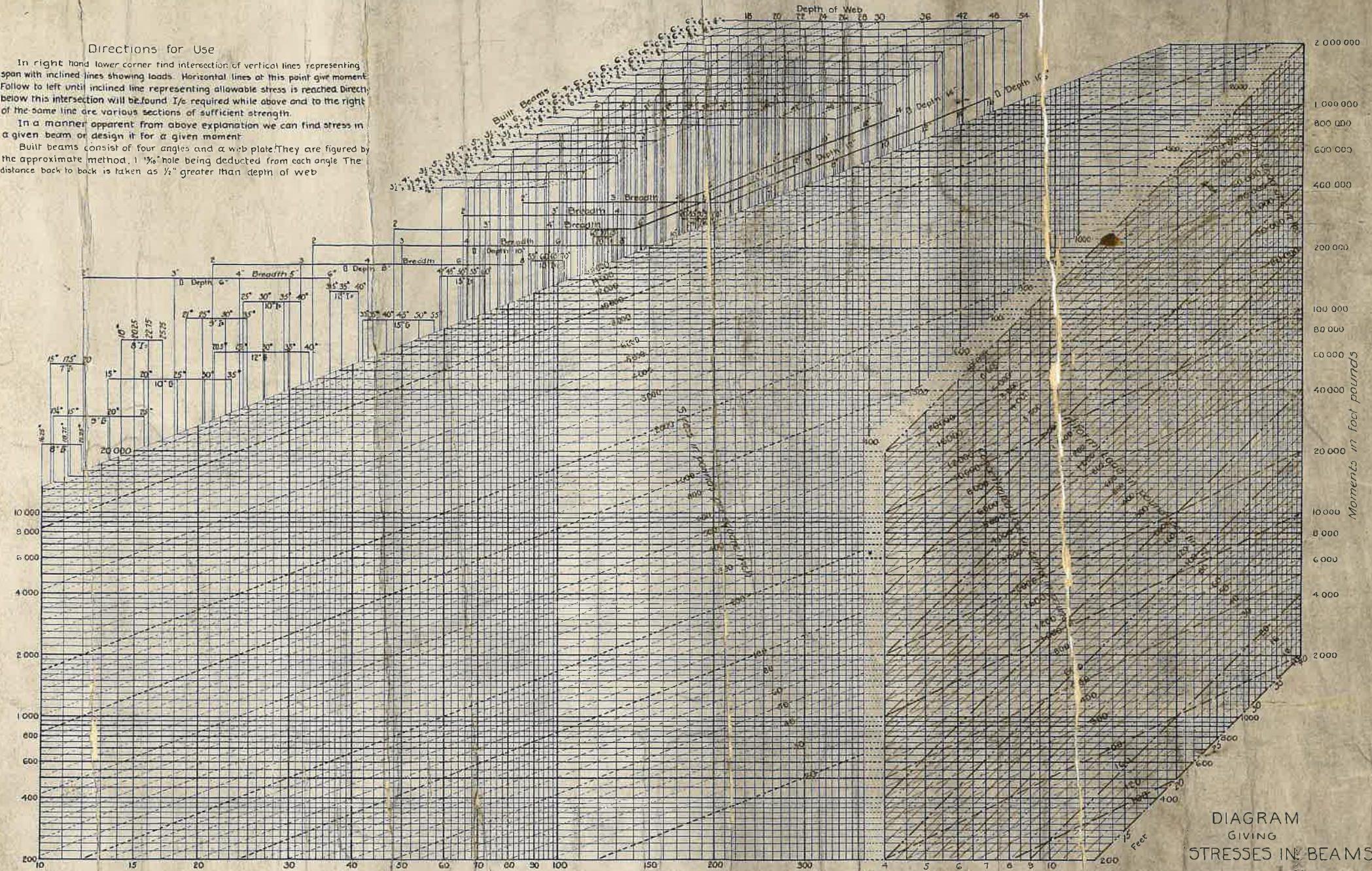


Directions for Use

In right hand lower corner find intersection of vertical lines representing span with inclined lines showing loads. Horizontal lines at this point give moment. Follow to left until inclined line representing allowable stress is reached. Directly below this intersection will be found I/c required while above and to the right of the same line are various sections of sufficient strength.

In a manner apparent from above explanation we can find stress in a given beam or design it for a given moment.

Built beams consist of four angles and a web plate. They are figured by the approximate method, $1 \frac{1}{8}$ " hole being deducted from each angle. The distance back to back is taken as $\frac{1}{2}$ " greater than depth of web.



Values of Section Moduli (I/c) in inches³

Allowable Stresses in lbs. per sq. in.

	Wrought Iron	Medium Steel	Chestnut	White Oak	Red Oak	Hemlock	Spruce	White Pine	Oregon Pine	Yellow Pine
Machinery	6000	7000	300	500	400	250	300	300	600	700
Bridges	9000	11000	500	750	600	400	500	500	900	1000
Buildings	13000	16000	750	1000	900	600	750	750	1100	1500

DIAGRAM GIVING STRESSES IN BEAMS

H. R. Thayer March 1910

EDIT ACCOUM

A. B. & A. R. R.

Tractive Power of Engines 1617 - 1624

Cylinder = 21" x 28"

Diameter of driving wheels = 63"

Steam pressure = 200 lbs

Weight on drivers = 65 Tons

" " trucks = 23 "

" " tender = 60 "

Tractive power, 10 miles pr. hour = 33,320 lbs

Table showing number of cars and engine can haul on different grades compensated for curvature.

Grade	Draw bar pull in pounds.	Number of cars					
		10 Tons	20 Tons	25 Tons	30 Tons	40 Tons	50 Tons
0.0%	31,462	240	199	187	180	167	157
0.1 "	31,166	206	157	143	133	116	103
0.2 "	30,870	180	123	115	105	88	77
0.3 "	30,574	160	100	96	86	71	61
0.4 "	30,278	143	95	82	73	59	50
0.5 "	29,982	129	83	71	63	51	42
0.6 "	29,686	118	74	63	55	44	37
0.7 "	29,390	108	67	56	49	39	32
0.8 "	29,094	100	60	51	44	35	29
0.9 "	28,798	92	55	46	40	31	26
1.0 "	28,502	86	51	42	36	28	23

A. B. & N. R. R.

Tractive Power of Engines 1617 - 1624

Cylinder 21" x 28"

Diameter of driving wheels 63"

Steam pressure = 200 lbs

Weight on drivers = 105 Tons

" " trucks = 23

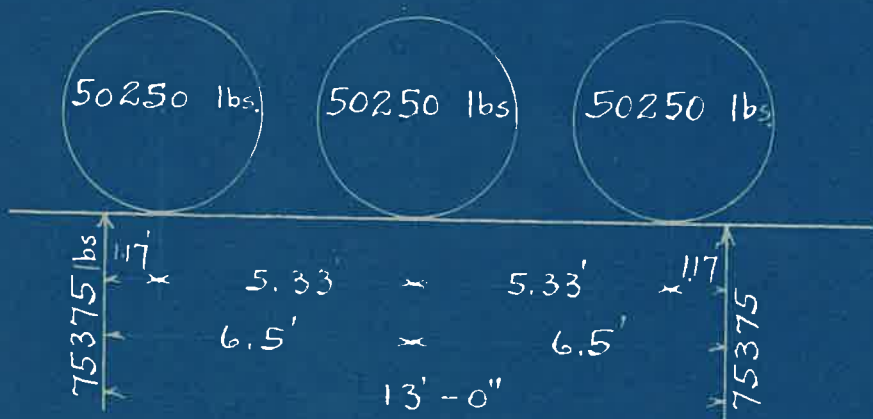
" " tender = 60

Tractive power, 10 miles pr. hour = 33,320 lbs.

Table showing number of cars one engine can haul on different grades compensated for curvature.

Grade	Draw bar pull in pounds	Number of cars					
		10Tons	20Tons	25Tons	30Tons	40Tons	50Tons
0.0%	31,462	240	199	157	130	107	86
0.1	31,166	206	157	123	103	84	69
0.2	30,870	180	129	115	95	77	64
0.3	30,574	160	110	96	86	71	61
0.4	30,278	143	95	82	73	59	50
0.5	29,982	129	83	71	63	51	42
0.6	29,686	118	74	63	55	44	37
0.7	29,390	108	67	56	49	39	32
0.8	29,094	100	60	51	44	35	29
0.9	28,798	92	55	46	40	31	26
1.0	28,502	86	51	42	36	28	23

Engines 90-91 on 2 Ply Chord Trestle.



Dead Load
 13' Track @ 150" 1950"
 Ties (10) @ 533 FIBM.
 G.R. 113 "
 Stringers (4) 455 "
 1101 @ 45" = 4955"
 6905

D.L. Moment

$$\frac{6905 \times 13}{8} = 11220 \text{ Ft.Lb.}$$

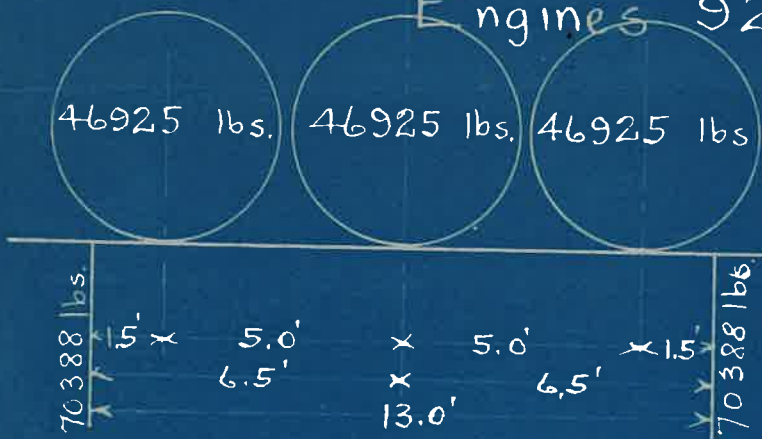
L.L. Moment = $(75375 \times 6.5) - (50250 \times 5.33) = 222105 \text{ Ft.Lb.}$

D.L. " " 11220 "
 Impact @ 25% L.L.M. $\frac{55526}{288851}$

Stress $\frac{72 \times 288851}{4 \times 7 \times 15^2} = 3300$

Factor of Safety = $\frac{7200}{3300} = 2.2$

Engines 92-96 inc.



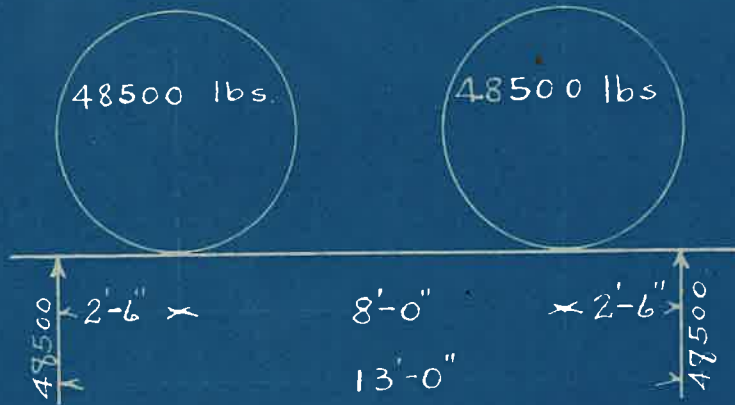
L.L. Moment = $(70388 \times 6.5) - (46925 \times 5) = 222897$

D.L. " " 11220 "
 Impact = 25% L.L.M. $\frac{55724}{289841}$

Stress = $\frac{72 \times 289841}{4 \times 7 \times 15^2} = 3312$

Factor of Safety = $\frac{7200}{3312} = 2.2$

Class 30 Engines on 2 Ply Cord Trestle



D.L.

13 Ft Track @ 150" = 1950
Ties 533 Ft BM
G.R. 113 "
Stringer 455 "
1101 " @ 4.5" = 4955
6905

D.L. Moment

$$\frac{6905 \times 13}{8} = 11220 \text{ Ft.lb}$$

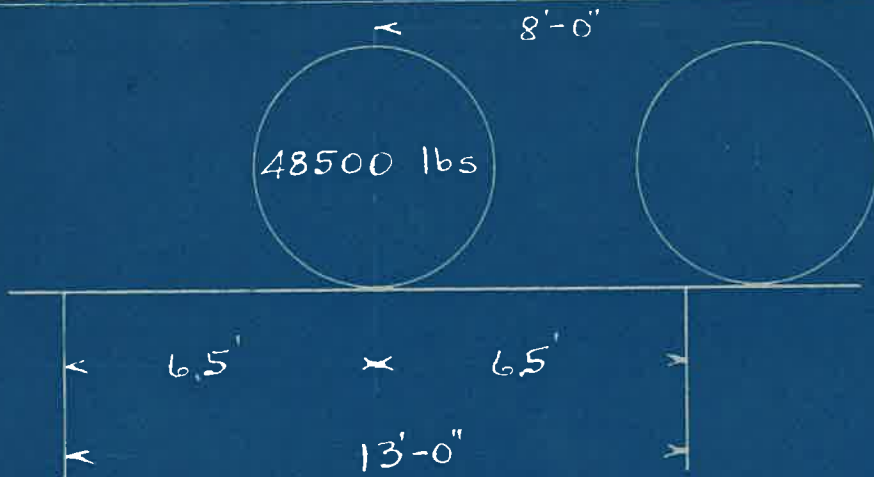
L.L. Moment = $48500 \times 2.5 = 121750 \text{ Ft.lb.}$

D.L. " = 11220 "

Impact = 25% L.L.M = $\frac{30312}{162732} \text{ "}$

Stress = $\frac{72 \times 162732}{4 \times 7 \times 15^2} = 1860$

Factor of Safety = $\frac{7200}{1860} = 3.9$



L.L. Moment = $\frac{48500 \times 13}{4} = 157625 \text{ Ft.lb.}$

D.L. " = 11220 "

Impact = 25% L.L.M = $\frac{39406}{208251} \text{ "}$

Stress $\frac{72 \times 208251}{4 \times 7 \times 15^2} = 2380$

Factor of Safety = $\frac{7200}{2380} = 3.0$

A.B. & A. R.R.

Tractive Power of Engines No 71 and 72

Cylinder 25" x 32"

Diameter of driving wheels = 50"

Steam pressure = 170 lbs.

Weight on drivers = 100 tons.

" " trucks = 30 "

" " tender = 68 "

Tractive power, 10 miles pr hour = 57,800 lbs.

Table showing number of cars one engine can haul on different grades compensated for curvature.

Grade	Draw bar pull in pounds	Number of cars					
		10Tons	20Tons	25Tons	30Tons	40Tons	50Tons
0.0%	55,090	420	348	328	316	293	275
0.1 "	54,694	362	276	251	233	204	182
0.2 "	54,298	317	228	202	184	156	135
0.3 "	53,902	282	193	169	152	125	107
0.4 "	53,506	253	168	145	129	105	89
0.5 "	53,110	230	148	127	112	90	75
0.6 "	52,714	210	132	112	98	78	65
0.7 "	52,318	193	119	101	88	70	58
0.8 "	51,922	178	108	91	79	62	51
0.9 "	51,526	165	99	83	72	56	46
1.0 "	51,130	154	91	76	66	51	42

A B & A. R. R. - Engine 30

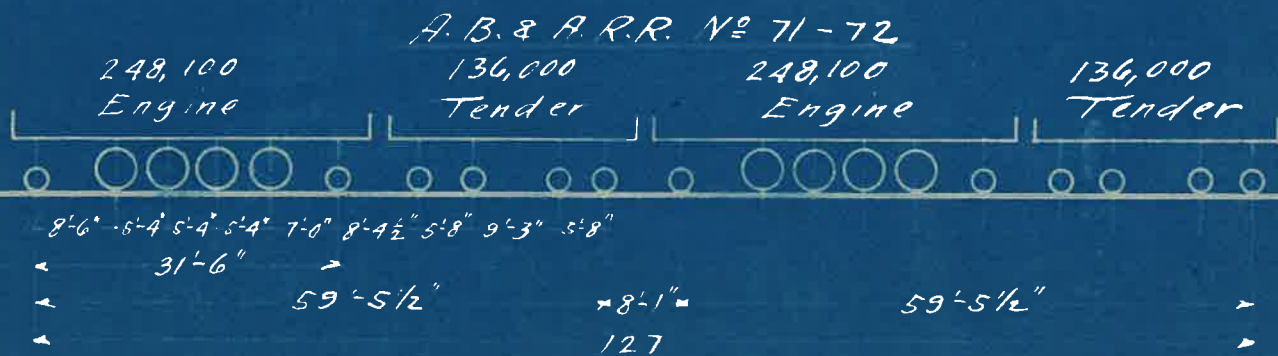
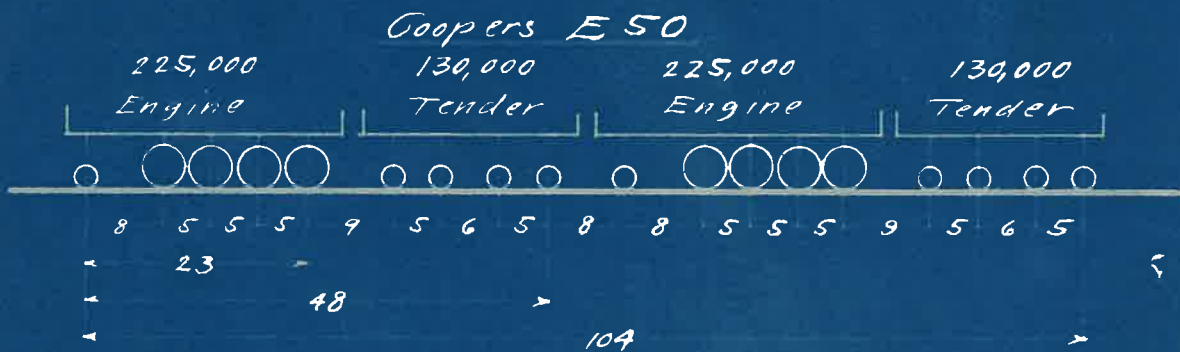
Cylinder 19 x 26, 66 diam. driving wheels, 200 lbs steam pressure, 48.5 ton weight on drivers, 23 ton weight on engine trucks, 57.5 ton weight on engine tender.

$$T.P. = \frac{19 \times 19 \times 26 \times 0.85 \times 200}{66} = 24,176 \text{ lbs}$$

	Miles per hour						
	25	26	27	28	29	30	35
Piston speed	552	574	596	618	640	662	772
Tractive power	17,528	17,024	16,536	16,078	15,594	15,111	12,934
Draw bar pull	13,468	12,964	12,476	12,018	11,534	11,051	9,874
Resistance per ton on 1% grade	272	273	275	277	278	280	288
Tons it can haul on 1% grade	445	475	454	434	415	395	308
							40
							882
							11,363
							7,303
							297
							246

May 29 - 1911
C.V.

Weight of Engines



Type	Engine Alone		Double-Header		
	Weight Lbs.	Wheel Base, Ft.	Weight Lbs.	Wheel Base, Ft.	Weight Per Ft.
Coopers E 50	225,000	23.00	710,000	104.00	6,830
" " 45	202,500	23.00	639,000	104.00	6,140
" " 40	180,000	23.00	568,000	104.00	5,460
" " 35	157,500	23.00	497,000	104.00	4,780
" " 30	135,000	23.00	426,000	104.00	4,100
" " 27	121,500	23.00	383,400	104.00	3,690
A. B. & A. Nos 71-72	248,100	31.50	768,200	127.00	6,050
" " 1601-1616	176,200	25.67	552,400	114.00	4,850
" " 1517-1526	146,500	24.33	533,000	116.00	4,600

Nov. 16 - 1911

C.V.

QUANTITIES & COST PER LINEAL FOOT OF TRACK FOR STEEL VIADUCTS
 Loading COOPERS E-60
 For Approximate Estimates only.

Distance from Ground to Base of Rail	Pounds of Steel, per lineal foot of track	Units of Masonry in pedestal per lineal foot of track	Total Cost per lineal foot of track
10	900	1.0	446.00
15	950	1.0	466.00
20	1000	1.0	486.00
25	1050	1.0	506.00
30	1100	1.0	526.00
35	1150	1.0	546.00
40	1200	1.0	566.00
45	1250	1.0	586.00
50	1300	1.0	606.00
60	1400	1.5	680.00
70	1500	1.5	720.00
80	1600	1.5	760.00
90	1700	1.5	800.00
100	1800	2.0	880.00
110	1900	2.0	920.00
120	2000	2.0	96.00
130	2100	2.0	1000.00
140	2200	2.0	1040.00
150	2300	2.0	1080.00

Approximate weight of steel load in pounds may be obtained by multiplying the profile area in sq. ft. by 10 increase height for sloping ground.

Safe distributed loads on Pitch Pine Beams 1 1/2" wide Factor safety 4.5

Span in feet	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"
4	1250	1687								
5	1230	1666	1837	2325						
6	885	1206	1650	1912	2160					
7	725	1053	1376	1570	1760	2000				
8	680	920	1210	1410	1580	1780	2000			
9	620	844	1100	1296	1420	1580	1760	2000		
10	562	768	1000	1167	1280	1420	1580	1760	2000	
11	517	705	917	1060	1160	1280	1420	1580	1760	2000
12	475	649	827	962	1052	1160	1280	1420	1580	1760
13	432	603	750	867	950	1052	1160	1280	1420	1580
14	392	562	683	790	870	950	1052	1160	1280	1420
15	355	523	623	730	800	870	950	1052	1160	1280
16	320	486	570	670	730	800	870	950	1052	1160
17	285	450	520	620	670	730	800	870	950	1052
18	255	415	475	570	620	670	730	800	870	950
19	225	385	435	520	570	620	670	730	800	870
20	200	355	400	480	520	570	620	670	730	800
21	175	325	365	440	480	520	570	620	670	730
22	155	295	330	400	440	480	520	570	620	670
23	135	265	295	360	400	440	480	520	570	620
24	115	235	260	320	360	400	440	480	520	570
25	100	210	230	290	320	360	400	440	480	520
26	85	185	200	250	280	320	360	400	440	480
27	75	165	175	220	250	280	320	360	400	440
28	65	145	150	190	220	250	280	320	360	400
29	55	125	130	160	190	220	250	280	320	360
30	45	105	110	140	160	190	220	250	280	320

For other widths multiply tabular load by width in inches.
 Example: Required safe distributed load on beam 16" deep x 5" wide in foot span.
 200 lbs. x 16" = 3200 lbs. / 16" = 200 lbs.
 Example: Required safe distributed load on beam 15" deep x 5" wide in foot span.
 187.5 lbs. x 15" = 2812.5 lbs. / 15" = 187.5 lbs.
 Example: Required safe distributed load on beam 14" deep x 5" wide in foot span.
 175 lbs. x 14" = 2450 lbs. / 14" = 175 lbs.

Track Material
80" Rail.

Turnout using #7 Frog Rigid

Switch stand	18.00
points	20.25
Frog	48.40
Guard Rail	18.90
Rail 1/2 tons @ 33"	23.50
Switch ties	39.60
Hoops bars 6 pr @ 14'	6.90
Balls 24 @ 1/2"	96
Spikes 176 @ 2"	352
Laying	30.00
Total	\$ 288.95



Note - Above estimate includes all material from Switch stand to heel of frog

Add for deroiler 14.00

Track Material
80" Rail.

Turnout using #9 Frog Spring

Switch stand	18.00
points	20.25
Frog	52.50
Guard Rail	18.90
Rail 1/2 tons @ 33"	49.50
Switch ties	70.00
Hoops bars 6 pr @ 14'	6.90
Balls 24 @ 1/2"	96
Spikes 220 @ 2"	440
Laying	30.00
Total	\$ 271.71

Turnout using #8 Frog Rigid

Switch stand	18.00
points	20.25
Frog	48.40
Guard Rail	18.90
Rail 1/2 ton @ 33"	36.30
Switch ties	66.00
Hoops bars 6 pr @ 14'	6.90
Balls 24 @ 1/2"	96
Spikes 200 @ 2"	400
Laying	30.00
Total	\$ 249.71



Above estimate includes all material from Switch stand to heel of frog. Customer requested.

Add for deroiler 14.00

Track Material.

80" Rail
Short line rail cost \$300 per ton
80" 132.2 section 5 days 3" in wh base
50 per cent
120% loss per mile cost \$15 per pair
Wash base
U.S.P. Co. Recondition bit
320 pairs per mile
50 lbs per pair cost 12¢ each
The photos
Cable line 10 x 1/4 wire
Total used in all sections over 30.
Bolt
Heavy Grip 7" x 3"
5 Head per mile Cost 20¢
180 bolts per mile
200¢ per ft. Cost \$500 per ton
Springs
3" x 3"
202 2 x 1/2"
44 Mega per mile (only in one form)
300¢ per ton Cost \$300 per ton
Cross Tie
7 x 9" - 45¢
2080 per mile of track
18 per rail length 700 per mile
Switches
52 Ties to each
7 x 10

Frog
Bund Sand 100
Switches
Bund Sand 100
1000
50 per ton

Track Material.

80" Rail
Cost of one mile of track \$6716.90
Cost of one rail length 32¢ 22.15
Cost of Turnout using #9 Spring Tray 271.71
" " #8 Rail 149.71
" " #7 238.93

70" Rail

Cost of one mile of track \$207.50
Cost of one rail length 30¢ 35.03
Cost of Turnout using #9 Spring Tray 255.89
" " #8 Rail 244.84
" " #7 220.64

60" Rail

Cost of one mile of track \$613.34
Cost of one rail length 30¢ 31.65
Cost of Turnout using #8 Spring Tray 317.24
" " #7 194.25

Cost of one day's Demolition 64.00

Trestles Standard Sizes

Ties 8" x 8" - 9' spaced 15"
Guard Rails 6" x 8" - 20'
Stringers 7" x 10" - 25'
Caps 12" x 14" - 13'
Posts 12" x 12" -
Sills 12" x 12" -
Mid Sills 10" x 12" - 4'
Sway Braces 3" x 10" -
Sash " 3" x 12" -

Trestles

A. B. M. of frame trestles
different heights

Floor system by midulls are included
in these quantities

Height of bent 19.3115 - lowest part

5	130
10	174
15	204
20	272
25	304
30	327
35	407
40	464
45	497
50	452
55	607
60	693
65	714

Interpolate for intermediate heights

Note: The above figures are given
for approximate calculations

TRACH MATERIAL

70th RAIL

Main line rail
30 foot sections
110 tons per mile
Angle bars
352 pairs per mile
52 lbs per pair
Tie plates
Galv. Cl. Br. 24 x 7 1/2"
To be used on all curves over 3 degrees.
Bolts
Harvey Grip
75 Nags per mile
195 Bolts per track
200 lbs per track
Spikes
5" x 5 1/2"
2 to a track
200 lbs per mile (1 per added pair) 200 lbs per track
Cross ties
7" x 9" - 8' 6"
2800 per mile
16 per rail length
Switch ties 59 Frog
Frog Penna. Steel Co.
Switches Penna. Steel Co.
Derailer
Cost \$33.00 per ton
Cost 95¢ per pair
Cost 12¢ each
Cost \$60 per track
Cost 6.5¢ per track
Cost 40¢ to 50¢ each
Cost \$70.00 per set
Cost 14.00

Track Material

70th Rail

Turnout using No 7 Rigid Frog

Switch stand	18.00
Points	1772
Frog	45.00
Guard Rails	per pair 18.90
Rail 200 tons	@ 35" 34.88
Switch ties	per set 5.00
Angle bars	6 pair @ 9¢ 5.70
Bolts	@ 3¢ 72
Spikes	@ 2¢ 352
Laying	30.00
Total	\$250.00



Note - Above estimate includes all material from Switch stand to heel of frog.

Figure a Derailer @ \$14.00

Cost of one mile of track
Using 70# Rail

100 tons rail @ .33¢ 33.00
352 Rail spikes @ .13¢ 45.76
75 Hops of bolts @ .5¢ 37.50
41 Hops of spikes @ .5¢ 20.50
2880 Cross ties @ .12¢ 345.60
Laying & Surfacing 700.00
Total \$ 6207.40

Cost per linear foot of track \$ 1.21

Note - Tie plates are to be used
on all curves of 3 degrees or over.

Cost per rail length of track 180'

Rail $\frac{525}{1000}$ tons @ .33¢ 20.63
High bars 2 pairs @ .9¢ 1.80
Bolts 8 @ .02 0.16
Spikes 6.4 @ .17 1.09
Ties 16 @ .45 7.20
Laying 394
Total \$ 35.08

Note - In the estimate for cost per mile of
track, a small percentage for wear
in both spikes
\$ 12.74
4.80

Estimated cost of supplying

Material for 1 mile of track
Full length of rail 1800
Full length of spikes 1800
Full length of bolts 1800
Full length of cross ties 2880
Full length of surfacing 700
Full length of laying 1800
Total 10080
Cost per linear foot of track \$ 1.21

Through going to supplies

Switch stand 15.00
Ties 17.74
Rail 21.40
Spikes 18.72
Bolts 1.09
Cross ties 352
Surfacing 700
Laying 1800
Total 2145.85

Track Material 60# Rail

Rail 30 Sections Cost 33¢ per ton
 94 1/2 tons rail per mile
 Angle bars Cost 75¢ per pair
 552 pairs per mile
 227 lbs per pair
 Bolts Cost \$5.00 per bag
 70 lbs per bag
 Spikes Cost \$5.00 per bag
 200 lbs per bag

40 Hogs to a mile Cost \$4.75 each
 Cross ties 7" x 9" - 8" 6"
 2880 per mile
 16 per rail length
 Switch ties in estimate for frog
 Frog Cost \$3,940 each
 Detailer Cost each \$1400

Switch stand 1800
 points 1485
 Frog 3340
 Guard rails 1450
 Rail 83 Ties @ 33¢ 27.39
 Switch ties 50.40
 Angle bars 6 pcs @ 70¢ 4.50
 Bolts 24 @ 3¢ 72
 Spikes 176 @ 2¢ 3.52
 Laying Total 19928

Heel of frog
 Note: Above estimate includes all material from switch stand & rail frog

Track Material 60# Rail

Turnout using #8 Rigid Frog

Switch stand 18.00
 points 16.85
 Frog 3340
 Guard rails 14.50
 Rail 89 Ties @ 33¢ 29.37
 Switch ties 50.40
 Angle bars 6 pairs @ 70¢ 4.50
 Bolts 24 @ 3¢ 72
 Spikes 200 @ 2¢ 4.00
 Laying Total 30.00 217.32

Turnout using #7 Rigid Frog

Switch stand 1800
 points 1485
 Frog 3340
 Guard rails 1450
 Rail 83 Ties @ 33¢ 27.39
 Switch ties 50.40
 Angle bars 6 pcs @ 70¢ 4.50
 Bolts 24 @ 3¢ 72
 Spikes 176 @ 2¢ 3.52
 Laying Total 3000 19928

Cost of one mile of track
using 60" Rail.

1000 tons of rail	@ 33¢	330.00
200 pairs of anchor bars	@ 70¢	140.00
72 kegs of bolts	@ 55¢	39.60
40 kegs of spikes	@ 50¢	20.00
2000 cross ties	@ 45¢	900.00
Laying & Surfacing		720.00
Total		\$1719.60
Cost per linear foot.		\$1.72

Note The plates are to be used on all curves of 3 degrees & over.

Cost per rail length - 30 feet of track

Rail	1000 tons @ 33¢	330
Anchor bars	200 pairs @ 70¢	140
Bolts	8 kegs @ 26¢	208
Spikes	40 kegs @ 12¢	480
Ties	16 @ 45¢	720
Laying		720
Total		\$1716

Note In the estimate for cost per mile of track, a small percentage has been added for work in both ends of spikes.

Cost of one mile of track
using 80" Rail.

1250 tons of rail @ 33¢	412.50
220 Pairs of Anchor bars @ 70¢	154.00
8 kegs of bolts @ 50¢	40.00
41 kegs of Spikes @ 50¢	205.00
2000 Cross ties @ 45¢	900.00
Laying & Surfacing	720.00
Total	\$1631.50

Cost per linear foot of track \$1.63

Note The plates are to be used on all curves of 3- & over. The plates 12 to each.

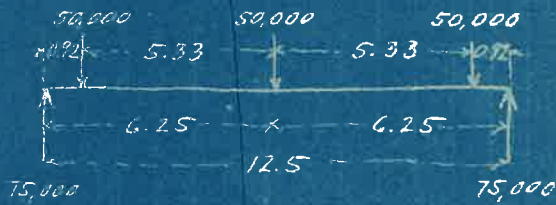
Cost per rail length - 33' of track

1250 tons of rail	@ 33¢	412.50
2 pairs anchor bars	@ 70¢	140.00
8 bolts	@ 26¢	208
40 spikes	@ 12¢	480
16 ties	@ 45¢	720
Laying		720
Total		\$1630.50

A.B. & A.R.R.
Standard Trestle
6 Stringers 7" x 15" Span 12.5'

D.L. Rails and fastenings = $150 \times 12.5 = 1875^*$
 Ties = 10 Pcs. $8" \times 8" \times 10' = 533 \text{ Ft. B.M.}$
 G.R. = $2 \times 6\frac{1}{2} \times 8 \times 12\frac{1}{2} = 108 \text{ " " "}$
 Str. = $6 \times 7 \times 15 \times 12\frac{1}{2} = 656 \text{ " " "}$
 Total = $1297 \text{ Ft. B.M.} \times 4.5 = 5835 \text{ "}$
 Total D.L. = 7710^*

D.L.M. = $\frac{7710 \times 12.5}{8} = 12,050 \text{ ft.}^{\#}$



A.B. & A.R.R. N^o 71 & 72
 L.L.M. = $75,000 \times 6.25 - 50,000 \times 5.33 = 202,150 \text{ Ft.}^{\#}$
 I = 25% of L.L.M. = $50,560$
 D.L.M. = $12,050^*$
 Total M. = $269,860 \text{ Ft.}^{\#}$

Stress = $\frac{72 \times 269,860}{6 \times 7 \times 15^2} = 2020$

Factor of safety = $\frac{7200}{2020} = 3.6$

Coopers	E 40	Stress = 1760	Factor of safety = 4
"	" 35"	" = 1550	" " " = 4.6
"	" 30	" = 1340	" " " = 5.4

Yellow Pine - Allowable fibre stress 1200 pounds per sq. inch,
 Safety factor 6.

Modulus of rupture 7200 pounds per sq. inch.

Note: - It would take 10 stringers to get a factor of safety of 6 for Engines N^o 71 & 72
 8 Stringers would give a factor of safety of 4.8.

A. B. & A. R. R.

Tractive Power of Engines 1601 - 1616

Cylinder = 21" x 28"

Diameter of driving wheels = 63"

Steam pressure = 200 lbs.

Weight on drivers = 65 tons

" " trucks = 23 "

" " tender = 50 "

Tractive power, 10 miles pr. hour = 33,320 lbs.

Table showing number of cars one engine can haul on different grades compensated for curvature.

Grade	Draw bar pull in pounds	Number of cars					
		10Tons	20Tons	25Tons	30Tons	40Tons	50Tons
0.0%	31,512	240	199	188	181	167	157
0.1 "	31,236	206	157	143	133	116	104
0.2 "	30,960	181	130	115	105	89	77
0.3 "	30,684	160	110	96	86	71	61
0.4 "	30,408	144	95	82	73	59	50
0.5 "	30,132	130	84	72	63	51	43
0.6 "	29,856	118	74	63	55	44	37
0.7 "	29,580	109	67	57	49	39	32
0.8 "	29,304	100	61	51	44	35	29
0.9 "	29,028	93	56	47	40	31	26
1.0 "	28,752	86	51	43	37	29	23

Cost of
Frog & Switch Material
for
Estimating Purposes.

	Weights of Rail		
	60 #	70 #	80 #
New Century Switch Stands:-			
High Target, Model 51-c, with 2 Latches	\$ 21.00	\$ 21.00	\$ 21.00
Low Target, Model 50-A, with 2 Latches	10.00	10.00	10.00
Split Switches, Design 630 . 15'-0"	26.00	27.00	29.00
No. 9 Spring Keyed Frogs, Design 211-15'-0"	37.00	41.00	45.00
No. 9 Stiff Keyed Frogs, Design 14; 15'-0"	27.00	30.00	33.00
No. 8 Spring Keyed Frogs. 12'-6"	25.50	27.50	30.50
No. 8 Stiff Keyed Frogs 12'-6"	25.50	27.50	30.00
Guard Rails without chocks, clamps, or braces 15'-0"	7.50	8.50	9.50
Angle Bars	.75		1.15
Bolts, per keg	4.40		4.40
Spikes, " "	3.42		3.42

COST OF CORRUGATED IRON

CULVERT PIPE

<u>Diam.</u>	<u>Gauge.</u>	<u>Weight</u>	<u>Cost per ft.</u>
8	16	7½	.80
10	16	9	1.00
12	16	11½	1.05
15	16	13½	1.25
18	16	16½	1.50
20	16	18½	1.65
24	14	26	2.55
30	12	42	4.50
36	12	49	5.35
42	12	58	6.25
48	12	67	7.50
60	10	110	12.50
72	10	135	15.25
84	10	160	18.00

SALES BOND

Cost of Bridges & Culverts on Ga. Ter. Co.

Bellwood Ave Chestnut St.	Double track reinforced concrete Tunnel 45' Deck Girders. Concrete abutments. Wooden floor system. (Painting 19.87)	15370.67 4703.78
Herbert St.	45 Deck Girders, concrete abutments. Wooden Floor system (Painting 20.00)	3768.19
Echo St.	Same construction as Herbert St. (P19 20.00)	3937.82
Bellwood Ave Meldrim St.	34' Concrete Arch Double track 49' 9" Deck Girders with Concrete abutments. Wood floor (Painting 97.00)	17159.57 17401.84
Hennedy St.	Double track 59' 6" Thru Girder concrete abutments, wood floor (Painting 107.50)	11852.73
Jett St.	30' Concrete Arch.	13905.17
Bush St.	Double track 40' 4" thru Girder concrete abutments (Painting 58.00)	7213.48
Jones Ave	Double track 70' Thru Girders concrete abutments Painting 142.88	14417.11
Simpson St.	Double Track 76' 8" Thru Girders, concrete abutments (Painting 153.87)	15446.12
Davis St.	Double Track 78' Deck Girder concrete abutments, wood floor (Painting 103.37)	19927.23
Rock St.	Double Track 55' Deck Girder concrete abutment, Wood floor (Painting 53.37)	15097.89
Haynes St.	One 73' 6" Deck Girder } Concrete One 71' 3" " " } abutments, wood floor (Painting 96.00)	36435.34
Thurmond St.	34' Concrete Arch	23390.95
Foundry St.	34' Concrete Arch	20266.26
Magnolia St.	34' Concrete Arch	59697.79
L & N. R.R.	42' 6" Thru steel Girder Concrete abutment, wood floor (Painting 46.50)	10235.32
		\$ 310,227.26

Note - The amounts for painting are included in the Total for each bridge.

Bridge Iron

Drift

weight of 10 lengths of iron bars

Size	Square	Round
1"	0.2806 lbs.	0.2209 lbs.
3/4"	0.2187 "	0.1687 "
5/8"	0.1577 "	0.1260 "
7/8"	0.1096 "	0.0860 "
1 1/8"	0.0701 "	0.0551 "

Boat Spikes

Approx number in keg of 200 pounds and weight of one single spike.

Size	5	6	7	8	9	10	11	12	14	16
1/4"	2050	1925								
5/16"	1230	1175	990	890						
3/8"	940	800	650	600	535	475				
7/16"	660	570	511	490	360	320	230			
1/2"	450	375	335	300	275	260	240			
5/8"				260	240	220	205	190	175	160

Size	Length in inches	Weight
1/4"	3000	2375
5/16"	1600	1360
3/8"	1370	1180

12 Hole D.C. Washer - 0.66 #
 Old Packing Spool = 3.82 #

Bridge Iron

Drift Bolts

Length in inches	Square Section		Round Section	
	3/4"	1 1/8"	1 1/2"	1 3/4"
18	2.7	2.6	4.3	4.6
20	3.2	3.1	2.3	4.0
22	3.5	3.7	2.5	4.4
24	3.8	4.2	2.8	4.9
26	4.1	4.7	3.0	5.3

Bolts

Approx weight of bolts in pounds, with square heads & nuts, including both.

Length under head in inches	Diameter in inches		
	1/2"	3/8"	7/8"
6	0.59	1.01	
7	0.64	1.10	
8	0.70	1.19	
9	0.75	1.27	
10	0.81	1.36	2.10
11	0.86	1.44	2.22
12	0.92	1.53	2.35
13	0.97	1.62	2.47
14	1.03	1.70	2.59
15	1.08	1.79	2.72
16		1.87	2.82
17		1.96	2.97
18		2.05	3.07
19			3.21
20			3.34
21			3.46
22			3.59
23			3.71
24			3.83
26			4.09
28			4.33
30			4.57

11# 0.07

Bridge Iron

Steel Wire Nails

Size	Length	No. Found
2 d	1	900
3 0	1 1/4	615
4 0	1 1/2	322
5 0	1 3/4	250
6 0	2	200
7 0	2 1/4	154
8 0	2 1/2	136
9 0	2 3/4	85
10 0	3	74
12 0	3 1/4	57
16 0	3 1/2	46
20 0	4	33
3 0 0	4 1/2	23
4 0 0	5	17
5 0 0	5 1/2	13 1/2
6 0 0	6	10 1/2

Wrought Iron Washers

Number in bag of 50 lbs

Diameter	Stock of material	Number
1/2	1 1/2	80,000
3/8	1 1/2	35,000
3/4	1 1/2	22,000
1	1 1/2	18,000
1 1/4	1 1/2	14,000
1 3/8	1 1/2	7,500
1 1/2	1 1/2	4,500
1 3/4	1 1/2	2,500
2	1 1/2	1,500
2 1/4	1 1/2	1,000
2 1/2	1 1/2	900
2 3/4	1 1/2	900
3	1 1/2	700