachment
Longitudional Elevation View
Only longitudional welds



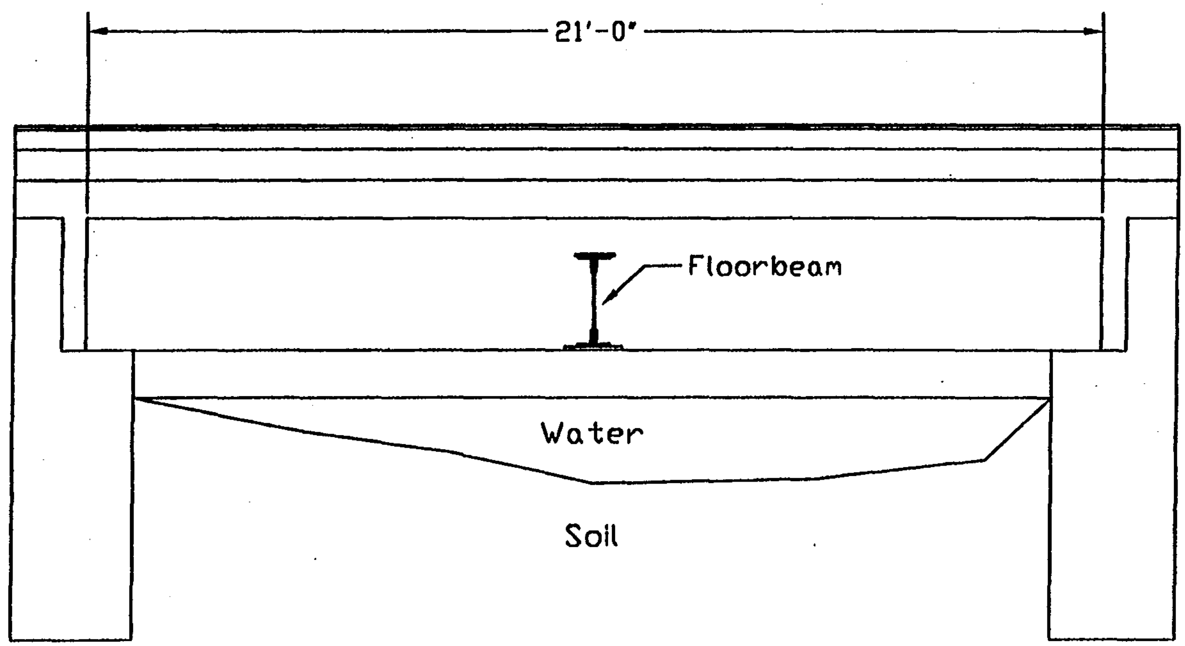
Bridge #8 - Through Plate Girder | 1' = 1/4"



Heavy Axle Study	2-11-01
Bridge #8 - Through Plate Girder	1' = 1/4"

Bridge located in Tyrone, PA

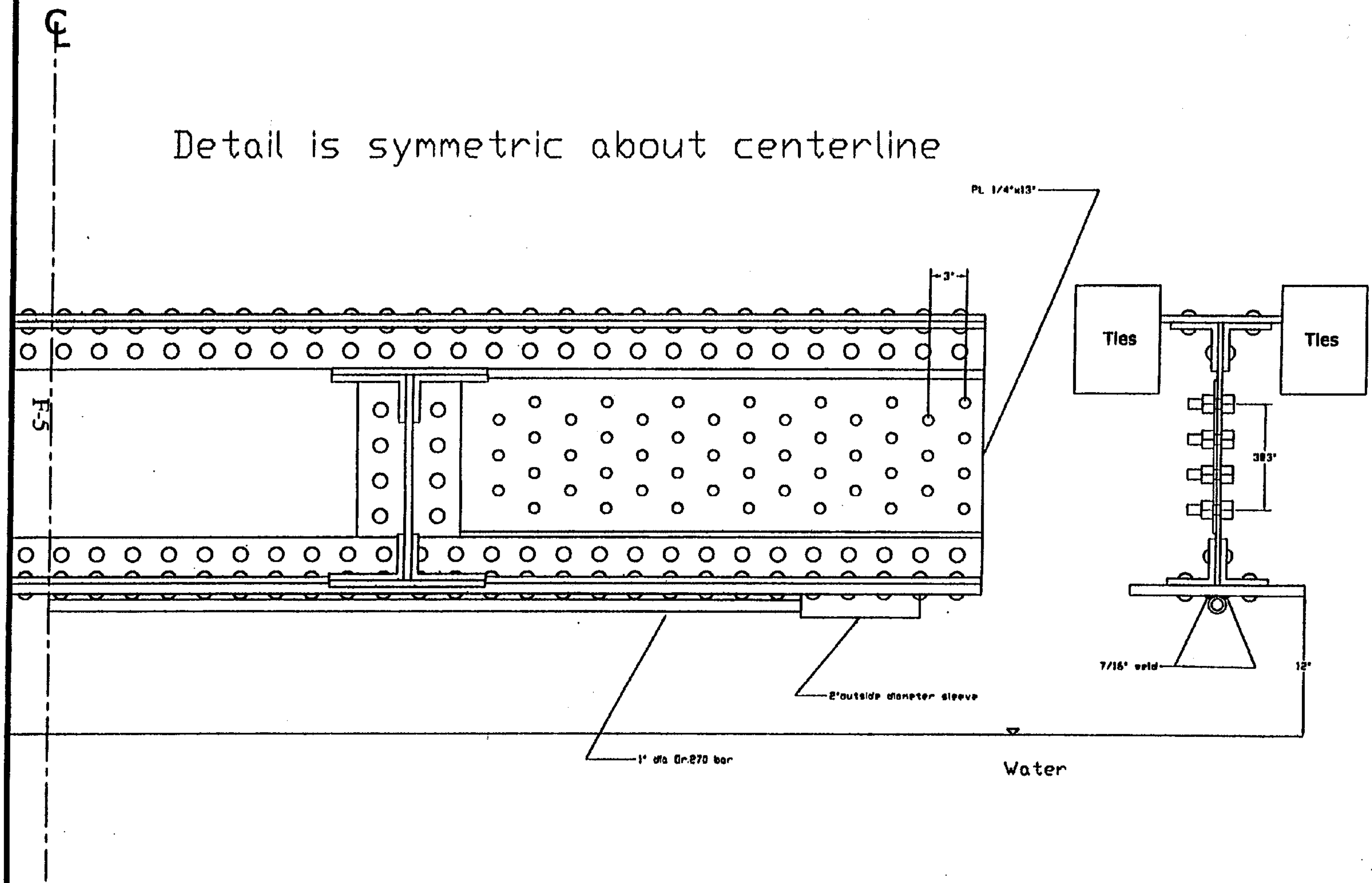
Longitudional Bridge Elevation
Floorbeams span between girders 1 and 4 and 4 and 7
Only repair floorbeam between girders 1 and 4



Bridge #8 - Floorbeam Detail

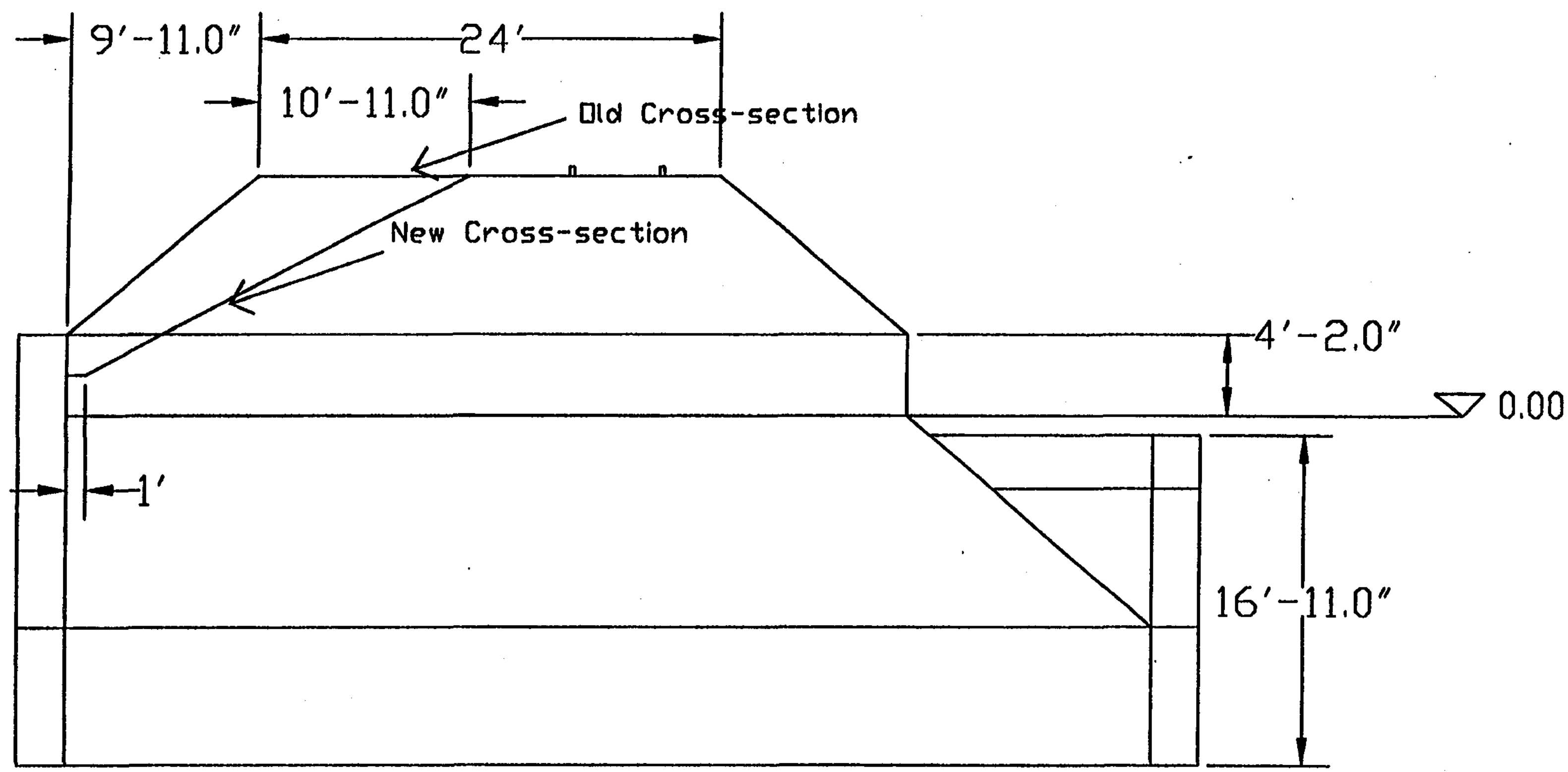
1'=1"

Detail is symmetric about centerline



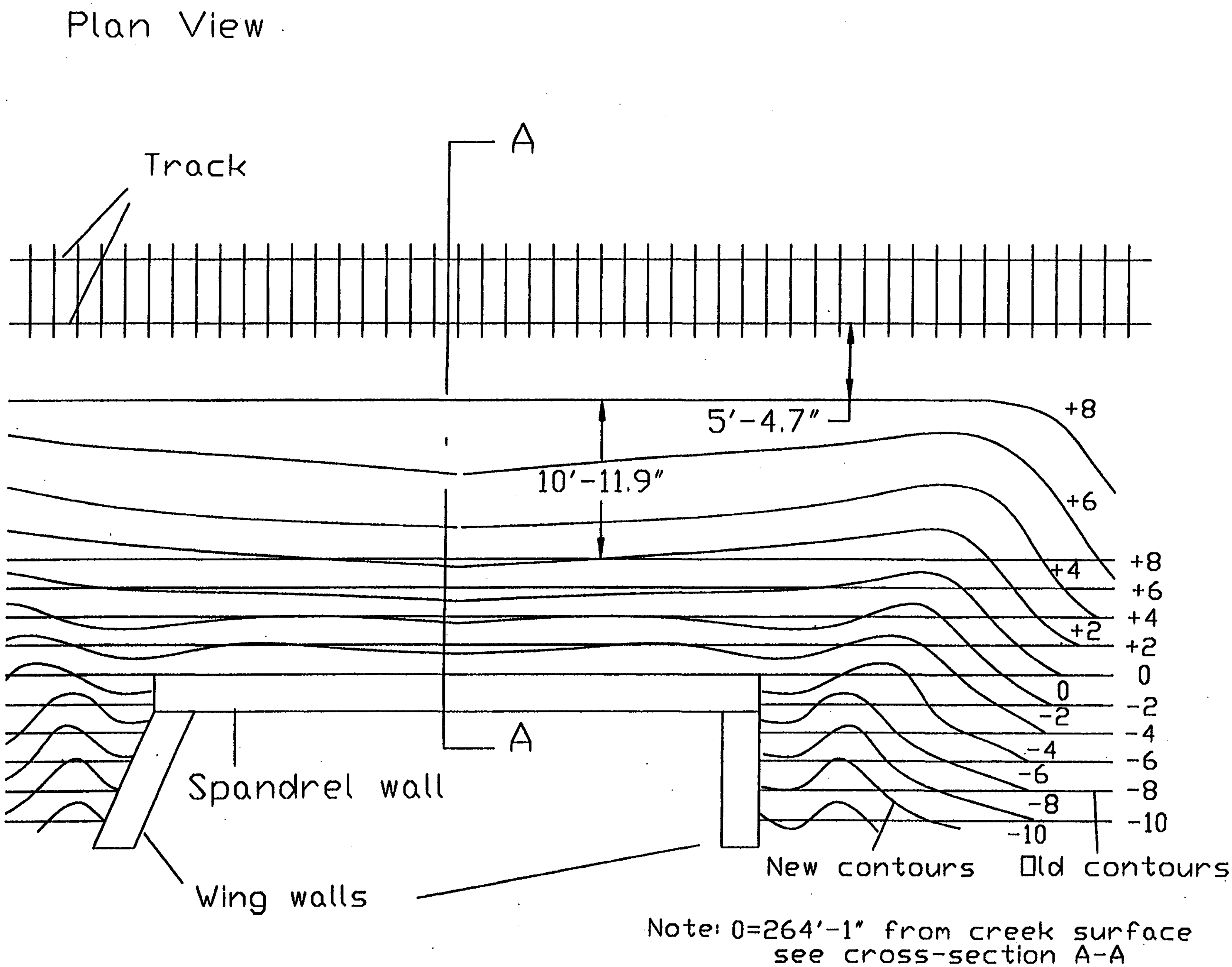
Heavy Axle Study	2-18-01
Bridge #18 - Masonry Arch	1" = 10'

Cross-Section A-A



Bridge #18 - Masonry Arch

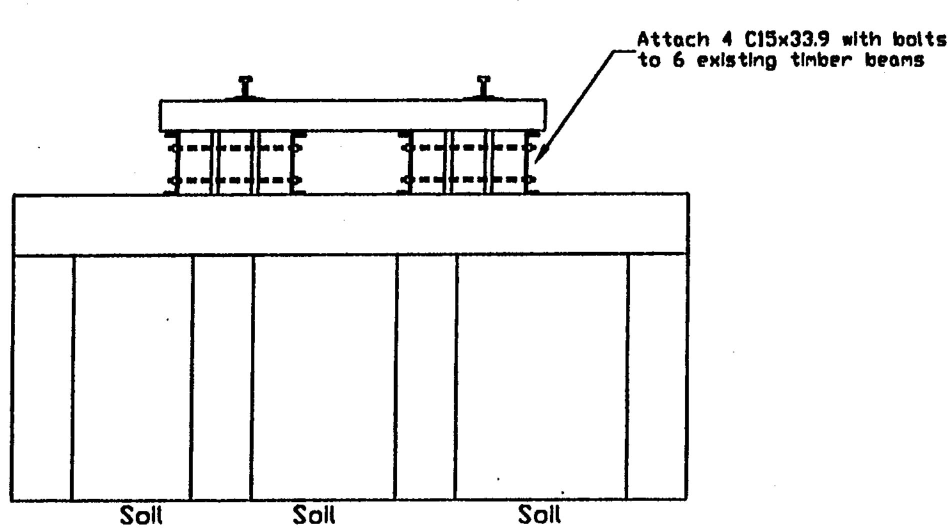
1" = 10'

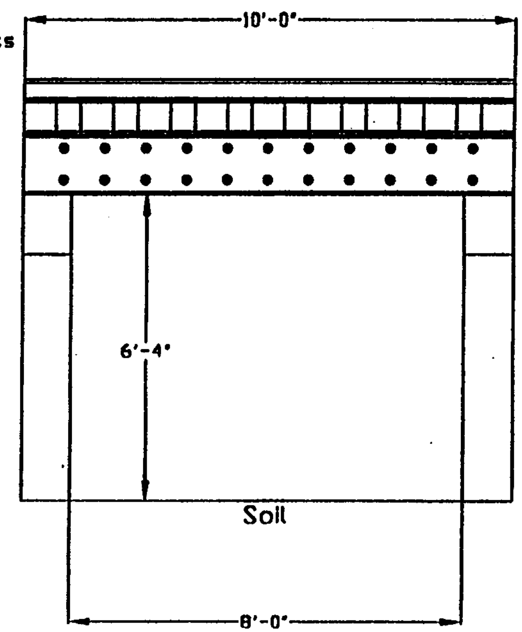


Heavy Axle Study	2-8-01
Bridge #19 - Timber Bridge	1'=1/4"

Bridge is located in Knox, PA

Existing Timber Structure with Steel Channel Attachment



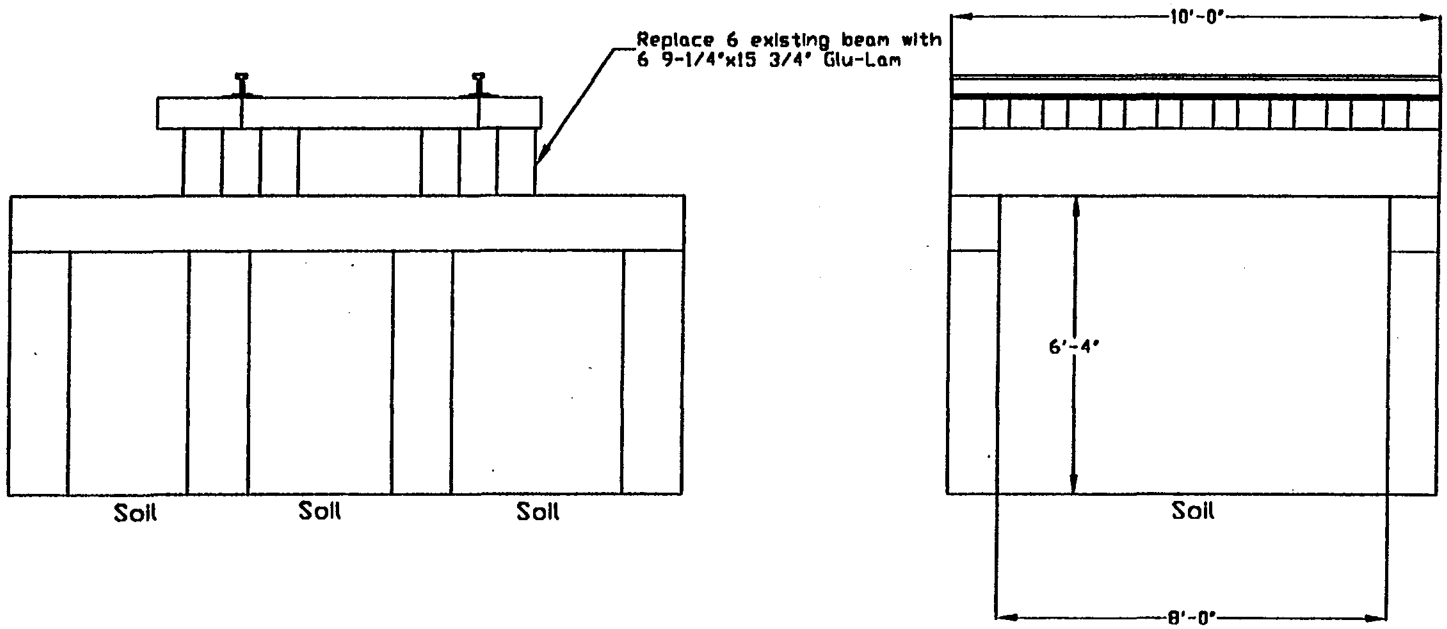


Bridge #19 - Timber Bridge

1'=1/4"

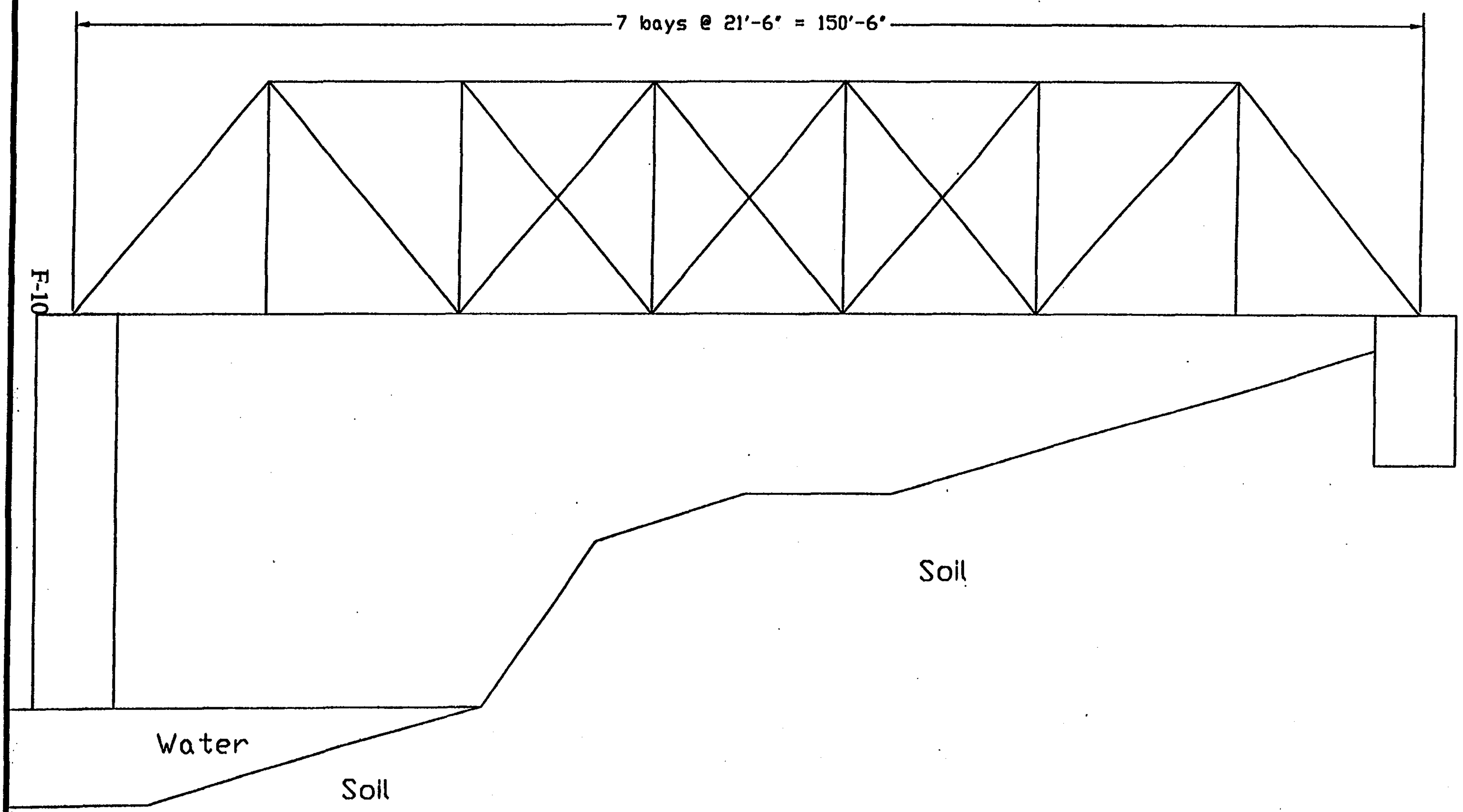
Bridge is located in Knox, PA

Existing Timber Structure replaced with Glue-Laminated Timber



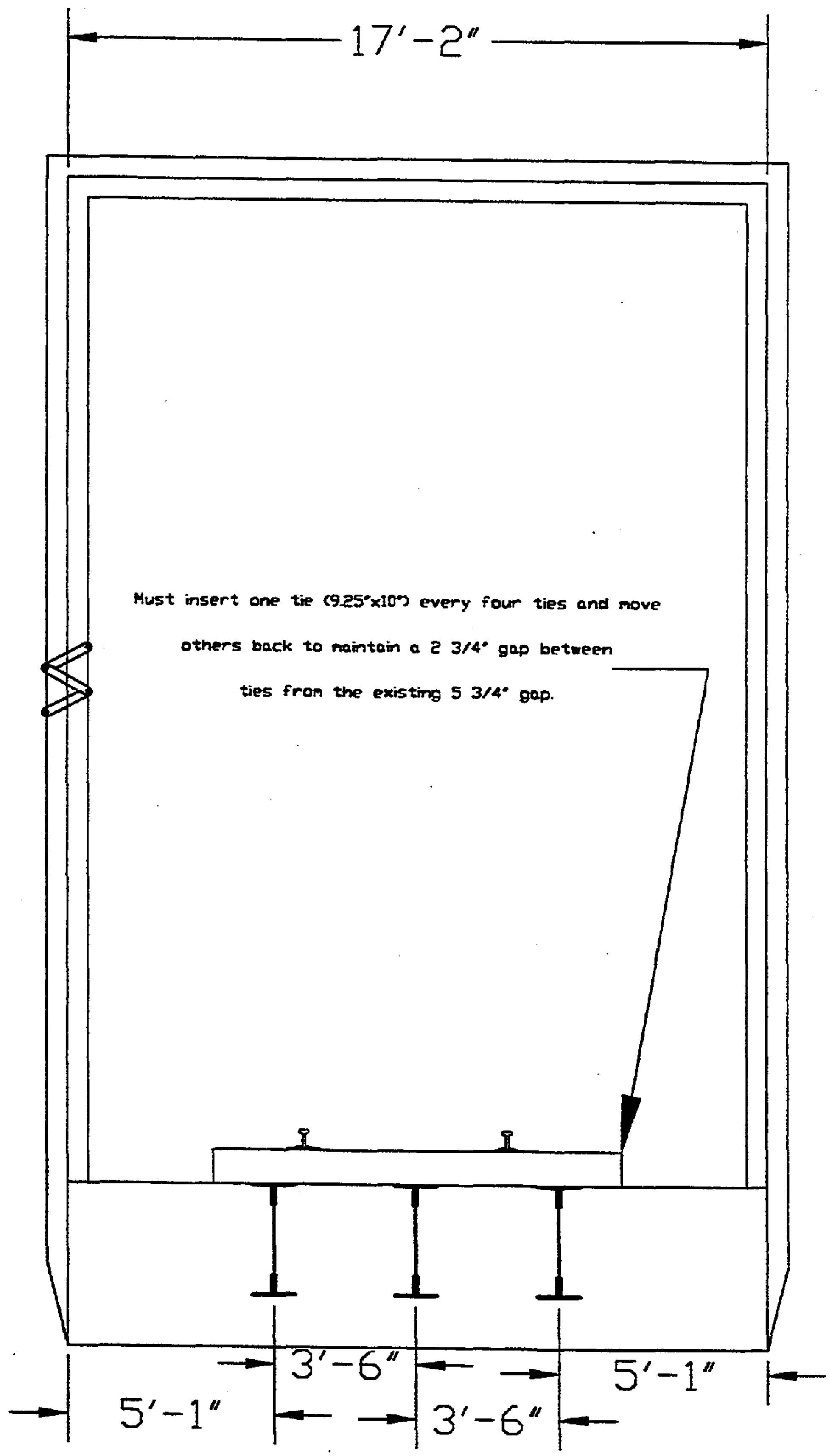
Heavy Axle Study	2-11-01
Bridge #24 - Through Truss	1'=1/16"

Bridge is located in Punxsutawney, PA
Additional Tie Placement
Floorbeam at every panel point
3 stringers span between floorbeams



Bridge #24 - Through Truss

1" = 1/4"



APPENDIX G

GENERAL TRACK DATA

General Track Data

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
1	46	115	Bolted	Very Good	Very Good
2	25	90	Bolted		
3	20	130	Bolted		
4	13	130	Bolted		
5	12	100PS		Class 1	
6	2	140RE	Welded	Class 1	
7	28	130PS	Bolted and welded	Class 1	
8	14	127	Bolted		
9	3	131	Bolted		
10	4	110			
11	5	130	Bolted		
12	19	Mixed	Bolted	Accepted	
13	5	127	Bolted	Class 1	
14	12	105	Bolted	Class 1	
15	6	105	Bolted	Class 1	
16	2	132	CWR	Class 2	
17	36	115	Bolted	Class 3	
18	47	112	Bolted	Class 3	
19	4	115	CWR	Class 2	
20	10	132	Bolted	Class 3	
21	11	115	CWR		
22	15	127	Bolted		
23	26	127	Bolted		
24	7	130	CWR	Class 2	
25	2	130	Bolted	Accepted	
26	9	131	Bolted	Class 1	

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
27	6	.131	CWR	Class 2	
28	21	131	CWR	Class 2	
29	13	127	CWR	Class 2	
30	3	130	CWR	Class 2	
31	7	131	CWR	Class 2	
32	10	100ASCE	Bolted		
33	2	115RE	CWR		
34	2	85	Bolted		Bad
35	1	131RE	CWR		
36	12	100PS	bolted		
37	2	80	Bolted	Class 2	
38	16	130	Bolted	Class 2 or Better	
39	2	140	Bolted	Upgrading	
40	5	130	Bolted	Accepted track	
41	2	130	Bolted	accepted	
42	9	100	Bolted	accepted	
43	8	130	Bolted	Class 1	
44	8	130	Bolted	Class 1	
45	6	130	Bolted	Class 1	
46	3	140	Bolted		
47	1	130	Bolted		
48	3	131	Bolted		
49	3	140	Bolted		
50	2	132	CWR		
51	2	131	Bolted		
52	2	140	Bolted		
53	2	130	Bolted		
54	1	140			

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
55	146	130			
56	1	100			
57	8	140			
58	26	100			
59	69	112			
60	203	130			
61	10	100	Bolted	Class 2	
62	41	85		Class 1	
63	29	100		Class 1	
64	1	131	Bolted		
65	1	131	CWR		
66	1	130	Bolted		
67	2	136	CWR		
68	8	131	Bolted		
69	4	133	CWR		
70	10	115	Bolted		
71	2	133	CWR		
72	2	133	CWR		
73	4	131	Bolted		
74	7	133	CWR		
75	5	133	CWR		
76	1	130	Bolted		
77	2	152	Bolted		
78	1	130	Bolted		
79	5	105	Bolted		
80	1	105	Bolted		
81	1	130	Bolted		
82	3	105	Bolted		

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
83	2	101	Bolted		
84	1	101	Bolted		
85	6	130	Bolted		
86	21	101	Bolted		
87	3	101	Bolted		
88	13	130	Bolted	Class 2	
89	2	136			
90	1	100			
91	2	131			
92	64	110			
93	2	112	Bolted	Good	Good
94	1	90	Bolted	Fair	Fair
95	16	100	Bolted		
96	12	157	CWR	Class 2	
97	36	155	CWR	Class 2	
98	6	127	CWR	Class 2	
99	2	130	CWR	Class 2	
100	5			Class 2	
101	3	130	Bolted		
102	5	85	Bolted		
103	13	130	Bolted	Class 1	
104	13	100	Bolted	Class 1	
105	1	115	Bolted	Good	Good
106	8	131	CWR	Class 2	
107	32	112	Bolted	Class 2	
108	4	105	Bolted	Class 1	
109	1	132	Bolted	Accepted	
110	2	85	Bolted	Accepted	

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
111	4	100	Bolted	Accepted	
112	1	132	CWR	Accepted	
113	1	90	Bolted		Replaced Last Year
114	11	130	Bolted		
115	8.2	115RE	Bolted and Welded	Class 1	
116	15	90	Bolted		14000 New Ties
117	2	100	Bolted		
118	1	130	CWR		
119	11	131			
120	6	100			
121	3	130	Bolted		
122	4	130	Bolted		
123	8	140RE	Bolted and Welded	Class 1	
124	2	132RE		Class 1	
125	1	131		Class 1	
126	4	85	Bolted	Class 1	
127	2	100	Bolted	Class 1	
128	1	132	Bolted	Good	Fair
129	1	90	Bolted	Good	Good
130	4	80	Bolted	ood(rebuilt in 2 years)	
131	11	130	Bolted	Class 1	
132	2	130PA	Bolted		Tie work
133	3	100PA	Bolted		
134	1	131	CWR		
135	3	130	Bolted		
136	4	131	CWR	Class 2	
137	12	127	CWR	Class 2	
138	8	155	CWR	Class 2	

SLRR Number	Length of Track	Rail Size	Rail Type	Rail Steel Cond	Cross Tie Cond
139	3	105	Bolted		
140	2	105	Bolted	Class 1	
141	1	135	Bolted	Class 1	ood Ties and Fair Ballas
142	1	100			
143	1	131			
144	16	100	CWR	Class 2	

APPENDIX H

ON-SITE TRACK INSPECTION FOR THE SAMPLE

Appendix H: On-site Track Inspection for The Sample

Inspected Track (Based on Sample Bridges)	Rail size (Database)	Rail size (Site)	Rail Type	Class of Track	Oper. Speed	Tie dim.	Tie Spacing	Number of ties/39ft	
								Number	OK?
1	112RE, **115RE**, 130PS, 140AREA, 119AREA, 100PS,130RE, 132RE, 140RE	115.25	bolted & welded	Class1	10mph	9x9x144	14.2	21	>6, OK
2	**100**	100	bolted	Class 2	20mph	9x9.5x120	15.15	20	>9, OK
3	112, 115, **132**	132	welded	Class 2, 3	10, 25	10.25x141	14.75	19	>10, OK
4	115, 130, **131**, 133, 136, 152	131				9X10X144	21.325	16	>10, OK
5	112, 115, 132	122.8		Class 2, 3	10, 25	9x10x144	14	21	>10, OK
6	112, 115, 132	122.8		Class 2, 3	10, 25	10x10x142	14.3	20	>10, OK
7	112, **115**, 132	115.25	welded	Class 2, 3	10, 25	10x10x144	14.8	19	>10, OK
8	115, 130, **131**, 133, 136, 152	131				10x10x144	21.6	16	>10, OK
9	112, 115, 132	121.6		Class 2, 3	10, 25	10x10x144	20.3	16	>10, OK
10	115, 130, 131, 133, 136, 152	131				10x10x144	22.25		
11	105, 127, Mixed	130		Class 1	10mph	9.75x9.75x12'	10.75	23	>6, OK
12	112, 115, 132	122.8		Class 2, 3	10, 25	10x10x144	13.5	20	>10, OK
13	112, **115**, 132	115.25	bolted	Class 2, 3	10, 25	10.25x10x120	14.25	20	>10, OK
14	112, 115, 132	122.8	bolted	Class 2, 3	10, 25	14x10x120	14.85	16	>10, OK

(Based on Sample Bridges)	Rail size (Database)	Rail size (Site)	Rail Type	Class of Track	Oper. Speed	Tie dim.	On Bridge	Number of ties/39ft Number	OK?
15	112, 115, 132	115, 112 RE	bolted	Class 3	40mph		13.8"	14(br), 11(tr)	>9, OK
16	112, 131	115	bolted	Class 2	25mph	8.25x8.75x109"	11.8	24	>9, OK
17							~20		
18	100, 130, 140						~20		
19	85, 100	100	bolted	Class 1	10mph		Vary-Not acceptabl		
20	130	130	bolted	Class 1	10mph	10x10x144	22.175	15	>6, OK
21	130	130RG-HF	bolted			10x10x145	21.49	15	>10, OK
22	132, 140	130RE	bolted	Class 2	25mph	9x10x110	20.225	16	>9, OK
23	100, 112, 130, 140	115RE (115.25)	welded			10x10x144	12	21	>10, OK
24	100, 112, 130, 140	132RE				9.25x10x120	15.225	19	>10, OK
25	100, 112, 130, 140	131				8x10x122	13	22	>10, OK
26	112, 115, 132	132RE				8.5x8.5x102	21.3	15	>10, OK
27	100, 112, 130, 140	115RE	welded			10x10x144	19	16	>10, OK

Appendix H: On-site Track Inspection for The Sample

Inspected Track (Based on Sample Bridges)	Gage length		Condition	Remarks
	size	Range, OK?		
1	56.25	56-58 OK		None
2	56.25	56- 57.75, OK	Good	ties are new
3	56.5	56- 57.75, OK	Poor	ties are in poor condition
4	56.25	56- 57.75, OK		none
5	56.75	56- 57.75, OK		none
6	56.25	56- 57.75, OK		none
7	56.5	56- 57.75, OK		none
8	56.25	56- 57.75, OK		none
9	56.625	56- 57.75, OK		none
10	56.5	56- 57.75, OK	Fair	ties in fair condition
11	56.5	56-58, OK	Good	"Accepted"
12	56.75	56- 57.75, OK	Poor	Ties are in very bad shape , cracks through bolts, spikes move, diagonal crack all through one tie(unusable). MUST BE REPLACED.
13	56.5	56- 57.75, OK	Poor	One of every 5 ties is in bad condition. Spikes move.
14	56.625	56- 57.75, OK	Poor	13 ties out of ( ) on the bridge are in severe condition. Section loss due to moisture in most of them.

Appendix H: On-site Track Inspection for The Sample

Inspected Track (Based on Sample Bridges)	Gage length		Condition	Remarks
	size	Range, OK?		
15	56.5	56- 57.75, OK	Fair	Few spikes move, Few Cracks
16	56.25	56- 57.75, OK		none
17				
18				
19	56.75	56- 58, OK	Very Poor	Big gaps between the ties. MUST BE REPLACED, DEFINITELY.
20				approaching a curve
21	56.25	56- 57.75, OK	Poor	Ties are Very bad in condition. Some are totally missing.
22	56.5	56- 57.75, OK		none
23	56.25	56- 57.75, OK	Poor	Nearly poor in condition, problem is not very big since there is no curve but still bad.
24	56.5	56- 57.75, OK	Poor	Wood decayed on top layers. Derailed car marks on the center. Spikes move Spikes are stiff, most of them don't move. No vegetation on
25	56.25	56- 57.75, OK	Fair	tracks. A few ties have serious cracks and some have section loss.
26	56.75	56- 57.75, OK	Fair	6 out of 20 ties (on bridge) are very bad in condition.(30%)Track curved, therefore may be concluded as "bad" also.
27	56.75	56- 57.75, OK		none

degrees

good	no loose spike or bad tie
fair	few loose spike or bad tie
poor	many loose spike or bad tie

APPENDIX I

LIST OF RAIL STRATIFICATION FOR PENNSYLVANIA SHORTLINE RAILROADS

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	Total miles	Class	Cond. (286k car)	Cond. (315k car)	80 Rail Miles	85 Rail Miles	90 Rail Miles	100 Rail Miles	101 Rail Miles	105 Rail Miles	110 Rail Miles	112 Rail Miles	115 Rail Miles	119 Rail Miles
1	46	1	Pass	Pass									46	
2	134.3	1	Pass	Pass										
	13.2	2	Pass	Fail (1)				1						
3	4	1	Pass	Pass							4			
4	65.1	1	Pass	Pass				25				4.8	8.9	
	186.8	2	Pass	Pass								23.7	28.5	
5	17	1	Pass	Pass				6						
6	1.5	1	Pass	Pass				1						
7	12	1	Pass	Pass				10					2	
8	15	1	Fail (2)	Fail (2)		2		12						
9	23	2 or better	Pass	Pass										
10	10	2	Pass	Fail (10)				10						
11	8	1	Pass	Pass										
12	8	1	Pass	Pass										
13	5	1	Pass	Pass										
14	8	1	Fail (5)	Fail (5)		5								
15	6	1	Pass	Pass										

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	Total miles	Class	Cond. (286k car)	Cond. (315k car)	80 Rail Miles	85 Rail Miles	90 Rail Miles	100 Rail Miles	101 Rail Miles	105 Rail Miles	110 Rail Miles	112 Rail Miles	115 Rail Miles	119 Rail Miles
16	70	1	Fail (41)	Fail (41)		41		29						
17	17	1	Pass	Pass										
18	18	2	Pass	Pass										
19	26	1	Pass	Pass				13						
20	1	1	Pass	Pass									1	
21	8	1	Fail (2)	Fail (2)		2		4						
22	1	1	Pass	Fail (1)			1							
23	50	3	Pass	Fail (10)									10	
24	10	1	Pass	Pass										
25	3	1	Pass	Pass										
26	4	1	Pass	Pass										
27	4	1	Pass	Pass										
28	18	2	Fail (15)	Fail (17)			15	2						
29	44	1	Pass	Fail (36)					27	9				
30	2	2	Fail (2)	Fail (2)	2									
31	13	2	Pass	Pass										
32	40	2	Pass	Pass								32		

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	Total miles	Class	Cond. (286k car)	Cond. (315k car)	80 Rail Miles	85 Rail Miles	90 Rail Miles	100 Rail Miles	101 Rail Miles	105 Rail Miles	110 Rail Miles	112 Rail Miles	115 Rail Miles	119 Rail Miles
33	3	1	Pass	Fail (1)			1					2		
34	16	1	Pass	Pass				16						
35	42	1	Pass	Pass				12						
36	8.2	1	Pass	Pass									8.2	
37	11	1	Pass	Pass										
38	33.9	1	Pass	Pass				1.1			11.9	2.2	18.7	
	36	2	Pass	Fail (0.05)				0.05			9.4	8.15	13.2	
39	36	1	Pass	Fail (12)						12				
40	68	1/ 2	Pass	Pass										
41	11	1	Pass	Pass				9						
42	56	2	Pass	Pass										
43	24	2	Pass	Pass										
44	25	1	Pass	Fail (25)			25							
45	6	1	Fail (4)	Fail (4)		4		2						
46	4	2	Pass	Pass									4	
47	20	1	Pass	Pass										
48	6	1	Fail (4)	Fail (5)	4		1							
49	11	1	Pass	Pass										

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	Total miles	Class	Cond. (286k car)	Cond. (315k car)	80 Rail Miles	85 Rail Miles	90 Rail Miles	100 Rail Miles	101 Rail Miles	105 Rail Miles	110 Rail Miles	112 Rail Miles	115 Rail Miles	119 Rail Miles
50	13	1	Pass	Pass										
51	52	1	Pass	Pass									11	
52	3	1	Pass	Fail (3)						3				
53	6	2	Pass	Pass									4	
54	93	3	Pass	Fail (83)								47	36	
55	4	1	Pass	Fail (4)						4				
56	2	1	Pass	Fail (2)						2				
57	6	1	Pass	Fail (6)						6				
58	1	1	Pass	Pass										
59	16	2	Pass	Fail (16)				16						

			80	85	90	100	101	105	110	112	115	119
TOTAL	1505	MILES/ RAIL TYPE	6	54	43	169.15	27	36	25.3	119.85	191.5	0
		PERCENT OF TOTAL	[redacted]	[redacted]	2.86%	11.24%	1.79%	2.39%	1.68%	7.96%	12.72%	0.00%
Miles of Rail Failure by Rail Type			6	54	15	0	0	0	0	0	0	0

			80	85	90	100	101	105	110	112	115	119
TOTAL	1505	MILES/ RAIL TYPE	6	54	43	169.15	27	36	25.3	119.85	191.5	0
		PERCENT OF TOTAL	0.40%	3.59%	2.86%	11.24%	1.79%	2.39%	1.68%	7.96%	12.72%	0.00%
Miles of Rail Failure by Rail Type			6	54	43	29.05	27	36	0	47	46	0

100RE

[redacted]
288.05 miles 19.14%

[redacted]
repair; replace rails

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	125 Rail Miles	127 Rail Miles	130 Rail Miles	131 Rail Miles	132 Rail Miles	133 Rail Miles	135 Rail Miles	136 Rail Miles	140 Rail Miles	152 Rail Miles	155 Rail Miles	157 Rail Miles	Total Miles
1													46
											TOTAL		46
2			68	65.7		0.3			0.3				134.3
			10.3	1.9									13.2
											TOTAL		147.5
3	0	0	0	0	0	0	0	0	0	0	0	0	4
4			3.6	8.6	12.3				1.9				65.1
			5.5	62.2	61				5.9				186.8
5				11									17
6				0.5									1.5
											TOTAL		274.4
7													12
											TOTAL		12
8				1									15
											TOTAL		15
9			21						2				23
											TOTAL		23
10													10
											TOTAL		10
11			8										8
12			8										8
											TOTAL		16
13			5										5
14			3										8
											TOTAL		13
15			6										6
											TOTAL		6

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	125 Rail Miles	127 Rail Miles	130 Rail Miles	131 Rail Miles	132 Rail Miles	133 Rail Miles	135 Rail Miles	136 Rail Miles	140 Rail Miles	152 Rail Miles	155 Rail Miles	157 Rail Miles	Total Miles
16													70
											TOTAL		70
17		14		3									17
18			3	5	2				8				18
											TOTAL		35
19			13										26
											TOTAL		26
20													1
											TOTAL		1
21					2								8
											TOTAL		8
22													1
											TOTAL		1
23			2	14		20		2		2			50
24			10										10
25			3										3
26			4										4
27			3	1									4
											TOTAL		71
28			1										18
											TOTAL		18
29			8										44
											TOTAL		44
30													2
31			13										13
32				8									40
											TOTAL		55

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	125 Rail Miles	127 Rail Miles	130 Rail Miles	131 Rail Miles	132 Rail Miles	133 Rail Miles	135 Rail Miles	136 Rail Miles	140 Rail Miles	152 Rail Miles	155 Rail Miles	157 Rail Miles	Total Miles
33													3
											TOTAL		3
34													16
											TOTAL		16
35			28						2				42
36													8.2
37				1	8				2				11
											TOTAL		61.2
38													33.9
				1.3	1.7			2.2					36
											TOTAL		69.9
39		5	19										36
40		13	12	43									68
41			2										11
42		6	2								36	12	56
43		12		4							8		24
											TOTAL		195
44													25
											TOTAL		25
45													6
											TOTAL		6
46													4
											TOTAL		4
47			20										20
											TOTAL		20
48					1								6
											TOTAL		6
49			11										11
											TOTAL		11

Appendix I: List of Rail Stratification For Pennsylvania Railroads

SLRR NO	125 Rail Miles	127 Rail Miles	130 Rail Miles	131 Rail Miles	132 Rail Miles	133 Rail Miles	135 Rail Miles	136 Rail Miles	140 Rail Miles	152 Rail Miles	155 Rail Miles	157 Rail Miles	Total Miles
50			13										13
											TOTAL		13
51		41											52
52													3
											TOTAL		55
53					2								6
54					10								93
55													4
56													2
57													6
											TOTAL		111
58							1						1
											TOTAL		1
59													16
											TOTAL		16

TOTAL	0	91	305.4	231.2	100	20.3	1	4.2	22.1	2	44	12	TOTAL
PERCENT	0.00%	6.05%	20.29%	15.36%	6.64%	1.35%	0.07%	0.28%	1.47%	0.13%	2.92%	0.80%	1505.0
FAIL	0	0	0	0	0	0	0	0	0	0	0	0	76.00

TOTAL	0	91	305.4	231.2	100	20.3	1	4.2	22.1	2	44	12	TOTAL
PERCENT	0.00%	6.05%	20.29%	15.36%	6.64%	1.35%	0.07%	0.28%	1.47%	0.13%	2.92%	0.80%	1505.0
FAIL	0	0	0	0	0	0	0	0	0	0	0	0	288.05

APPENDIX J

TRACK COST ESTIMATIONS

Track Rehabilitation Cost Estimate-1 (Per track mile)					
Source: Stone Consulting					
Rail Replacement Items					
No.	**Item Description**	**Quantity**	**Units**	**Unit cost**	**Total**
	MATERIAL ITEMS				
1	Rail 136#RE Standard New Rail (inludes CWR plant welds)	10560	TF	$10.74	$113,414.40
2	136#RE 14" Tie Plates	6182	EA	$4.56	$28,189.92
3	Cut Spikes	18546	EA	$0.24	$4,451.04
4	Tie Plug Bndls	(N/A)			$0.00
5	Field Weld Kit	(Labor includes)			$0.00
6	Rail Anchors, 136#	6180	EA	$0.75	$4,635.00
			MATERIAL SUBTOTAL =		$150,690.36
	MATERIAL ADDITIVES				
7	Stores& Handling	N/A			
8	Use tax on Purchased Materials	N/A			
9	Transportation of Rail	5280	TF	$0.42	$2,217.60
10	Transportation of Materials	N/A			
			ADDITIVES SUBTOTAL=		$2,217.60
	SALVAGE ITEMS	N/A			
11	Cropped rail Ends	N/A			
12	Rail, scrap	N/A			
13	Transportation of scrap	N/A			
			SALVAGE SUBTOTAL=		$0.00
	LABOR AND EQUIPMENT ITEMS				
14	Distribution and Pick up of rail	N/A			
15	Install CWR Rail	0.5	Track Mile	$116,594.00	$58,297.00
16	Field Welding	N/A			
17	Supervision	N/A			
18	Labor Additives	N/A			
19	Peronal Expense	N/A			
20	Rail Train Expense	N/A			
		LABOR AND EQUIPMENT SUBTOTAL=			$58,297.00
				TOTAL=	**$211,204.96**

Track Rehabilitation Cost Estimate-1				
	Quantity	Units	Unit cost	Total
Upgrade to 315,000 lb car				
Total Single Track Cost Per Mile	288.05	Miles	$211,204.96	$60,837,588.73
Upgrade to 286,000 lb car				
Total Single Track Cost Per Mile	75.00	Miles	$211,204.96	$15,840,372.00

Track Rehabilitation Cost Estimate-2 (Per track mile)					
Source: Nittany and Bald Eagle Railroad					
Rail Replacement Items					
No.	**Item Description**	**Quantity**	**Units**	**Unit cost**	**Total**
	MATERIAL ITEMS				
1	Rail 136#RE Standard New Rail (inludes CWR plant welds)	10560	TF	$14.70	$155,232.00
2	136#RE 14" Tie Plates	N/A			
3	Cut Spikes	N/A			
4	Tie Plug Bndls (N/A)	N/A			
5	Field Weld Kit (Labor includes)	N/A			
6	Rail Anchors, 136#	N/A			
				MATERIAL SUBTOTAL =	$155,232.00
	MATERIAL ADDITIVES				
7	Stores& Handling	N/A			
8	Use tax on Purchased Materials	N/A			
9	Transportation of Rail	N/A			
10	Transportation of Materials	N/A			
				ADDITIVES SUBTOTAL=	$0.00
	SALVAGE ITEMS	N/A			
11	Cropped rail Ends	N/A			
12	Rail, scrap	N/A			
13	Transportation of scrap	N/A			
				SALVAGE SUBTOTAL=	$0.00
	LABOR AND EQUIPMENT ITEMS				
14	Distribution and Pick up of rail	N/A			
15	Install CWR Rail	1	Track mile	$20,000.00	$20,000.00
16	Field Welding	N/A			
17	Supervision	N/A			
18	Labor Additives	N/A			
19	Personal Expense	N/A			
20	Rail Train Expense	N/A			
				LABOR AND EQUIPMENT SUBTOTAL=	$20,000.00
21	Miscellaneous	1	Track mile	$24,768.00	$24,768.00
				TOTAL=	**$200,000.00**

Track Rehabilitation Cost Estimate-2				
	Quantity	Units	Unit cost	Total
Upgrade to 315,000 lb car				
Total Single Track Cost Per Mile	288.05	Miles	$200,000.00	$57,610,000.00
Upgrade to 286,000 lb car				
Total Single Track Cost Per Mile	75.00	Miles	$200,000.00	$15,000,000.00

Track Rehabilitation Cost Estimate-3 (Per track mile)					
Source: Jannotti Rail Consulting					
Rail Replacement Items					
No.	**Item Description**	**Quantity**	**Units**	**Unit cost**	**Total**
	MATERIAL ITEMS				
1	Rail 136#RE Standard New Rail (inludes CWR plant welds)	240	TF	$590.00	$141,600.00
2	14" Tie Plates	6182	EA	$6.25	$38,637.50
3	Cut Spikes	18546	EA	$0.40	$7,418.40
4	Tie Plug Bndls (N/A)	18102	EA	$0.20	$3,620.40
5	Field Weld Kit (Labor includes)	18	EA	$320.00	$5,760.00
6	Rail Anchors, 136#	6180	EA	$0.92	$5,685.60
				MATERIAL SUBTOTAL =	$202,721.90
	MATERIAL ADDITIVES				
7	Stores& Handling	N/A			
8	Use tax on Purchased Materials	Assumed to be exempt			
9	Transportation of Rail	Included in the rail price			
10	Transportation of Materials	N/A			
				ADDITIVES SUBTOTAL=	$0.00
	SALVAGE ITEMS				
11	Cropped rail Ends				
12	Rail, scrap	146	GT	$75.00	$10,950.00
13	Transportation of scrap				
				SALVAGE SUBTOTAL=	$10,950.00
	LABOR AND EQUIPMENT ITEMS				
14	Distribution and Pick up of rail	N/A			
15	Install CWR Rail	5,280	LF	$5.75	$30,360.00
16	Field Welding	N/A			
17	Supervision	N/A			
18	Labor Additives	N/A			
19	Personal Expense	N/A			
20	Rail Train Expense	N/A			
				LABOR AND EQUIPMENT SUBTOTAL=	$41,310.00
				TOTAL=	**$254,981.90**

Track Rehabilitation Cost Estimate-3

	Quantity	Units	Unit cost	Total
Upgrade to 315,000 lb car				
Total Single Track Cost Per Mile	288.05	Miles	$254,981.90	$73,447,536.30
Upgrade to 286,000 lb car				
Total Single Track Cost Per Mile	75.00	Miles	$254,981.90	$19,123,642.50

Track Rehabilitation Cost Estimate-4 (Per track mile)

Source: Atlas Railroad Construction Company

Rail Replacement Items

No.	Item Description	Quantity	Units	Unit cost	Total
	MATERIAL ITEMS				
1	Rail 136#RE Standard New Rail (inludes CWR plant welds)	240	T	$670.00	$160,800.00
2	14" Tie Plates	5770	EA	$8.75	$50,487.50
3	Cut Spikes	60	Kegs	$75.00	$4,500.00
4	Tie Plug	26	Bndls	$31.00	$806.00
5	Field Weld Kit (Labor includes)	8	EA	$146.00	$1,168.00
6	Rail Anchors, 136#	7600	EA	$1.26	$9,576.00
				MATERIAL SUBTOTAL =	$227,337.50
	MATERIAL ADDITIVES				
7	Stores& Handling	N/A			
8	Use tax on Purchased Materials	Included above			
9	Transportation of Rail	Freight to jobsite variable			
10	Transportation of Materials	Freight to jobsite variable			
				ADDITIVES SUBTOTAL=	$0.00
	SALVAGE ITEMS				
11	Cropped rail Ends	N/A			
12	Rail, scrap	146	GT	$70.00	$10,220.00
13	Transportation of scrap	N/A			
				SALVAGE SUBTOTAL=	$10,220.00
	LABOR AND EQUIPMENT ITEMS				
14	Distribution and Pick up of rail	10560	LF	$1.15	$12,144.00
15	Install CWR Rail	10560	LF	$3.20	$33,792.00
16	Field Welding	8	EA	$346.00	$2,768.00
17	Supervision	N/A			
18	Labor Additives	N/A			
19	Personal Expense	N/A			
20	Rail Train Expense	N/A			
				LABOR AND EQUIPMENT SUBTOTAL=	$58,924.00
				TOTAL=	**$296,481.50**

Track Rehabilitation Cost Estimate-4				
	Quantity	Units	Unit cost	Total
Upgrade to 315,000 lb car				
Total Single Track Cost Per Mile	288.05	Miles	$296,481.50	$85,401,496.08
Upgrade to 286,000 lb car				
Total Single Track Cost Per Mile	75.00	Miles	$296,481.50	$22,236,112.50

APPENDIX K

LOADING: HISTORY AND CURRENT PRACTICE

LOADING: HISTORY AND CURRENT PRACTICE

For a complete analysis and rating of the bridges, calculation of both dead and live loads must be employed. In this study, current rail-car loading schemes such as 263,000-lb, 286,000-lb, and the proposed 315,000-lb cars were employed for the evaluation of the infrastructure in order to achieve the objectives of the study. In addition, for comparison with standard railway practice, E-ratings were also determined. The history of the railway loading dates to the 1800s; this appendix presents an overview of the history of railway live loads prior to the current practice.

DEAD LOADS

The self-weight of the structural elements of the bridges constitutes a considerable amount of static load on the structures, and therefore they should be added to the live loads when the bridges are evaluated for strength. The material densities recommended by the current AREA specifications (AREA, 1996) are used for estimating the weight of the structural elements in this study; the unit weights for different material types are listed in Table K.1.

Table K.1 Unit Weights for Dead Load Stresses (AREA, 1996).

Type of Material	**Pounds per cubic foot**
Steel	490
Concrete	150
Sand, gravel and ballast	120
Asphalt-mastic and bituminous macadam	150
Granite	170
Paving bricks	150
Timber	60

LIVE LOADS

The history of railroad car loading schemes depends mostly on the developments of the rail car industry. In this section a review of the live-load schemes from the 19th century to date is provided with respect to the developments in the railroad industry.

Historical Overview

Because most short-line railroads in Pennsylvania do not posses complete track and bridge structure inventory information, a detailed evaluation was conducted to determine the capacity of these bridges at the time they were designed. Many of the short-line railroad bridges were constructed 75 to 100 years ago; therefore, loading schemes and design considerations prevalent to the day are included in order to better evaluate these structures.

During the third quarter of the nineteenth century most American railroad bridges were designed to support uniformly distributed live loads with the same live-load scheme used for the design of both long- and short-span bridges. This practice, coupled with increases over time in the weights of locomotives, resulted in inadequate floor systems and truss spans and undercapacities in other short-span systems. The eventual adoption of a series of concentrated loads to model locomotive wheel loads eliminated this inconsistency. The first American use of a series of concentrated loads to model typical locomotives was in 1873 (Cooper, 1889). Between 1873 and 1893, more than 40 different design-load models of this type were developed; these models were in general unnecessarily accurate representations of the heaviest locomotive in use on the line on which the bridge was built. Individual railroads specified up to three different loadings for design of bridges on different segments of the same railroad due to different classes of power employed in different operating districts. In addition, a number of railroads frequently increased design live loads during this era while others made changes in axle spacing and in the relationship between loads on various axles (Byers, 1992). A summary of the weights of the typical freight locomotives and the design load used by various railroads can be found in Table K.2.

The expanding inconsistencies in the load models developed during this era prompted the preparation of a specification for both loadings and design criteria. Consequently, Theodore Cooper prepared the Erie Specifications in 1878 (Cooper, 1889). In these specifications, Cooper advocated the use of a simplified locomotive load model that would reasonably approximate actual loadings and could be increased proportionally to accommodate changes in locomotive weight (Ketchum, 1924). In the initial Erie Specifications, Cooper defined four types of train loadings, as shown in Table K.3.

Table K.2 Typical Freight Locomotive Weights and Design Loads in 1900s (Forsyth, 1904).

Description **(1)**	**Total (kips)** **(2)**	**Portion On Drives (kips)** **(3)**	**Average Axle Load On Drivers (kips)** **(3)**
Weights of Typical Freight Locomotives in 1900s	292	171	43
	478	334	56
Design Loads Used by Various Railroads in 1900s	282	176	44
	426	264	66

In 1905, the American Railway Engineering Association published the first version of design specifications for steel and wrought-iron bridges (AREA, 1905). In these specifications, a slightly modified Cooper's E40 loading scheme (Table K.4), including a special loading consisting of two 50-kip axle loads at 7-ft centers, was specified (Table K.5). The special loading aimed to represent passenger locomotives as a minimum live load, with heavier loading of the same configuration being optional. Cooper's E40 freight locomotive consists of two locomotives with gross weights of 280 kips each, 160 kips on four driver axles and a maximum axle load of 40 kips followed by a uniform load of 4 kips/ft (Table K.4). In addition to the various live loads specified by particular railroads, Cooper's E40 was apparently commonly accepted between 1900 and 1910 (Schaub, 1903).

All of the common load models for steel bridges were specified by AREA in 1911 specifications. These load models were composed of a minimum of E40 plus a special loading as shown on Tables K.4 and K.5 (Ketchum, 1924). Live loads and impact for concrete and wood structures were left to the judgment of the designer.

Table K.3. Cooper Erie Loadings, 1878 (Cooper, 1889).

Designation	Axle spacings	Axle loads	Uniform Load (lbs./ft)
N/A	5', 6', 6', 6', 6', 5', 5', 5', 6', 5', 6', 6', 6', 6', 5', 5', 5'	10000, 10000, 24000, 24000, 24000, 10000, 10000, 10000, 10000, 10000, 10000, 24000, 24000, 24000, 10000, 10000, 10000, 10000	1820
N/A	8.1', 5.8', 4.5', 4.5', 7.1', 4.8', 5.7', 4.8', 9.0', 8.1', 5.8', 4.5', 4.5', 7.1', 4.8', 5.7', 4.8'	15100, 22000, 22000, 22000, 22000, 14560, 14560, 14560, 14560, 15100, 22000, 22000, 22000, 22000, 14560, 14560, 14560, 14560	2240
N/A	8', 5', 5', 5', 11', 5', 5', 5', 8', 8', 5', 5', 5', 11', 5', 5', 5'	14000, 30000, 30000, 30000, 30000, 17000, 17000, 17000, 17000, 14000, 30000, 30000, 30000, 30000, 17000, 17000, 17000, 17000	3000
E40	8.1', 5.8', 4.5', 4.5', 7.1', 4.8', 5.7', 4.8', 8.2', 8.1', 5.8', 4.5', 4.5', 7.1', 4.8', 5.7', 4.8'	16000, 40000, 40000, 40000, 40000, 18000, 18000, 20000, 20000, 16000, 40000, 40000, 40000, 40000, 18000, 18000, 20000, 20000	4000

Table K.4 Cooper's Conventional Engine Loadings, 1924 (Loads for one track) (Ketchum, 1924).

Designation	8'	5'	5'	5'	9'	5'	6'	5'	8'	8'	5'	5'	5'	9'	5'	6'	5'		Uniform Load
E40	20000	40000	40000	40000	40000	26000	26000	26000	26000	20000	40000	40000	40000	40000	26000	26000	26000	26000	4000 lbs.
E45	22500	45000	45000	45000	45000	29250	29250	29250	29250	22500	45000	45000	45000	45000	29250	29250	29250	29250	4500 lbs.
E50	25000	50000	50000	50000	50000	32500	32500	32500	32500	25000	50000	50000	50000	50000	32500	32500	32500	32500	5000 lbs.
E55	27500	55000	55000	55000	55000	35750	35750	35750	35750	27500	55000	55000	55000	55000	35750	35750	35750	35750	5500 lbs.
E60	30000	60000	60000	60000	60000	39000	39000	39000	39000	30000	60000	60000	60000	60000	39000	39000	39000	39000	6000 lbs.

Table K.5 Cooper's Special Loadings (Ketchum, 1924)

Cooper Loading Designation	E40	E45	E50	E55	E60
Special Loading (in lbs)	50000 50000	56250 56250	60000 60000	68750 68750	75000 75000
Configuration	7'	7'	7'	7'	7'

In the early 1920s, typical locomotive driver axle loads ranged from 41 kips to 67 kips, with the heaviest axle loads on passenger locomotives. The majority of freight cars had a capacity of 40 tons with a loaded gross weight of 136 kips on four axles (Byers, 1992). In the same era, three general specifications for steel railway bridges were available (Ketchum, 1924):

1. AREA adopted a revised "General Specifications for Steel Railway Bridges" in 1920, which was again revised in 1923. These specifications specify a live load of E60 followed by a train load of 6 kips/ft (Table K.4) or two concentrated axle loads of 7,500 lb each, spaced 7 ft apart (Table K.5). Although E60 was the widely used load model, in special cases an E45 load model may have been specified.

2. The Canadian Engineering Standards Committee prepared a specification for railway bridges that was generally adopted by railways in Canada. These specifications, as adopted in 1920 and revised in 1922, agreed in all essentials with the AREA specifications.

3. A special Committee on Specifications for Bridge Design and Construction of the American Society of Civil Engineers (ASCE) prepared "Specifications for Steel Railway Bridge Superstructure" (Steinman, 1923). In addition to the Class E Loadings of AREA and the Canadian Engineering Standards Committee, the ASCE specifications defined a live load of Class M for mainline bridges (Figures K.1 and K.2). The M loading was proposed by D. B. Steinman in 1923 (Steinman, 1923). The equivalent E loadings for M50 loadings, up to spans of 250 ft, can be calculated from Table K.6; ratings for longer spans are shown in Table K.7.

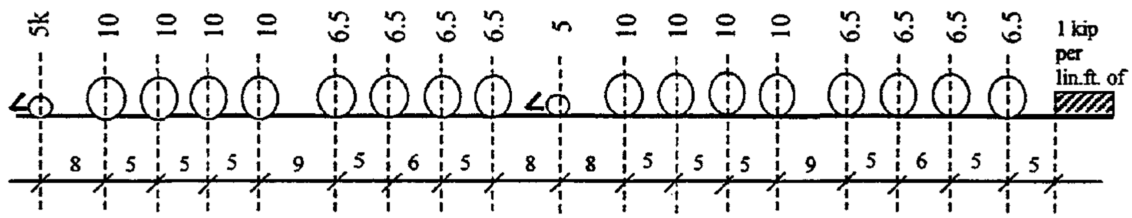


Figure K.1 Class E-10 Engine Loading (Ketchum, 1924).

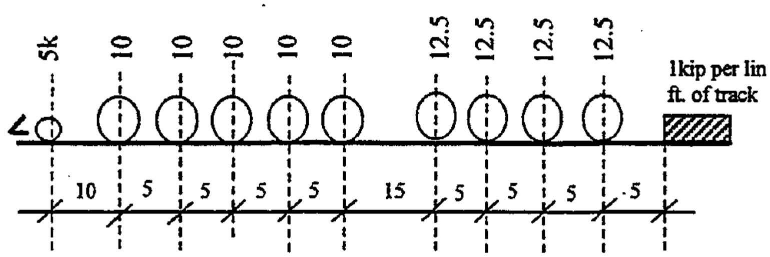


Figure K.2 Class M-10 Engine Loading (Ketchum, 1924).

Primarily depending on Cooper loadings and AREA Standards of 1910 and 1924, Ketchum (1924) describes three types of live loads:

1. Cooper's Conventional System of Wheel Concentrations:

Cooper loadings consist of two consolidation locomotives followed by a uniformly distributed train load. The typical loadings for Class E40, E45, E50, E55, and E60 are shown in Table K.4. The wheel spacing is the same for all classes. The E50, E55, and E60 loadings were most commonly used for steam railways in the United States. Bridges designed for Cooper loadings must also be checked for two moving loads spaced 6 ft apart on each track. The AREA adopted Cooper's loadings except that the special loads are spaced at 7 ft (Table K.5).

Table K.6 Conversion Table, Class E to class M Engine Loading (Ketchum, 1924).

Span Length, ft	Maximum Moment	Maximum Shear	Maximum Floor Beam Reaction	Span Length	Maximum Moment	Maximum Shear	Maximum Floor Beam Action
10	0.800	0.800	0.800	46	0.755	0.771	0.777
11	0.801	0.799	0.769	48	0.759	0.771	0.777
12	0.800	0.800	0.747	50	0.765	0.775	0.778
13	0.800	0.800	0.732	52	0.769	0.772	0.782
14	0.801	0.799	0.730	54	0.769	0.767	0.786
15	0.800	0.800	0.729	56	0.774	0.760	0.793
16	0.800	0.800	0.727	58	0.777	0.759	0.803
17	0.801	0.800	0.725	60	0.779	0.756	0.812
18	0.800	0.800	0.724	62	0.781	0.756	0.818
19	0.800	0.799	0.729	64	0.782	0.759	0.825
20	0.800	0.800	0.739	66	0.785	0.760	0.831
21	0.800	0.786	0.746	68	0.785	0.766	0.837
22	0.786	0.773	0.754	70	0.786	0.770	0.845
23	0.772	0.763	0.757	72	0.784	0.775	0.850
24	0.760	0.760	0.761	74	0.781	0.784	0.857
25	0.751	0.758	0.764	76	0.782	0.790	0.862
26	0.743	0.756	0.765	78	0.778	0.795	0.867
27	0.735	0.752	0.770	80	0.776	0.801	0.873
28	0.731	0.749	0.774	82	0.775	0.808	0.877
29	0.729	0.746	0.778	84	0.775	0.815	0.881
30	0.730	0.748	0.778	86	0.775	0.825	0.885
31	0.729	0.750	0.779	88	0.774	0.828	0.887
32	0.728	0.752	0.782	90	0.774	0.839	0.893
33	0.726	0.751	0.786	92	0.774	0.850	0.895
34	0.726	0.752	0.788	94	0.777	0.854	0898
35	0.724	0.751	0.789	96	0.777	0.855	0.901
36	0.726	0.754	0.786	98	0.777	0.859	0.906
37	0.728	0.753	0.782	100	0.776	0.858	0.909
38	0.731	0.757	0.781	125	0.823	0.874	0.937
39	0.732	0.758	0.782	150	0.859	0.883	0.953
40	0.738	0.759	0.782	175	0.886	0.893	0.964
42	0.745	0.768	0.779	200	0.905	0.902	0.971
44	0.752	0.768	0.776	250	0.939	0.913	0.981

Note: To convert E-rating to equivalent M-rating, multiply by the coefficients in this table. To convert M-rating to equivalent E-rating, divide by the coefficients in this table.

Table K.7 Equivalent E Loadings for M50 Loadings (Ketchum, 1924).

Span, ft	E Loading for Maximum	E Loading For End Shear	Span, ft	E Loading for Maximum Moment	E Loading For End Shear
10	E62.5	E62.5	300	E52.5	E54.2
50	E65.4	E64.5	400	E51.4	E53.3
100	E64.4	E58.3	500	E51.0	E52.7
200	E55.2	E55.4	600	E50.6	E52.4

2. Equivalent Uniform Load System:

The equivalent uniform load for calculating the stresses in trusses and the bending moments in beams is the uniform load that will produce the same bending moment at the quarter points of the truss or beam as the maximum bending moment produced by the wheel concentrations. The equivalent uniform load is proportional to Cooper "E" loadings. Maximum end shear and the shear at intermediate points must be determined from the wheel loads.

3. Uniform Load and One or Two Excess Loads:

A uniform load is used and to provide an equivalent for the wheel concentrations, one or two excess loads are assumed to run on top of the uniform load.

In 1935, the live load for steel bridges was increased to E72 (AREA, 1935) and the concrete bridge specification recommended the same live load for main-line bridges. During the 1950s, only minor changes were made to steel design specifications. The special loading of two 90-kip axles 7 ft apart was deleted from the Cooper E72 loading. Concrete design specifications were significantly revised in 1953 for stresses; however, no changes were made to loading schemes (AREA, 1953). A general revision of steel specifications was made in 1969 (Byers, 1992). Major items in this revision were an increase in the design live load from E72 to E80 and changes in allowable stresses.

AREA under went several revisions during the period from 1970 to the present. Cars with gross weights of 263 kips on four axles became common and a significant number of 125-ton capacity cars with 315 kips gross weights on four axles were built. Heavy cars are particularly damaging from a fatigue perspective to short-span bridges, truss floor systems, and floor beam hangers, as their truck centers allow unloading under each car and approximately 100 load cycles per train result as compared with one or two cycles over members reacting as a longer span. Solid trains of 263-kip cars, which are commonly used in unit trains hauling bulk commodities, rate near E65 on 8-ft spans, near E50 on moderate length spans, and from E40 to E75 on very long spans, depending on the length of the cars. The truck centers of these cars vary from 20 ft to nearly 50 ft. The 315-kip cars rate near E80 on very short spans and near E60 on long spans (Byers, 1992).

Changes in both the steel and concrete specifications since 1979 have been refinements related to increased knowledge of material behavior and can be found in the latest version of AREA specifications (AREA, 1996).

CURRENT PRACTICE

The current loading used for analysis and design of railway bridges is E80 loading, based on the historical Cooper E-loadings. However, the current and newly proposed rail car weights are becoming more important. The E80 loading scheme as defined in AREA 1996 and current rail car weights are presented in Tables K.8 and K.9, respectively.

Table K.8 E80 Loading Scheme (AREA, 1996).

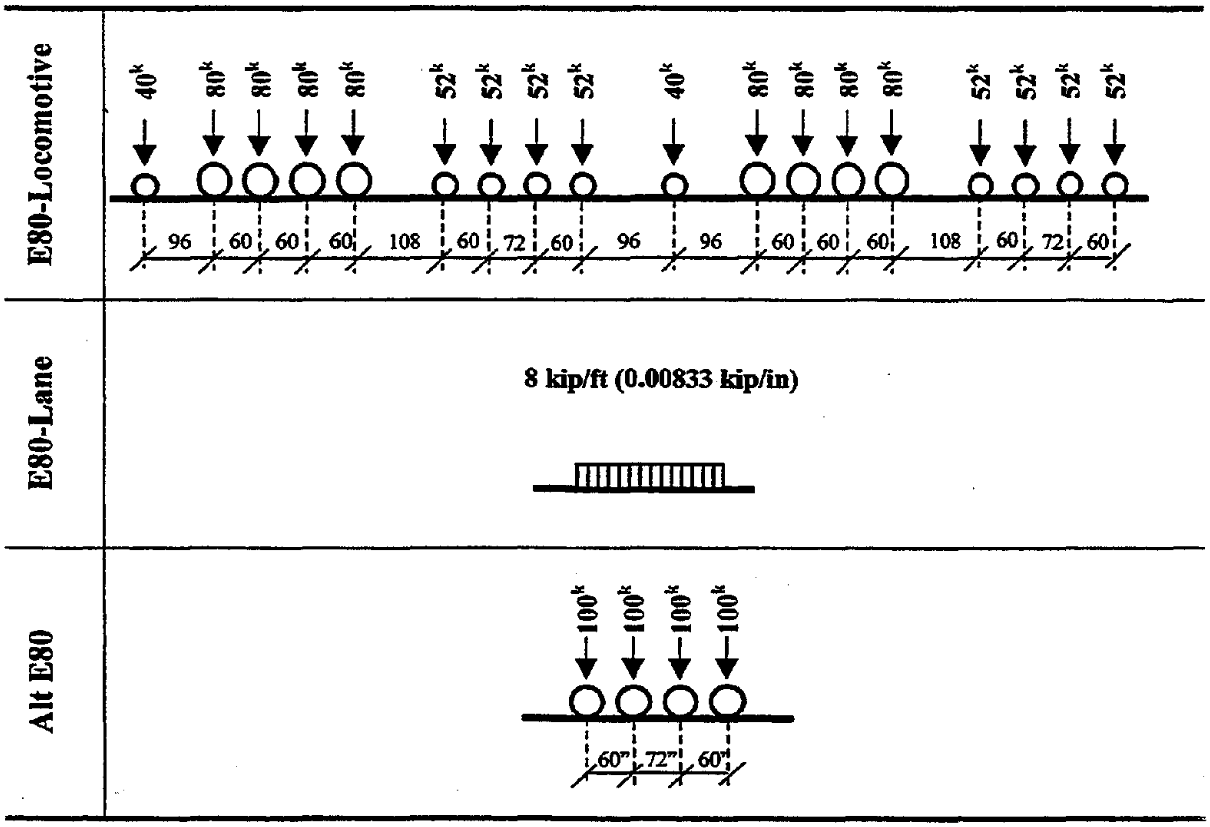
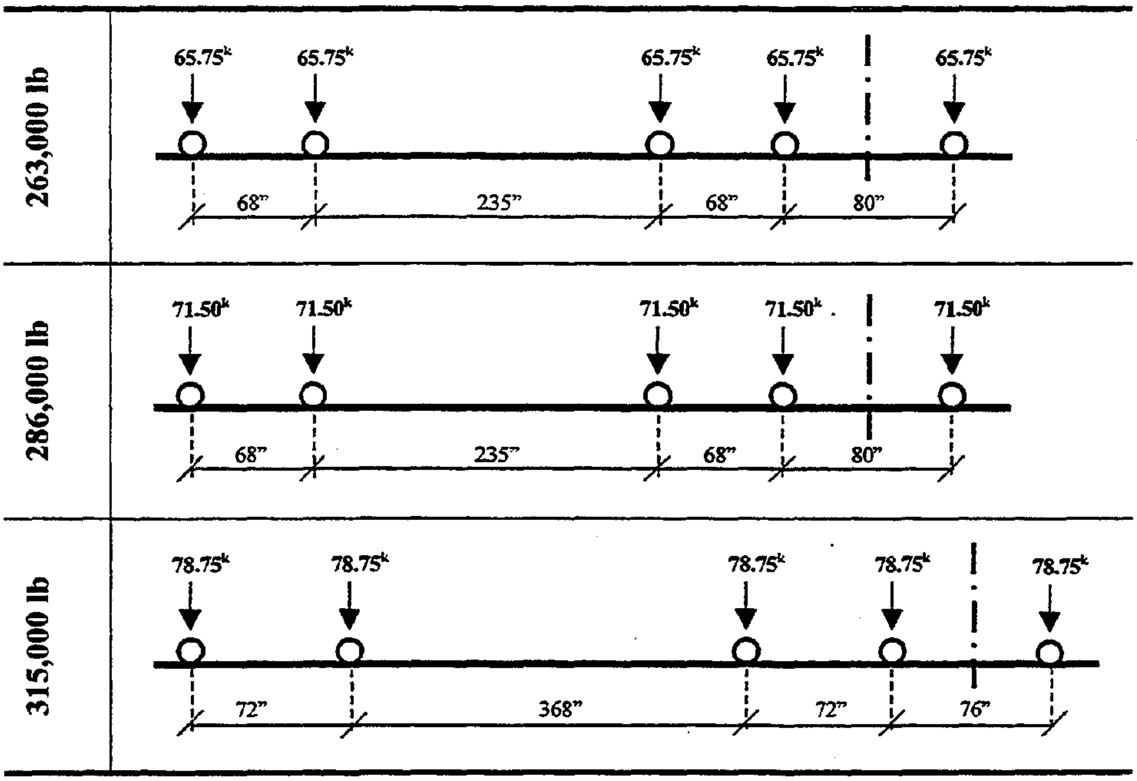


Table K.9 Current Rail Car Loading Scheme (Norfolk Southern Railroad, Inc.).



IMPACT LOADS

The dynamic increment of load due to the effects of speed, roll, and track irregularities is defined as the "impact loads," and it is usually added to the live load as a proportion. The calculation of impact factors in the past and current practices is discussed in this section.

Historical Overview

In the previous provisions of the AREA specifications, the impact factors were calculated in terms of computed maximum live-load strain, but later in practice this was found to be impractical and strain values were excluded from the impact factor calculations.

1910 AREA Specifications (Ketchum, 1924):

$$I = S\frac{300}{L+300} \tag{K.1}$$

where I is the impact or dynamic increment to be added to live-load strains, S is the computed maximum live-load strain, and L is the loaded length of track in feet producing the maximum strain in member.

1920 AREA Specifications (Ketchum, 1924)

$$I = S\frac{300}{300+\frac{L^2}{100}} \qquad \text{(K.2)}$$

where I is the impact or dynamic increment to be added to live-load strains, S is the computed maximum live-load strain, and L is the loaded length of track in feet producing the maximum strain in member.

Current Practice

According to AREA (AREA, 1996), the impact effect on open deck bridges must be determined according to equations K.3 through K.7.

1. The percentage of the live load for rolling equipment without hammer blow, for diesels, electric locomotives, tenders alone, etc., is calculated as follows:
   - For L less than 80 ft:

     $$RE + 40 - \frac{3L^2}{1600} \qquad \text{(K.3)}$$

   - For L of 80 ft or more:

     $$RE + 16 + \frac{600}{L-30} \qquad \text{(K.4)}$$

2. The percentage of the live load for steam locomotives with hammer blow, for beam spans, stringers, girders, floor beams, posts of deck truss spans carrying load from floor beam only, and floor-beam hangers, is calculated as follows:
   - For L less than 100 ft:

     $$RE + 60 - \frac{L^2}{500} \qquad \text{(K.5)}$$

   - For L of 100 ft or more:

$$RE + 10 + \frac{1800}{L - 40} \tag{K.6}$$

- For truss spans:

$$RE + 15 + \frac{4000}{L + 25} \tag{K.7}$$

where RE = rocking effect consisting of the percentage of downward force on one rail and upward force on the other rail, increasing and decreasing, respectively, the loads otherwise specified. RE shall be expressed as a percentage, either 10% of the axle load or 20% of the wheel load. L = length in feet, from center to center of supports for stringers, transverse floor beams without stringers, longitudinal girders and trusses (main members) or length in feet of the longer adjacent supported stringers, longitudinal beam, girder or truss for impact in floor beams, floor-beam hangers, subdiagonals of trusses, transverse girders, supports for longitudinal and transverse girders and viaduct columns. The impact effect to be used for ballasted deck bridges should be taken as 90% of that for the open deck bridges. Equations K.3 through K.7 are for members receiving load from only one track; for members receiving load from more than one track, the impact loads are as shown in Table K.10.

Table K.10 Impact Loads (AREA, 1996).

Loads Received From	**Impact**
Two Tracks	
For L less than 175 ft	Full impact on two tracks
For L from 175 feet to 225 ft	Full impact on one track and a percentage of full impact on the other, as given by the formula *450-2L*
For L greater than 225 ft	Full impact on one track and none on the other
More Than Two Tracks	
For all values of L	Full impact on any two tracks

FATIGUE LOADS

When steel bridges are analyzed and evaluated, effects of repeated stresses must be considered. As vehicles pass through any given location on a steel structure again and again, the metal gets tired of being continuously subjected to moderate-level stresses. Fatigue is the name of the failure mechanism, which consists of the formation and growth of cracks under the action of repeated stresses, each of which is insufficient to cause failure itself (Barker and Puckett, 1997).

Historical Overview

In the 1960s, heavier cars came into general use. The heavy cars produced more severe loading than diesel locomotives and greatly increased the number of cycles of heavy load on short spans. While rewriting impact formulas in 1967 and increasing the design load to E80 in 1969, load-rating changes in design specifications after 1960 were concerned with the expected number of load cycles and fatigue. Allowable working stresses were adjusted, often downward, because of improved knowledge of material behavior (Byers, 1992).

A general revision of steel specifications was made in 1969 (AREA, 1968; 1969). Major items in this revision were an increase in the design live load from E72 to E80 and a reduction in allowable stresses for members subjected to repeated loads with different allowable fatigue stresses for the portions of members between connections, riveted or high-strength bolted connections, and welds. Allowable fatigue stresses depended on the ratio of maximum to minimum stress and on whether the expected lifetime number of cycles was more or less than 500,000. As cars with heavier axle loads became common after the 1960s, the fatigue damage on short-span bridges, truss floor systems, and floor beam hangers increased.

Current Practice

Members and connections subjected to repeated stress cycles must meet the fatigue specifications cycles, the magnitude of the stress range, and the type and location of constructional detail. Mean impact load should be taken as the percentages indicated in Table K.11. The number of stress cycles can be determined according to Table K.12 unless traffic surveys or other considerations indicate otherwise. N depends on the span length in the case of longitudinal members and on the number of tracks in the case of floor-beams, hangers, and certain truss members. The live loading scheme, for which Tables K.11 and K.12 should be used, are E80 loadings of AREA 1996 as well as the specifications for strength (see Appendix L). The major factors governing fatigue resistance are the number of stress cycles.

Table K.11 Mean Impact Load Percentages (AREA, 1996).

Member Span Length L, feet	Percentage
L≤30	100%
L>30	65%

Table K.12 Number of Stress Cycles (AREA, 1996).

Member Description	Span Length, L of Flexural Member or Truss or Load Condition	Constant Stress Cycles, N
Classification I		
Longitudinal flexural members, truss chord members including end posts, and their connections	L>100 feet	2,000,000
	L≤ 100 feet	>2,000,000
Classification II		
Floor-beams, truss hangers, sub-diagonals carrying only floor-beam reactions, truss web members and their connections.	Two tracks loaded	2,000,000
	One track loaded	>2,000,000

The stress range, S_R, is defined as the algebraic difference between the maximum and minimum calculated stresses due to dead load, live load, mean impact load and centrifugal load. Allowable stress ranges for different types of members are presented in Tables K.13 and K.14.

Table K.13 Allowable Fatigue Stress Range S_{rfat} (ksi) for Fracture-Critical Members (AREA, 1996).

Stress Category	No. of Constant Stress Cycles, N	
	2,000,000	>2,000,000
A	24	24
B	16	16
B'	11	11
C	10	9
	12 (Note 1)	11 (Note 1)
D	8	5
E	6	2.3
E' (Note 2)	4	1.3
F	7	6

Note 1: For transverse stiffener weld on web or flange.

Note 2: Partial length welded cover plates shall not be used on non-redundant members having flanges more than 0.8 in thick.

Note 3: This table is based on E80 live loads.

Table K.14 Allowable Fatigue Stress Range, S_{rfat} (ksi) for Other Than Fracture-Critical Members (AREA, 1996).

Stress Category	No. Of Constant Stress Cycles, N	
	2,000,000	>2,000,000
A	24	24
B	18	16
B'	14.5	12
C	13	10 or 12 (Note 1)
D	10	7
E	8	4.5
E'	5.8	2.6
F	9	8

Note 1: For transverse stiffener weld on web or flange.

Note 2: This table is based on E80 live loads.

APPENDIX L
MATERIAL PROPERTIES AND ANALYSIS OF BRIDGE STRUCTURES

MATERIAL PROPERTIES AND ANALYSIS OF BRIDGE STRUCTURES

The analysis and evaluation of bridges differs according to the material, geometry, and general behavior of the bridges. In this appendix, material properties and analysis of bridge types are discussed. The historical development of material manufacturing as well as varying construction and design techniques have resulted in a variety of material and section properties that directly affect the structure resistance.

HISTORICAL OVERVIEW OF BRIDGE STRUCTURE MATERIALS

Many bridges on short-line railroads date back to the 19th or early 20th century. Therefore, the history of material resistances is as important as the contemporary material properties when a rehabilitation program is of consideration.

Steel for Bridge Structures

The minimum yield points and designated strengths of the steel used for bridges up to 1980 are summarized in Table L.1.

Table L.1 Physical Properties of Structural Steel (Ketchum, 1924; AREA, 1929).

Period	Minimum Yield Point (psi)	Ultimate Tensile Strength (psi)
1910-1930	30,000	55,000-65,000
1930-1960	33,000	65,000
1960-1980	36,000	65,000

Note: The minimum yield point of the structural steel cannot be less than half of the ultimate tensile strength.

Concrete for Bridge Structures

Extensive use of concrete for bridge construction began in the early 20th century with many applications in railroad infrastructure, such as piles, abutments, piers, bridges, and culverts. The properties of different mixtures of concrete, as used for the analyses and design of bridges in the early 20th century, are summarized in Tables L.2 and L.3.

Table L.2 Compressive Strength (psi) of Concrete (Ketchum, 1924).

Aggregate	Water-Cement Ratio*				
	1:3	1:4.5	1:6	1:7.5	1:9
Granite, trap rock	3300	2800	2200	1800	1400
Gravel, hard limestone and hard sandstone	3000	2500	2000	1600	1300
Soft limestone and sandstone	2200	1800	1500	1200	1000
Cinders	800	700	600	500	400

*Combined volume of fine and coarse aggregate measured separately.

Table L.3 Compressive Strength of Concrete in 28 Days for Different Amounts of Water (AREA, 1929).

Gallons of Water per Sack of Cement	Compressive Strength (psi)
5.00	3500
5.50	3000
6.25	2500
7.00	2000
8.00	1500

The available sizes of reinforcing bars in the 1920s are shown in Table L.4 and their strength should conform to the requirements of contemporary structural steel.

Table L.4 Sizes and Areas of Reinforcement Bars (AREA, 1929).

Size of Bar (in)	Area for Round Bar (sq. in.)	Area for Square Bar (sq. in.)
3/8	0.110	N/A
½	0.196	0.250
5/8	0.306	N/A
¾	0.441	N/A
7/8	0.601	N/A
1	0.785	1.000
1-1/8	N/A	1.265
1-1/4	N/A	1.562

Masonry for Bridge Structures

Spandrel, retaining, and wing walls as well as arches constructed of masonry were designed and inspected according to the criteria specified by AREA (Ketchum, 1924). The AREA specifications (1929) state that the stone should be of the type designated (ashlar or rubble) and also should be hard, durable, of approved quality and shape, and free from seams or other imperfections. The mortar should also be mixed according to

AREA specifications. The unit weight, specific gravity, and crushing strength of different types of masonry are listed in Table L.5.

Table L.5 Material Properties of Different Types of Masonry (Ketchum, 1924).

Materials	Weight (pcf)	Specific Gravity	Crushing Strength (psi)
Sandstone	150	2.4	4,000-15,000
Limestone	160	2.6	6,000-20,000
Trap	180	2.9	19,000-33,000
Marble	165	2.7	8,000-20,000
Granite	165	2.7	8,000-20,000
Paving Brick, PC*	150	2.4	2,000-6,000
Stone Concrete, PC	140-150	2.2-2.4	2,500-4,000
Cinder Concrete, PC	112	1.8	1,000-2,500
*Portland Cement			

Timber for Bridge Structures

The earliest railroad bridges and trestles were constructed of timber. Short-span timber bridges were supported on piles or timber cribs filled with stone. If the site conditions did not allow the use of either of these construction schemes, arch spans were usually constructed. Because the use of timber as a building material was prevalent until the ready availability of steel in the late 1800s and early 1900s, timber constitutes a very important part of the history of railway structures.

The ultimate stresses for bending, shear, and modulus of elasticity of some common types of timber in the 1920s are listed in Table L.6.

Table L.6 Material Properties of Common Timber Types (Ketchum, 1924).

	Bending		Shear	
Type of Timber	Extreme Fiber Stress (psi)	Modulus of Elasticity (psi)	Parallel to Grain (psi)	Longitudinal Shear in Beams (psi)
Douglas fir	6100	1,510,000	690	270
White pine	4400	1,130,000	400	180
Norway pine	4200	1,190,000	590	250
Western hemlock	5800	1,480,000	630	270
White oak	5700	1,150,000	840	270
Note: The unit stresses are for a green condition of timber and are to be used without increasing the live load stresses for impact.				

CURRENT BRIDGE STRUCTURE MATERIALS

Material design values presented in this section are based primarily on the current AREA specifications (AREA, 1996).

Steel for Bridge Structures

The material properties of structural steel used in bridge construction are listed in Table L.7 as documented by AREA in its 1996 specifications.

Table L.7 Structural Steel (AREA, 1996).

ASTM Designation	F_y-Min Yield Point (psi) (Note 1)	F_u—Min Ultimate Strength (psi) (Note 1)	Thickness Limitation	
			For Plates and Bars (in) (Note 1)	Applicable to Shapes Of Groups (Note 1 and 2)
A36	36,000	58,000	To 6 incl.	All
A709, Grade36	36,000	58,000	To 4 incl.	All
A588 (Note 3) A709, Grade 50W (Note 3)	50,000	70,000	To 4incl.	All
A588 (Note3)	46,000	67,000	Over 4 to 5 incl.	None
A588 (Note 3)	42,000	63,000	Over 5 to 8 incl.	None
A572, Grade 50 A709, Grade 50	50,000	65,000	To 4 incl.	All
A572, Grade 42	42,000	60,000	To 6 incl.	All
A852 (Note 3) A709, Grade 70W (Note 3)	70,000	90,000	To 4 incl.	None

- Note 1: These data are current as of January 1994
- Note 2: Groups 1 and 2 include: W shapes 40x149 to 268incl; 36x135 to 210 incl.; 33x118 to 152 incl.; 30x90 to 211 incl.; 27x84 to 178 incl.; 24x55 to 162 incl., 21x44 to 147 incl.; 18x35 to 143 incl.; 16x26 to 100 incl.; 14x22 to132 incl.; 12x14 to 106 incl.; 10x12 to 112 incl.; 8x10 to 67 incl.; 6x9 to 25 incl.; 5x16 and 19; 4x13. M shapes to 37.7 lb. /ft. All S, C and MC shapes. HP shapes to 102 lb./ ft. ALL L shapes to ¾ inch thickness incl. For a complete list of size groups see ASTM A6.
- Note 3: A588 or A709, Grade 50W and A852 or A709, Grade 70W have atmospheric corrosion resistance in most environments substantially better than that of carbon steels with or without copper addition. In many applications these steels can be used unpainted.

Concrete for Bridge Structures

According to AREA specifications, allowable strength for concrete should be taken as 25% of the design ultimate compressive strength. When the design ultimate strength of concrete is unknown, 2,500 psi will be used for the concrete.

Masonry for Bridge Structures

The AREA specifications specify material properties for masonry structures; therefore, material design values from the review of recent literature on masonry arch bridges will govern the evaluation of masonry structures investigated in this project, as listed in Tables L.8 and L.9 (Roberts, 1991; Boothby and Fanning, 2001; and Erdogmus, 2001).

Table L.8 Material Properties of Stone used in Masonry Arches and Spandrel Walls.

Modulus of Elasticity (ksi)	Poisson's Ratio	f'_t (ksi)	f'_c (ksi)
1500	0.15	0.075-0.150	1.5

Table L.9 Material Properties of the Soil Fill and Embankment for Masonry Bridges.

Modulus of Elasticity (ksi)	Poisson's Ratio	Cohesion	Phi.	Dil. angle
0.812 ksi	0.40	0.003	45	20

For masonry structures, which do not face vulnerability due to tensile stresses, the maximum compressive stresses are compared with the allowable bearing pressure of 400 psi, which is given in AREA, 1996 for masonry substructures. With this comparison, it was possible to calculate the percentage strength of the structure.

Timber for Bridge Structures

There are several types of timber listed in the AREA, 1996 specifications with corresponding material design stress values; however, the type of timber utilized for construction may not be readily identified. For the purposes of the present study, red oak was conservatively assumed, with design material stress values presented in Table L.10.

Table L.10 Modulus of Elasticity Values for Red Oak (AREA, 1996).

Species and Commercial Grade	Size Classification	Dry Condition Modulus of Elasticity	Wet Condition Modulus of Elasticity	"Untreated" Modulus of Elasticity
Select Str.	2-4 in thick 5 in and wider	1400	1350	1350
No.1		1400	1350	1350
No.2	2-4 in thick 5 in and wider	1200	1150	1150
No.3		1100	1050	1050
Appearance		1400	1350	1350
Stud		1100	1050	1050
Select Str.	Beams and Strs.	1200	1200	1200
No.1		1200	1200	1200
Select Str.	Posts and Timber	1200	1200	1200
No.1		1200	1200	1200

ANALYSIS OF BRIDGES BY MATERIAL

Depending on the material and type, the critical load effects and corresponding analysis methods vary for each group of bridges. In this section, the different methods of bridge assessment are discussed as they were used in this study.

Analysis of Steel Construction

The different types of steel bridges encountered in this study are as follows, with the abbreviations as used in the database, sampling, calculations, and documentation of results:

1. Deck Plate Girder (DPG)
2. Through Plate Girder (TPG)
3. Deck Truss (DTR)
4. Through Truss (TTR)
5. Steel Stringer (SST)

Analyses of steel bridges were completed using a combination of manual methods and commercially available software packages.

Analysis of Concrete Construction

Concrete bridges may consist of concrete girders, concrete slab, or concrete arch. The short-span concrete slab bridge (CSB) in the sample of the present study was analyzed by conventional hand-calculation methods based on maximum bending moments and shear forces.

Analysis of Masonry Construction

All masonry short-line bridges in the population are masonry arch bridges. Masonry arch bridges (MAR) may be of several types according to the shape of the arch barrel, type of material used, type of spandrel wall (open or massive/filled), and number of spans (single or multiple span). The bridges addressed in this study are massive or filled arch bridges. The most common materials used in arch bridges are concrete, brick, granite, sandstone, and limestone. Common arch barrel geometries are circular, parabolic, elliptical, and segmental arches.

The general types of failures for arch bridges according to AREA (AREA, 1996) and also from the analysis results are listed below:

A. General failures:
   - Settlement or shift in the foundations
   - Spalling, scour or undermining
   - Loss of mortar in brick or stone joints
   - Improper or blocked drainage
   - Fill failures

B. Failures in the span direction:
   - Changes in the alignment of the voussoirs in the arch ring
   - Sags in the arch crown
   - Transverse cracks
   - Plastic hinge and related mechanism formations in the arch barrel
   - Separation of rings in multiring arches

C. Failures in transverse direction:
   - Pushing-out or overturning of the spandrel walls
   - Separation of the spandrel wall from the arch barrel
   - Longitudinal cracks

Until recently there were no established methods available for the analyses of masonry arch bridges that considered the load effects in the transverse and longitudinal directions. Previously, the analyses focused on the span direction only. However, it was concluded by recent research that effects created in the transverse direction can be as significant as those in the span direction. Consequently, a three-dimensional nonlinear finite element analysis method was proposed (Roberts, 1999; Boothby and Fanning, 2001). Because railroad arch bridges often support extremely high soil-fill and embankment volumes, the transverse effects are anticipated to be significant; therefore, the present study has applied the analysis methods discussed above to the masonry arch bridges of the study.

Analysis of Timber Construction

The common types of timber bridges are timber stringers, trusses, and trestles. The timber bridge analyzed in the sample of this study is a short-span (9-ft) stringer bridge (TST). The response has been determined by employing conventional analysis for member bending moments and shear forces.

BRIDGE MEMBER EVALUATION

In this section the allowable stresses or other comparison criteria for the rating of the capacity of the bridge types are discussed.

Evaluation of Steel Members

The allowable stresses are calculated with the formulas in Table L.11 and the minimum yield point values are from Tables L.1 and L.7, in which the accepted material properties of steel in the past and current practices are listed respectively.

Table L.11 Allowable Stresses for Steel Structures (AREA, 1996)

Stress Area	Pounds per square inch
Axial tension, structural steel, net section.	$0.55Fy$
Tension in extreme fibers of rolled shapes, girders and built-up sections, subject to bending, net section.	$0.55Fy$
Axial compression, gross section for compression members centrally loaded, When $(kl/r) \le (3388/\sqrt{Fy})$ When $(3388/\sqrt{Fy}) < (kl/r) < (27111/\sqrt{Fy})$ When $(kl/r) \ge (27111/\sqrt{Fy})$ Where: kl is the effective length of the compression member, inch under usual conditions k=7/8 for members with pin-end connections, k=3/4 for members with riveted, bolted or welded end connections r is the applicable radius of gyration of the compression member, in.	 $0.55Fy$ $0.60Fy-\left(\frac{Fy}{1662}\right)^{3/2}\frac{kl}{r}$ $\frac{147{,}000{,}000}{(kl/r)^2}$
Compression in extreme fibers of riveted or bolted built-up flexural members symmetrical about the principal axis in the plane of the web (other than box-type flexural members) Where: l= distance between points of lateral support for the compression flange, inch. r_y=minimum radius of gyration of the compression flange and that portion of the web area on the compression side of the axis bending, about an axis in the plane of the web, inch.	$0.55Fy-\frac{0.55Fy^2}{1.8\times10^9}\left(\frac{l}{r_y}\right)^2$
Shear in webs of rolled beams and plate girders, gross section.	$0.35fy$
Members subject to both axial compression and bending stresses When $\frac{f_a}{F_a} \le 0.15$ When $\frac{f_a}{F_a} > 0.15$ And in addition at points braced in the planes of bending,	 $\frac{f_a}{F_a}+\frac{f_{b1}}{F_{b1}}+\frac{f_{b2}}{F_{b2}} \le 1.0$ $\frac{f_a}{F_a}+\frac{f_{b1}}{F_{b1}\left[1-\frac{f_a}{200\times10^6}\left(\frac{k_1l_1}{r_1}\right)^2\right]}+\frac{f_{b2}}{F_{b2}\left[1-\frac{f_a}{200\times10^6}\left(\frac{k_2l_2}{r_2}\right)^2\right]}$

Where: F_a=axial stress that would be permitted if axial force existed alone F_{b1} and F_{b2}= compressive bending stresses about axes 1-1 and 2-2, respectively, that would be permitted if bending alone existed f_a= computed axial stress f_{b1} and f_{b2}= computed compressive bending stress about axes 1-1 and 2-2 respectively, at the point under consideration $\frac{k_1 l_1}{r_1}$ *and* $\frac{k_2 l_2}{r_2}$= ratios of the effective length in inch to the radius of gyration in inch, of the compression member about axes 1-1 and 2-2, respectively	$\frac{f_a}{0.55Fy} + \frac{f_{b1}}{F_{b1}} + \frac{f_{b2}}{F_{b2}} \leq 1.0$

Because the steel bridges in this study were primarily constructed in the early 20th century, the yield point used conservatively in all of the calculations is 33 ksi.

Evaluation of Concrete Members

The allowable concrete stresses have been determined according AREA and are presented in Table L.12.

Table L.12 Allowable Stresses For Concrete (AREA, 1996)

Extreme fiber stress in compression f_c	$0.40f_c'$
Extreme fiber stress in tension for plain concrete, f_t	$0.21f_r$
Modulus of rupture f_r, from tests, or if data are not available: Normal weight concrete Lightweight concrete	 $7.5\sqrt{f_c'}$ $6.3\sqrt{f_c'}$
Shear carried by concrete, but not to exceed 95 psi	$0.95\sqrt{f_c'}$
Maximum shear carried by concrete plus shear reinforcement	$\nu + 4\sqrt{f_c'}$
Bearing on loaded area f_b, but not to exceed 1050psi	$0.30f'_c$

Evaluation of Masonry Members

The allowable stresses and pressures utilized in the present study are presented in Table L.13. In the current provisions of AREA (AREA, 1996) the only allowable stress values given for masonry are allowable bearing pressures, addressing mainly the common masonry abutments of the railroad bridge structures (Table L.14). These values have similarities with those listed in Table L.13. Therefore, in this study, a value of 400 psi has been adopted for the strength evaluation of masonry bridges. Instability will also be evaluated, with capacity reported as the ultimate loading predicted at collapse.

Table L.13 Allowable Stresses and Pressures for Masonry (Ketchum, 1924).

Type of Masonry	Allowable Stress (psi)	Allowable Pressure (tons per sq. in)
Common brick, Portland Cement Mortar	170	12
Hard burned brick, Portland Cement Mortar	210	15
Rubble Masonry, Portland Cement Mortar	170	12
1st Class Masonry, Sandstone	280	20
1st Class Masonry, Limestone	300	25
1st Class Masonry, Granite	400	30
Portland Cement Concrete, 1-2-4	400	25
Portland Cement Concrete, 1-3-5	300	20

Table L.14 Allowable Bearing Pressure For Masonry (AREA, 1996).

Bearing Surface	**Pounds per square inch**
Granite	800
Sandstone and Limestone	400

Evaluation of Timber Members

Timber structures in the present study have conservatively been assumed to be constructed of red oak. Design allowable stresses for red oak are presented in Table L.15.

Table L.15 Allowable Stress Values For Different Types of Timber (AREA, 1996).

Species and Commercial Grade	Size Classification	Dry Condition		Wet Condition		"Untreated"	
		F_b	F_v	F_b	F_v	F_b	F_v
Red Oak							
Select Str.	2-4 in. thick 5 in. and wider	1350	75	1150	75	1025	75
No.1		1175	75	1000	75	900	75
No.2	2-4 in. thick 5 in. and wider	950	75	825	75	750	75
No.3		575	75	500	75	450	75
Appearance		1175	75	1000	75	900	75
Stud		575	75	500	75	450	75
Select Str.	Beams and Strs.	1200	70	1200	70	1075	70
No.1	Beams and Strs.	1025	70	1025	70	925	70
Select Str.	Posts and Timber	1125	70	1125	70	1025	70
No.1		900	70	900	70	800	70

APPENDIX M

MATERIAL AND SECTION PROPERTIES AND ANALYSIS OF TRACK STRUCTURE

MATERIAL AND SECTION PROPERTIES AND ANALYSIS OF TRACK STRUCTURE

The track structure is critical to the economic viability of SLRR and the infrastructure. A condition assessment of track structure elements is required. In order to thoroughly assess the track structure, material properties, section properties and track analysis methods are discussed in this appendix.

MATERIAL AND SECTION PROPERTIES OF TRACK STRUCTURES

Railroads in the United States are classified by the Interstate Commerce Commission based on gross revenue with regard to its requirements for financial and operating reporting. Therefore, railroads with revenues higher than defined threshold values are accepted as Class I railroads. Light-traffic rail lines, or branch lines are classified by the FRA Classification System. The material/section properties and analysis of track structures may differ depending on the operational class. A historical overview and current practice of operational class are discussed herein. The track structure function is to transfer the concentrated wheel load applied at the head of the rail to a moderate, distributed pressure. Figures M.1 and M.2 illustrate the load transfer through elements of a typical main-line track structure (Armstrong, 1997).

Historical Overview of Track Structure Material and Section Properties

In past versions of the AREA specification, neither the material properties nor the analysis and evaluation of track structure were stated as explicitly as in the current AREA specification. The geometric properties, chemical material properties, inspection, evaluation methods, dimensions and section properties of different track structure elements as found in the AREA specification under which the current SLRR track structure was constructed are discussed below.

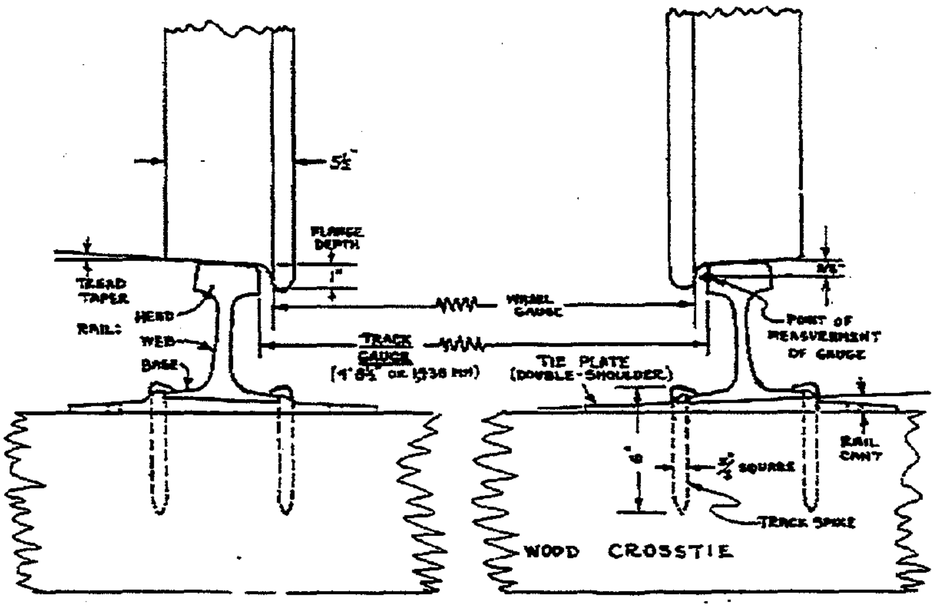


Figure M.1 Track Structure Wheel Relationship (Armstrong, 1997).

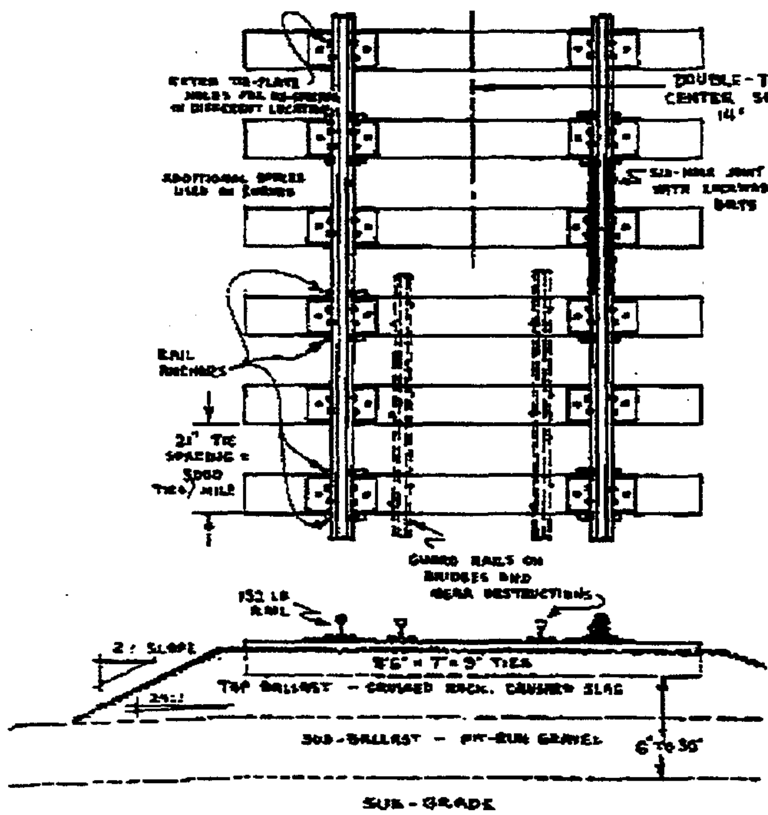


Figure M.2 Track Structure-Typical Main Line Track (Armstrong, 1997).

Steel Rail

The AREA 1929 specifications classify railways as follows:

- *Class A:* Districts of a railway with (1) more than one main track; (2) a single main track with traffic that equals or exceeds the following:
  - Freight car mileage passing over district per year per mile = 150,000.
  - Passenger car mileage per year per mile of district = 10,000 with maximum speed of passenger trains of 50 miles per hour.

- *Class B:* Districts of a railway with a single main track with a traffic that is less than the minimum prescribed for class "A" and that equals or exceeds the following:
  - Freight car mileage passing over district per year per mile, 50,000.
  - Passenger car mileage per year per mile of district, 5,000 with a maximum speed of 40 miles per hour for passenger trains.

- *Class C:* All districts of a railway not meeting the traffic requirements of classes A or B.

Specific yield and fracture strength and steel type information are not provided in the AREA 1929 specifications; however, chemical composition (Table M.1) and the tests required for rail steel strength are listed.

Table M.1 Chemical Composition Required by Standard Specifications for Open-Hearth Carbon Steel Rails - 1925 (AREA, 1929).

Constituents	Weight in lb. per yard			
	70-84	85-100	101-120	121-140
Carbon	0.53-0.70	0.62-0.77	0.67-0.83	0.72-0.89
Manganese	0.60-0.90	0.60-0.90	0.50-0.90	0.50-0.90
Phosphorus, not to exceed	0.04	0.04	0.04	0.04
Silicon, minimum	0.15	0.15	0.15	0.15

According to the AREA 1929 manual, ductility and resistance of the rail sections to impact were to be determined by the standard AREA drop testing machine, with test specimens of 4-to-6-ft-long sections cut from the top of the class-A rails. Rail sections commonly used in the early 20th century and accepted by AREA 1929 are presented in Table M.2, with rail elements presented in Figure M.3.

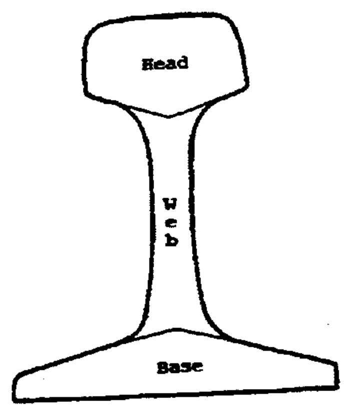


Figure M.3-Parts of a rail (AREA, 1996)

Rail Ties

In an effort to create a truly permanent track structure, earlier railroads mounted rails on stone blocks embedded firmly in the ground. This construction was impressively expensive in comparison to the practice of spiking rails to wooden cross members or ties laid on the surface; however, the stone ties were not satisfactory due to a lack of flexibility between rail and stone. This resulted in a jarring ride that damaged both rail and vehicle, and shifting of the blocks threw the track out of gauge. Wooden ties were discovered to exhibit a combination of nearly ideal properties. Hardwood is strong in tension (to hold the rails in gauge), in bending (to distribute the load to the ballast uniformly), and in compression (to support the rail) while providing enough flexibility to cushion impacts of wheels on rails. Moreover, it is nailable, so the very simple method of fastening the rail to the tie can be used (Armstrong, 1997).

Table M.2- Properties of Rail Sections (AREA, 1996)

	90 RA-A	100 RE	110 RE	120 RE	130 RE	140 RE	150 RE
Rail Area (sq. in) Head	3.2	3.8	4.04	4.40	4.63	4.93	5.12
Web	2.12	2.25	2.49	2.69	3.02	3.28	3.85
Base	3.5	3.9	4.29	4.76	5.06	5.37	5.78
Total	8.82	9.95	10.82	11.85	12.71	13.58	14.75
Rail weight (lb/yd)	89.96	101.49	110.36	120.87	129.64	138.52	150
Moment of Inertia	38.7	49	57	67.6	77.4	89.2	121.1
Section Modulus of Head	12.56	15.1	16.7	18.9	20.8	23.1	28.2
Section Modulus of Base	15.23	17.8	20.1	23.1	25.6	28.4	35.1
Height of NA above the base	2.55	2.75	2.83	2.92	3.03	3.14	3.45

Most common wood species used in the early 20th century for cross-ties were Douglas fir, gum, hemlock, oak, ponderosa pine, southern pine, mixed hardwoods and mixed softwoods (Hay, 1982). The types of wood recommended by AREA 1929 specifications are: ash, beech, birch, catalpa, cedar, cherry, chestnut, cypress, Douglas fir, elm, fir, gum, hackberry, hemlock, hickory, larch, locust, maple, mulberry, oak, pine, poplar, redwood, sassafras, spruce, sycamore and walnut. However, before manufacturing, producers should ascertain which of these kinds of wood are suitable for cross-ties. All ties should be free from any defects that may impair their strength or durability, such as decay, large splits, large shakes, large or numerous holes or knots, or grain with a slant greater than one in 15. Resistance to decay and wear is also required from the moment the ties are manufactured (AREA, 1929). The dimensions of the ties should again be ascertained by the producers before manufacturing and should not be more than 1-in shorter or ¼-in thinner or narrower than the following dimensions:

- *Length:* Standard gage ties should be 8 ft, 8 ft-6 in or 9 ft long.
- *Thickness:* 5-7 in thick depending on the size of the tie selected from 0 to 6.
- *Width:* 5-10 in wide depending on the size of the tie selected from 0 to 6.

In early versions of AREA such as the 1929 manual, there is no specification for the strength of the ties such as allowable wood stress.

Tie Plates

According to AREA 1929, tie plates could be from one of the following materials: steel (soft and medium), wrought iron, and malleable iron. Steel tie plates were made by the Bessemer or Open-Hearth process or both, and soft grade was preferred unless otherwise was specified. The strength of steel tie plates was determined according to bend test specimens, while the material properties of the wrought and malleable iron tie plates can be found in Table M.3.

Table M.3 Material Properties for Tie Plates (AREA, 1929)

	Tensile Strength (psi)	Yield Point (psi)
Wrought Iron	48,000	0.6 Tensile Strength
Malleable Iron	45,000	N/A

Dimensions for typical tie plates are shown in Figure M.4 and Table M.4.

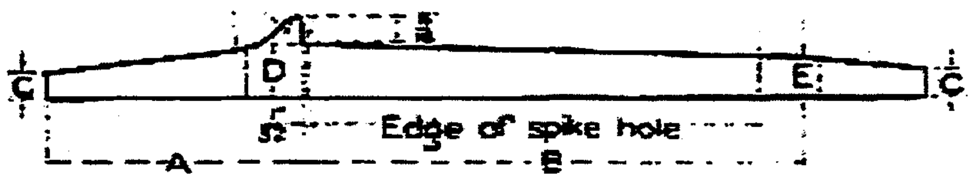


Figure M.4 Illustration of a Typical Tie Plate (AREA, 1929)

Table M.4 Tie Plate Dimensions with Reference to Figure M.4 (AREA, 1929)

Length of Plates	Range of Rail Bases	Same for Flat and Canted Plates			Flat Plates	Canted 1 in 40		Canted 1 in 20	
		A	B	C	D&E	D	E	D	E
9.0	$4\frac{3}{4}$-5	$2\frac{3}{8}$	$5\frac{3}{8}$	$\frac{5}{16}$	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{3}{4}$	$\frac{15}{32}$
9.5	$4\frac{3}{4}$–$5\frac{1}{8}$	$2\frac{5}{8}$	$5\frac{9}{16}$	$\frac{5}{16}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{15}{32}$
10.0	$4\frac{7}{8}$–$5\frac{1}{2}$	$2\frac{7}{8}$	$5\frac{3}{4}$	$\frac{5}{16}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{15}{32}$	$\frac{3}{4}$	$\frac{15}{32}$
10.5	$5\frac{1}{8}$–$5\frac{3}{4}$	3	$5\frac{15}{16}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{17}{32}$	$\frac{13}{16}$	$\frac{17}{32}$
11.0	$5\frac{3}{8}$–6	$3\frac{1}{4}$	$6\frac{1}{8}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{17}{32}$	$\frac{13}{16}$	½
11.5	$5\frac{3}{4}$–$6\frac{1}{4}$	$3\frac{1}{2}$	$6\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{19}{32}$	$\frac{13}{16}$	½
12.0	6-$6\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{19}{32}$	$\frac{13}{16}$	½

Ballast and Subgrade

Ballast used under the cross-ties is divided into two sections, top ballast and subballast. Subballast may have been of any material of a superior character that is spread on the finished subgrade of the roadbed and below the top ballast in order to provide drainage, prevent upheaval by frost, and distribute the load over the roadbed. Recommended ballast types by AREA 1929 specifications were stone ballast, washed gravel ballast, pit run gravel ballast, burnt clay ballast, and cinder ballast.

On a subgrade material such as clay, loam, etc. that is subject to deformations by the application of live load, the proper depth of ballast under the tie to produce approximately uniform pressure on the roadbed should be not less than the spacing center-to-center of the ties for Class-A track. On subgrade material that approximates the character of good subballast, the minimum depth of ballast under the tie should be at least 12 in. A 24-in total for good subballast of 18 to 14 in and top ballast of 6 to 10 in can produce the same result as though the top ballast material were used for the whole depth (AREA, 1929). According to AREA 1929 specifications, until sufficient tests are made under normal traffic conditions, the proper depth of the ballast under the tie depended on opinion, based on experience or some tests currently available such as the test made by Director Schubert of the German Railways and the "Altoona Test" made by the Pennsylvania Railroad. Proper drainage of the subgrade is necessary to success with any kind of ballast (AREA, 1929).

Current Track Structure Material and Section Properties

In the current version of AREA specifications (AREA, 1996) the material and section properties are stated more clearly than in previous AREA editions, and in this section these recommendations are discussed for each element of the track structure.

Steel Rail

The operational classes for the current railway practice, stated by FRA in "Track Safety Standards" (FRA, 2000), are presented in Table M.5.

Table M.5 FRA Operating Speed Limits (FRA, 2000)

FRA Class	Oper. Speed for Freight Cars (mph)	Oper. Speed for Passenger Cars (mph)
Class1	10	15
Class 2	25	30
Class 3	40	60
Class 4	60	80
Class 5	80	90
Class 6	110	110

Operational classes normally encountered for SLRRs range between class 1 and class 3.

Allowable rail bending stress may be one of the following (AREA 1996):

- Assuming the yield stress of the rail is 70,000 psi, the permissible calculated rail stress due to flexure becomes:

$$\frac{70{,}000-20{,}000}{1.2x1.25x1.15x1.15}=25{,}000\ psi$$

- Assuming the endurance strength of rail is 56,000 psi, the permissible calculated rail stress due to flexure and fatigue is reduced to:

$$\frac{56{,}000-20{,}000}{1.2x1.25x1.15x1.15}=18{,}000\ psi$$

Because the SLRRs participating in this study experience very low traffic, the flexural allowable stress is used in the calculations.

<u>Bolted and Continuous-Welded Rail (CWR) Bolted-Rail Track:</u> Bolted-rail track is connected with joint bars arranged to allow some lengthwise motion of the rails. When the rail is laid, a gap provided between the consecutive rail sections allows for expansion of the rails due to temperature fluctuations. Despite extensive research, the joint is always less rigid than the rest of the rail and deflects enough to allow gradual wear and battering of the rail ends. This can be corrected by building up the rail surface with weld metal and grinding it to its original contour. The reduced stiffness at the joint also causes

greater load on the ballast and subballast, resulting in "low joints" and resonant "rock and roll" of certain freight cars as well as rough riding unless overcome by frequent bolt-tightening and tamping of the ballast (Armstrong, 1997).

The perfection of welding techniques for rail into continuous strings, transporting them to the site, and fastening them in place so as to overcome the effects of expansion and contraction has resulted in the present standard practice of minimizing joints in main-line track. Lengths of rail, either new or relay, are welded into lengths (usually about 1,500 ft) in a central facility. Loaded on racks on a permanently coupled "rail-train," they bend easily around curves as they are hauled to the point of installation. There, the train is pulled out from under each pair of rails, which descend to the roadbed, ready to be substituted for the old rail. The remaining joints can be eliminated by field welding with portable equipment. The laying of rail is limited to a narrow range of temperatures near the upper limit of the expected range at the location (heating the rail if necessary when laid in cooler periods). Moreover, care must be taken not to reduce the lateral stability of the track by working on ties or ballast at times when high longitudinal stresses may be present. Quality control in field-welds is important to avoid pull-apart at low temperatures.

Rail Sections

Regardless of its joint type, rails are manufactured in standard sizes. There are many different types of rail, which result from a combination of rail sections listed in historical overview as well as rail types manufactured by special mills. However, AREA 1996 recommends the use of one of six standard rail types. The main properties of recommended rail sections by AREA 1996 are presented in Table M.6.

Rail Ties

Two major modifications were made to extend tie life (Armstrong, 1997). Steel tie plates, as long as 18 in for the heaviest traffic, spread the load of the rail over a large enough area to prevent local crushing and cutting of the wood. Pressure impregnation, where as much as 25 lb of preservative is forced into a 200-lb tie, prevents decay. With

Table M.6 Properties of Standard AREA Rail Sections (AREA, 1996)

	115RE	119RE	132RE	133RE	136RE	140RE
Rail Area (sq. in) Head	4.03	4.42	4.53	4.85	4.92	5.21
Web	2.8	2.8	3.35	3.2	3.39	3.44
Base	4.42	4.42	5.03	5.02	5.01	5.04
Total	11.25	11.64	12.91	13.07	13.32	13.69
Rail weight (lb/yd)	114.7	118.7	131.7	133.4	135.8	139.6
Moment of Inertia about NA*	65.9	71.4	87.9	86.2	94.2	95.9
Section Modulus of Head	18.1	19.4	22.4	22.3	23.7	24.3
Section Modulus of Base	22.0	22.8	27.4	26.9	28.2	28.6
Height of NA above the base	3.00	3.13	3.2	3.2	3.34	3.36
Lateral Moment of Inertia	10.7	10.8	14.4	14.4	14.44	14.9
Lateral Section Modulus of the Head	7.9	8.16	9.57	9.62	9.83	9.95
Lateral Section Modulus of the Base	3.9	3.94	4.79	4.81	4.82	4.98
Height of the Shear Center Above Base	1.45	1.51	1.57	1.57	1.64	1.67
Torsional rigidity is "KG" where G is the modulus of rigidity and K=(error for K greater than 10%)	4.69	5.11	5.31	5.69	6.24	6.85

NA: abbreviation for Neutral Axis

these and other improvements, such as pre-drilled spike holes (which reduce fiber damage and improve the grip of tie on spike), the service life of first-quality ties has been extended to the range of 25 to 30 or more years.

Because tie plates transfer load from the rails to the ties, their strength is of critical importance. The allowable contact stress between the tie plates and ties is specified as 400 psi for hardwood ties and 250 psi for softwood ties in AREA 1996 specifications. However, 200 psi is recommended and, therefore, used in the calculations in this study. When the effective bearing area of the ties is checked for strength, the allowable tie-ballast bearing pressure is given as 65 psi in AREA 1996 specifications, where the effective bearing area of the tie is taken as one third of the whole tie.

Tie Plates

Standard tie plates mounted with rails are also standardized by AREA with different sizes of tie-plates for each group of rails with different base widths. The tie-plates range in length from 10 to 18 in and are used for the six different rail types recommended by AREA 1996. The widths of the tie plates range from 7.5 to 8 in.

Ballast and Subgrade

All track structures are inherently flexible, resulting in a "wave of deflection" moving forward beneath each axle. This deflection is approximately 1/50 of an inch for an empty freight car on the stiffest track, 1/10 inch for a loaded 100-ton car on the same track structure, and as much as one-half inch for a loaded car on a relatively soft track. Correspondingly, more deflection can be seen at the joints in the bolted rail track (Armstrong, 1997). As long as this deflection is uniform along the track, the ride can still be smooth. The more rigid the track, however, the less movement and wear there is between the rails, fastenings, and ties. The major function of the ballast is to maintain tie spacing, prevent lateral deflections, and spread out the load, which averages about 100 psi underneath the ties, to a pressure lower than the endurance limit of the subgrade. This accounts for the modern ballast section standards, which cover the tie ends with a shoulder, sometimes 12 to 18 in from the ends of the ties. The endurance limit is the pressure that a soil can withstand repeatedly without further settling. It may be as high as 50 psi for some sand-gravel soils, or it may be much lower. In problem areas such as swampy ground, it may be necessary to drive wood piles or even use concrete slabs to spread the load and provide a stable enough foundation to support the ballast and subballast (see figure M.5).

One of the primary functions of ballast is to distribute the tie load (i.e., transmit the tie load to the roadbed with diminished unit pressure). The pressure distribution on the subgrade is a function of the depth of the ballast and can be improved up to the point of optimum ballast depth. It is recommended that the calculated pressure be smaller than 25 psi on a good subgrade. The value should be reduced for subgrades of poor quality. Ballast depth calculations are discussed in more detail in the following section.

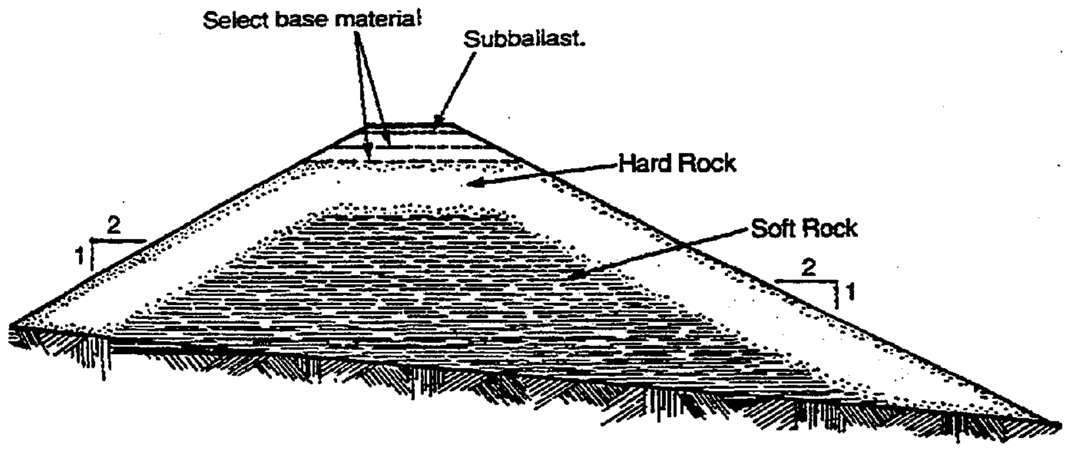


Figure M.5 Subgrade (AREA, 1996).

ANALYSIS AND EVALUATION OF TRACK STRUCTURE

The Association of American Railroads has researched safety issues regarding heavy axle loads. Results have shown that it is safe to operate heavy cars on main-line track, but premium materials must be used to ensure maintenance cost control (El-Sibaie, 1999). It was also shown that most problems occur as a result of lateral forces generated by cars negotiating curves when they are carried by standard design trucks. Fatigue and rail wear reduction are significant benefits of replacing standard trucks with improved-suspension trucks. SLRR tracks have not been inspected as part of the present study; however, estimates of subgrade condition and materials have been made. Therefore, this study recommends that a track survey, created with the cooperation of the individual short lines, be analyzed and a cost estimation for the necessary upgrades be conducted based on the analysis results.

Analysis and Evaluation of Rails

Rail support must ensure a stable wheel-rail interaction, distributing the forces effectively, damping rail vibrations, and minimizing frictional movement between wheel and rail. The analysis uses the static or quasi-static design parameters of bending moments, rail seat pressure, and track deflection discussed below. These may change to match specific performance requirements of a particular rail transportation system, but remain the same whether the support is of a ballasted or a non-ballasted type. Rail wear rates increase in proportion to gross tonnage but grow exponentially with any significant increase in maximum axle load (AREA, 1996).

Using the influence curves created by the application of the elastic theory, the maximum static loads created by the wheels can be achieved. However, the maximum stresses in track occur under dynamic loading and are affected by such factors as train speed, transfer of load due to rolling, torque reaction and track irregularities. Considering the speed only, the coefficient of impact recommended by the Association of American Railroads is as in equation M.1:

$$\theta = \frac{33x Speed(mph)}{100x\ Diameter\ of\ wheels\ (in)} \tag{M.1}$$

By using the coefficient calculated in equation M.1 based on the operation speed of the track, the dynamic loading can be found by equation M.2:

$$P^d = (1+\theta)P \tag{M.2}$$

where P is the static wheel load and P^d is the dynamic wheel load.

For one wheel load, the maximum rail deflection (w_{max}) and maximum rail bending moment (M_{max}) take place at the wheel. They are obtained by equations M.3 and M.4, respectively, according to AREA 1996 specifications:

$$w^d_{max} = \frac{\beta P^d}{2k} \tag{M.3}$$

$$M^d_{max} = \frac{P^d}{4\beta} \tag{M.4}$$

where β is the stiffness ratio, which can be calculated by equation M.5:

$$\beta = \sqrt[4]{\frac{k}{4EI}} \tag{M.5}$$

where E = Young's modulus of rail steel, I = moment of inertia of one rail with respect to the horizontal centroidal axis, and k = rail support modulus (spring rate per unit length of track). The rail support modulus is a function of content, temperature, compaction and depth and the subgrade a function of load-carrying capacity and uniformity. Summertime measurements of the modulus of ballasted wood-tie track yield varies from 1,000 lb/in/in (more elastic) to 3,000 lb/in/in (less elastic). Under deep frost conditions the elasticity of the support can drop to one-third its normal value. Parameter k is also one of the parameters that determines the level of noise, vibrations, harmonic load reactions and the initiation of certain types of rail. Parameter k is defined as the load (in pounds) that causes a 1-in vertical rail deflection per linear inch of track. The value of k depends on the quality of the ties, the tie spacing, tie dimensions, and the ballast; however, a detailed inspection of these parameters was not possible for the present study. In order to establish an approximate k value, the "Master Chart For Determination of k" from AREA 1996 was used (Figure M.6) and a conservative value of 2,500 was adopted. Based on the approximate value of k and maximum bending moment calculated by equation M.4, maximum bending stresses in the rail were calculated by equation M.6.

The determination of k for analysis purposes is a complicated issue. The actual k value can only be determined by field measurements of the rail:

$$\sigma^d_{\max} = \frac{M^d_{\max} \, x \, c}{I} = \frac{M^d_{\max}}{Z_b} \tag{M.6}$$

where c = the distance from neutral axis to base and Z_b is the section modulus for the rail base.

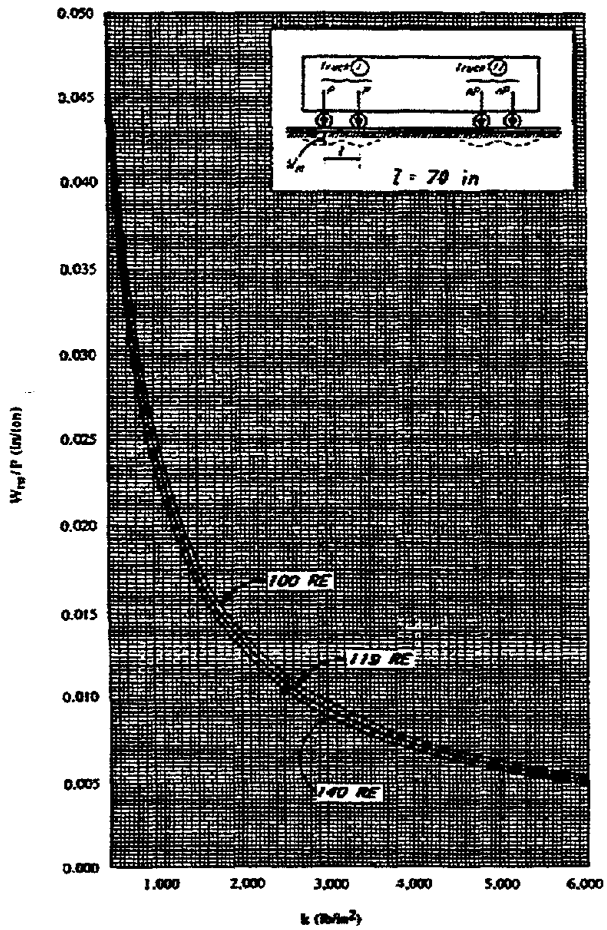


Figure M.6 Master Chart for Determination of k (AREA, 1996).

Then the calculated maximum stress value is compared with the allowable stress value (25,000 psi for flexure) and the strength percent of the specific rail types are achieved (equation M.7):

$$\sigma_{\max}^{d} \leq \sigma_{allow} = 25{,}000 psi \qquad \text{(M.7)}$$

Analysis and Evaluation of Rail Ties

Cross-tie and tie plate adequacy were determined based on the comparison of the maximum rail seat load ($F_{\max}^{d}$), tie plate dimensions, and allowable contact stress between tie plate and tie. The intensity of the maximum continuously distributed dynamic pressure "p" against the underside of the rail is given by equation M.8:

$$p^d_{max} = k \; x \; w^d_{max} \tag{M.8}$$

The maximum dynamic rail seat load (F^d_{max}) on an individual tie is given by equation M.9:

$$F^d_{max} = p^d_{max} \; x \; a \tag{M.9}$$

where a is the average spacing between the ties. A conservative value of 21 was assumed throughout the calculations of this study.

The required tie plate area is determined from equation M.10:

$$A_{req} = \frac{F^d_{max}}{\sigma_{all.wood}} \tag{M.10}$$

where $\sigma_{all.wood}$ is the allowable contact stress between tie plate and the ties. According to AREA 1996, $\sigma_{all.wood}$ = 400 psi for hardwood ties and 250 psi for softwood ties, however, 200 psi is recommended for design.

The effective bearing area of a tie and allowable bearing pressure is an additional critical variable for evaluation of the track structure. The contact pressure between tie and ballast for a well-maintained track is largest at the rail seat and smallest at the tie center. This pressure distribution varies with accumulated traffic and track condition. In order to simplify the calculations, the dashed uniform distribution may be assumed to be as in Figure M.7 and equation M.11, which is the analysis used in the present study.

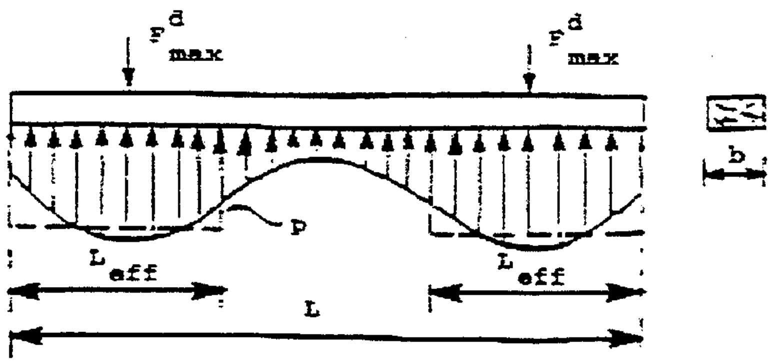


Figure M.7 Pressure Distribution on a Crosstie (AREA, 1996)

$$L_{eff} \cong L/3 \tag{M.11}$$

where L is the length of the cross-tie. Then the effective bearing area of the tie can be calculated by equation M.12:

$$A_b = b \; x \; L_{eff} = \frac{1}{3}(bxL) \tag{M.12}$$

where b= width of the tie at base. The corresponding tie-ballast bearing pressure (P_m) is then compared to the 65 psi allowable pressure, recommended by AREA 1996 as in equation M.13:

$$P_m = \frac{3xF^d_{\max}}{bxL} < 65psi \tag{M.13}$$

Analysis and Evaluation of Ballast and Subgrade

The accepted railroad practice of limiting subgrade pressure to 25 psi is also recommended by AREA 1996 and, therefore, used in the present study. There are several methods to determine required ballast depth under ties; however, the adopted method herein is the Talbot equation, presented here as equation M.14:

$$P_c = \frac{16.8\, P_m}{h^{1.25}} \tag{M.14}$$

where P_c is the maximum intensity of pressure on subgrade (25 psi), P_m is the intensity of pressure on ballast as calculated in the previous section, and h is the depth of the ballast below the ties in inches.

APPENDIX N

HEAVY AXLE RAIL CAR FLOWS IN PENNSYLVANIA

HEAVY AXLE RAIL CAR FLOWS IN PENNSYLVANIA

The two principal Class I railroad carriers operating in Pennsylvania, Norfolk Southern Corporation and CSX Transportation, were each requested to provide data on heavy axle rail car interchange volumes with short-line railroads operating in Pennsylvania. Each railroad provided typical monthly car flow data for 286,000-lb and 315,000-lb cars for various periods during 1999 and 2000. Each railroad also provided the names of the short lines with which these cars were interchanged and the junction points of the interchanges.

The heavy axle rail car data are tabulated and presented in Table N.1. As indicated, the movements are predominantly 286,000-lb cars. To obtain a better geographical picture of these data, the junction points through which these cars are flowing were located on a Pennsylvania railroad map and are presented in Figure N.1. An abbreviation for the name of each short line railroad involved in heavy-axle car moves is also shown on the map near each respective junction point.

As indicated by the legend, the junction points have been coded on the basis of the relative magnitude of the monthly heavy-axle car flow. The most intense flows are on a northeast-southwest axis that runs through the central part of the state. Secondary intensity is found in the area southeast of Harrisburg. Note that no distinction could be made as to whether the traffic is inbound or outbound to the connecting short line, nor was information obtained on the number of train movements associated with heavy-axle moves at each junction.

Table N.1 Heavy (286k) Rail Car Flows.

Railroad	Volume (cars/month)	Junctions with Class I Railroads
NSRC:	Norfolk Southern Railway Co	
PBNE	180	Bethelhem
EEC	5	Erie
TYBR**	83	Fair
GBRY	5	Gettysburg, Mt Holly Spring
EV	90	Hollidaysburg
HRS	70	Hollidaysburg
RJCP	1320	Keating, Cresson
SBRR	5	Lackawaxen
RBMN*	1850	Lehighton, Mehoopany
JVRR	75	Lewistown
NBER	740	Lock Haven, Tyronne
UCIR	130	Milton
NSHR	100	Northumberland
SVRR	60	Northumberland
SH	750	Steelton, Highspire
TMSS	10	Towanda
TCKR	15	Trafford
YRC	660	York
CSXT:	CSX Transportation	
YRC	305	Hannover, Porters
BPRR	1618	New Castle, Erie
WE	1819	Ohiopyle, Brook
KKRR	1	Could not be identified

*** RBMN volumes from 2 sources were (666 vs 1850). Difference could not be reconciled.**
**** TYBR takes the 315k cars.**

Abbreviations

NSRC	Norfolk Southern Railway Co
SVRR	Shamokin Valley RR corp
SBRR	Stourbridge Railroad Co
EEC	East Erie Commercial RR
EV	Everett Railroad Co
GBRY	Gettysburg Railroad Company
HRS	Hollidaysburg and Roaring Spring Railroad Co.
JVRR	Junaita Valley Railroad Co
NBER	Nittanny and Bald Eagle RR Co
NSHR	North Shore Railroad Co
PBNE	Philadelphia Bethelhem and New England RR
RJCP	RJ Corman Railroad Co.
SH	Steelton Highspire RR
TCKR	Turtle Creek Industrial RR
TMSS	Towanda-Monroeton Shippers Lifeline
UCIR	Union County Industrial RR
YRC	York rail company
RBMN	Reading Blue Mt. and Northern Railway
TYBR	Tyburn Railroad Co
CSXT	CSX Transportation
BPRR	Buffalo and Pittsburg Railroad
KKRR	Knox and Kane RR co
WE	Wheeling and Lake Erie Railroad

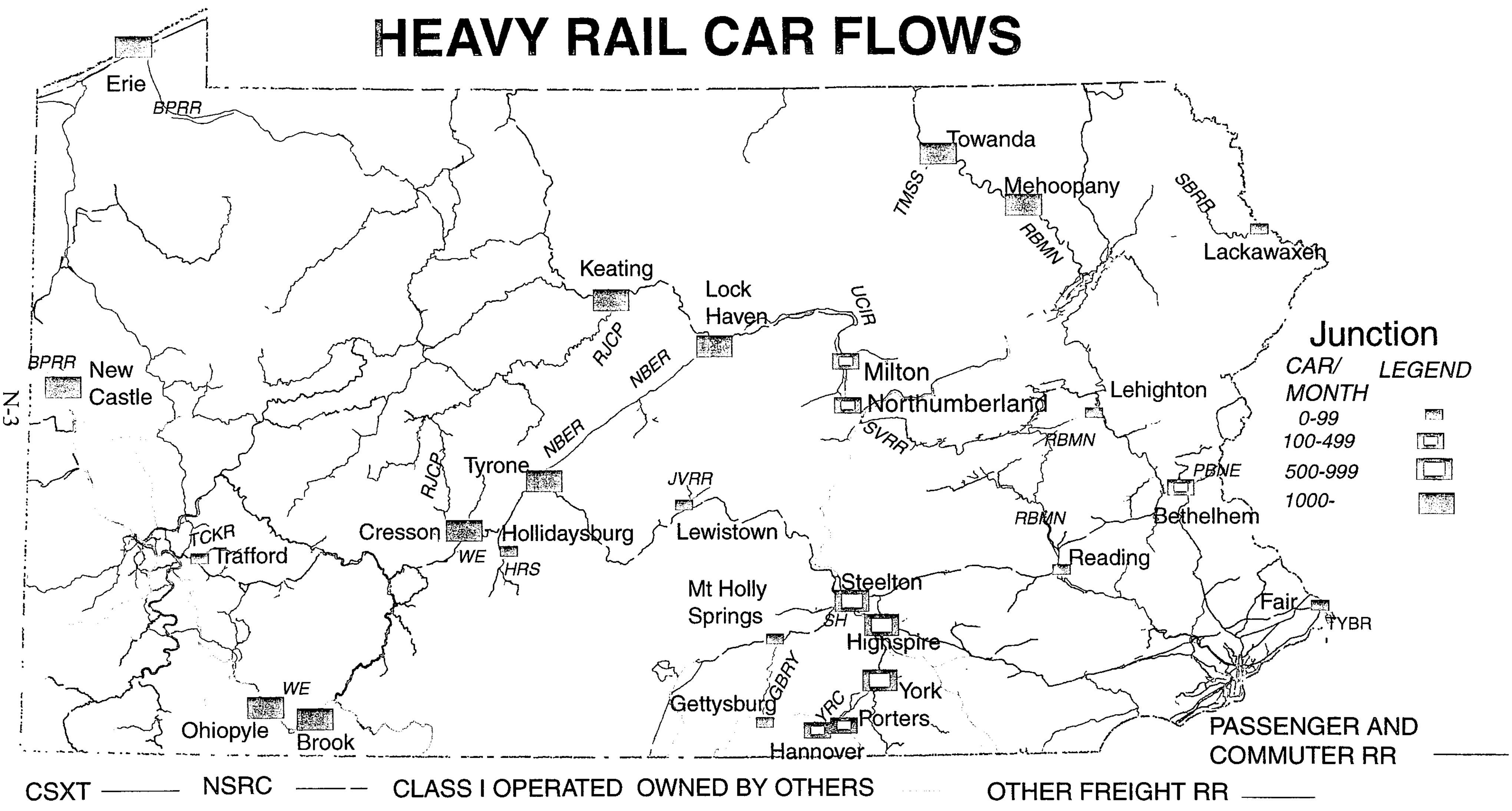


Figure N.1 Heavy Axle Rail Car Flow Data.

APPENDIX O

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