
# Northern Pacific Railway Company. Engineering Department Records.

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Version 3
August 20, 2018

[65-1]

# NORTHERN PACIFIC RAILROAD.

*Specifications for Wrought Iron Work of a Combination Truss Bridge across the White River, Washington Territory.*

## GENERAL DESCRIPTION.

The structure for which the Wrought Iron Work called for in these specifications is intended, is a Single Track, Combination Truss, Deck Bridge of 300 feet in length, composed of two parallel trusses 40 feet in depth, placed 18 feet apart from centre to centre of each. Each Truss has eight principal panels, 37 feet 6 inches long each, and sixteen sub-panels, 18 feet 9 inches long each.

The upper chords and posts of the trusses are of wood, and the remaining parts of wrought iron.

The deck, or floor, of the bridge consists of wrought iron floor beams let into and attached to the posts of the trusses, and supported by the floor beams, two lines of wooden stringers under the railroad track, wooden transverse ties, and guard rail.

The top lateral system is composed of wooden diagonal braces, the floor beams acting as ties.

The lower lateral system is composed of wooden struts between the feet of the principal posts, and diagonals of forged rods.

The wrought iron work will consist of 222,000 pounds of Eye-Bars, forming the lower chords and diagonals of the trusses. 52,500 pounds of angles and plates to form the joint boxes of the upper and lower chords. 67,100 pounds of riveted plate girders for the transverse floor-beams, and 27,300 pounds of rods, bolts, pins and washers for the lateral systems and for securing the wood parts to each other and to the iron work.

## QUALITY OF THE IRON.

The wronght iron used in tension-members shall be double rolled from the "muck-bar."

When tested in specimens having an observed length of ten inches and a sectional area of one square inch or less, the iron shall have an elastic limit of at least 26,000 pounds per square inch, and the portion observed shall have elongated at least 15 per cent. of its original length and have reduced its ruptured section at least 22 per cent. when tested to destruction. The fracture thus produced must be fine and fibrous, showing no granulation.

Specimens shall be capable of being bent cold without cracking, one hundred and eighty degrees to a curve of a diameter of one and a half thicknesses of the piece. When nicked with a sharp cold chisel and broken by bending the fracture must be clean and fibrous.

The iron must work satisfactorily while hot or at the forge.

Small specimens, cut from plate and angle iron, when tested with an observed length of eight inches, shall show an elastic limit of at least 25,000 pounds per square inch of section, and elongate at least twelve per cent. of their original length, showing a reduction of fifteen per cent. at the place of rupture. The ruptured section thus produced, or if produced by nicking and bending as above described, shall be clean and fibrous.

If full-sized bars are tested the results must be relatively satisfactory, according to their dimensions as compared with those of the small test specimens, and in all cases the fracture must be clean and fibrous.

No iron will be accepted specimens of which show bad welding, nor finished bars and shapes having ragged edges, ends too closely cropped, cold shuts, splinters, blisters, or other defects which in the opinion of the Engineers may render such bars or shapes unsuitable for their intended purposes.

## RIVETED WORK.

In riveted work the parts shall be punched with sharp punches and dies, the holes being one-sixteenth of an inch larger than the rivets intended for them, and so accurately spaced that when the several parts are assembled the rivet will pass through hot without ramming or injurious drifting. The several parts shall be kept tightly bolted together while being riveted.

All the joint boxes must be neatly fitted together to allow of fitting them to the necessary notches in the wood-work with neatness and accuracy, and to insure a fair bearing against the timber. Any imperfections in this respect the contractor must remedy by planing whenever the Engineers may require it, but no extra compensation will be allowed therefor.

The holes for the turned pins shall be bored to diameter one-fiftieth of an inch greater than that of the pins intended for them, and the distances and angles of the axes of such pin holes from points and planes of reference shall agree accurately with those given in the drawings furnished by the Engineers. The pins shall be turned truly cylindrical to the diameters and lengths given in said drawings

## FORGED WORK.

The enlarged screw-ends of rods and heads of eye-bars shall be formed by such a process of upsetting or die-forging as shall be satisfactory to the Engineers. No welding in the body of the bars will be permitted.

All screw threads must be full and true and fitting neatly.

Eye-bars must be of the required lengths, so that the pin holes when bored in the centres of the heads shall be accurately the distances apart shown by the drawings. The pin holes in the bars must be at right angles to the planes of the heads, and no head shall be thinner than the body of the bar, nor in any place exceed that thickness by more than an eighth of an inch.

## WORKMANSHIP.

All workmanship must be fully up to the highest standard of Bridge-work at the present time, and in all respects satisfactory to the Engineers.

Machine finished portions of the work shall be treated to a coating of white lead and tallow before shipment.

All parts to be joined together shall receive a coat of raw linseed oil before assembling and all completed work shall, before being sent out from the shop, receive a thorough coat of raw linseed oil.

## PROPOSALS.

Proposals for this work will be at so much per pound for the entire Iron work, more or less, regardless of the part considered. The price to include all materials, workmanship, testing, patterns, etc., and to include its delivery on board cars to the Northern Pacific Railroad Company, at Saint Paul, Minnesota, in a condition satisfactory to the Engineers, on or before the day of 1885.

G5-1

White River Bridge

Specifications

[65-2]

2M. 5-25-84. P. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

St. Paul, Minn. Sept 18 1884

Genl. A. Anderson
Engr-in-Chf.

Dear Sir,

According to instructions from you, I have examined accompanying strain sheet, 300 ft. combination span.

W.P. Standard rolling load.
Dead load assumed 2600 lbs per ft.

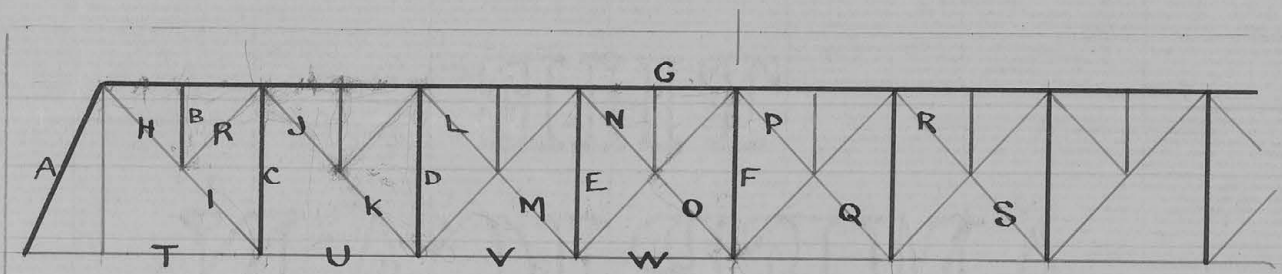
Results are as follows;—

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

St. Paul, Minn. 188

a.a. 2




| | str. | dimen. | area | str. pr. sq. in. | safe str. | Remarks. |
|---|---|---|---|---|---|---|
| A | 443.400 | 4-10"×22" | 880 | 500 | 800 | factor 4 |
| B | 59.100 | 1-12×10 | 120 | 490 | 800 | " |
| C | 314.000 | 4-10×20 | 800 | 390 | 800 | " |
| D | 228.000 | 4-10×18 | 720 | 300 | 800 | " |
| E | 149.000 | 4-10×16 | 640 | 230 | 700 | " |
| F | 75.000 | 2-10×18 | 360 | 210 | 800 | " |
| G | 912.700 | 4-10×22 | 880 | 1040 | 1000 | |
| H | 488.100 | 6-6×1¼ | 45 | 10840 | 10000 | |
| I | 427.000 | " | " | | | |
| J | 368.100 | 6-5×1 3/16 | 35.62 | 10330 | 10000 | |
| K | 310.000 | " | " | | | |
| L | 255.600 | 4-5×1¼ | 25. | 10220 | 10000 | |
| M | 202.700 | " | " | | | |
| N | 151.600 | 4-3×1¼ | 15 | 10100 | 10000 | |
| O | 102.500 | " | " | | | |

2M. 5-25-84. P. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

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| | str. | dimen. | area | str. pr. sq. in. | safe str. | Remarks |
|---|---|---|---|---|---|---|
| P | 70.100 | 2-3"×1 5/16" | 7.87 | 8910 | 10000 | |
| Q | 39.600 | " | " | | | |
| R | 40.300 | 2-1¼"⌀ | 2.46 | 16400 | 10000 | |
| S | 186900 | | | | | |
| T | 186.900 | 4-5"×15/16" | 18.75 | 9900 | 10000 | |
| U | 494.800 | 8-5"×1¼" | 50. | 9900 | 10000 | |
| V | 714.700 | 12-5×1 3/16 | 71.25 | 10.030 | 10000 | |
| W | 846.950 | 14-5×1 3/16 | 83.13 | 10.200 | 10000 | |

Upper laterals were calculated for a load of 450 lbs per running ft., and lower laterals for 150 lbs per ft.

| | str. | dimen. | area | str. | safe. |
|---|---|---|---|---|---|
| End upper laterals | 96.200 | 8"×10" | 80 □" | 1200 | 800 |
| End rods | 56.250 | 2 3/8"⌀ upset | 4.43 | 12700 | 15000 |
| End lower laterals | 36350 | 1½"⌀ upset | 1.77 | 20530 | 15000 |
| " | 51600 | 1½"⌀ upset | 1.77 | 29200 | 15000 |

# NORTHERN PACIFIC RAILROAD COMPANY.

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Aa. 4)

St. Paul, Minn. 188

| | | | | |
|---|---|---|---|---|
| Horbeams | str | not over | 7000 #/in² | 8000 # safe. |
| stringers (3-6"×16") | str. | | 1600 | 1000 " |
| End pin } top chd } | 4½" ø | steel — | 101500 ft lbs | 178.900 ft lbs |
| Centre pin } bot. chd } | 3¾" ø | " | 142.500 | 193,500 |

Further stability and stiffness would be secured by making the trusses 18 ft centres, (not 16 ft) and bracing smaller uprights (10"×12") laterally.

Respectfully yours.

H. J. Howe.

Asst. Engr.

2M. 5-25-84. P. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

St. Paul, Minn. Jan 13 1885

Genl. A. Anderson

Engi-in-Chf.

Dear sir,

According to instructions, I have examined the strain sheet of the 300 ft. span, White Riv. Bdg.

The live load was taken as the N.P. Standard, and dead load at 2600 lbs per lin. ft. of track. For wind strains, top chd, 500 lbs was assumed; 300 lbs being due to train load, and 200 to the upper half of the bridge, itself.

For bottom chord, 150 lbs pr. lin. ft.

Results are as follows, unsafe strains being underlined in red; —

# NORTHERN PACIFIC RAILROAD COMPANY.

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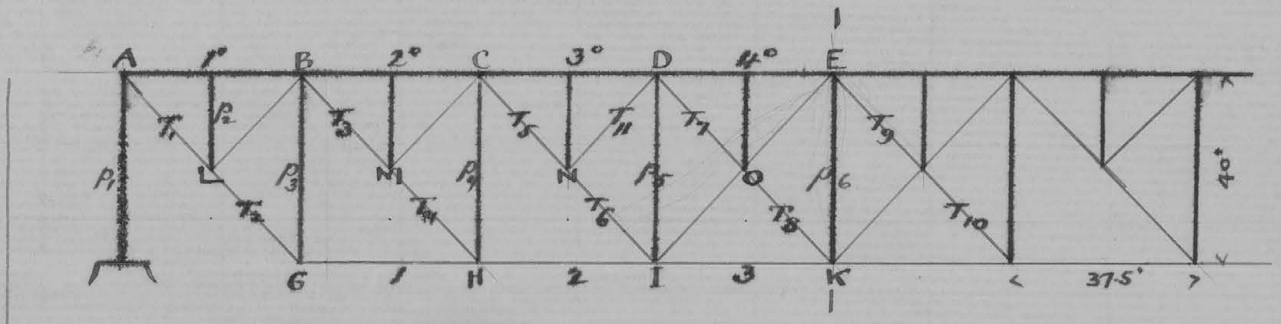
Genl. A.A. – 2 St. Paul, Minn. 188




300 ft Span, Combination Deck Bdg.

| bar | str. | dimen. | area | pr □" | Buck pr □" | safe pr □" |
|---|---|---|---|---|---|---|
| 1° | 377.300 | 2-11×22 / 1-10×22 | 704 | 540 | 550 | 860 |
| 2° | 629.000 | 3-12×22 | 792 | 790 | 810 | " |
| 3° | 779.700 | 3-14×22 | 924 | 840 | 860 | " |
| 4° | 830.000 | 3-14×22 | 924 | 900 | 920 | " |
| 1 | 352.100 | 6-5×1 3/16 | 35.6 | 9.900 | 10.060 | 10000 |
| 2 | 603.600 | 12-5×1 | 60. | 10.060 | 10.170 | " |
| 3 | 754.500 | 14-5×1 1/16 | 74.3 | 10.150 | 10.300 | " |
| $T_1$ | 549.350 | 4-1 5/8×6 / 2-1 7/16×6 | 56.3 | 9.760 | 10.020 | 10000 |
| $T_2$ | 505.650 | 6-1 7/16×6 | 51.8 | 9.760 | 10.040 | " |
| $T_3$ | 410.250 | 4-5×1 7/16 / 2-5×1 5/16 | 41.9 | 9.800 | 10.160 | " |
| $T_4$ | 369.100 | 6-5×1 1/4 | 37.5 | 9.800 | 10.180 | " |
| $T_5$ | 280.800 | 4-5×1 / 2-5×1 5/16 | 33.1 | 8.500 | 9000 | " |
| $T_6$ | 242.700 | 4-5×1 5/16 | 26.2 | 9.260 | 9700 | " |

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CONSTRUCTION DEPARTMENT.

Genl. a.a. -3 St. Paul, Minn. 188

| bar | str. | dimen. | area | pr. a" | Buck pr. a" | safe pr. a" |
|---|---|---|---|---|---|---|
| $T_7$ | 161.100 | 2-5×1 / 2-5×1¼ | 22.5 | 7160 | 7660 | 10,000 |
| $T_8$ | 126.600 | 4-5×¾ | 15. | 8440 | 9060 | 10.000 |
| $T_9$ | 44000 | 2-5×1 1/16 | 10.6 | 4150 | 6800 | 8.000 |
| $T_{10}$ | 20000 | 2-3×9/16 | 3.4 | 5880 | 8240 | 8.000 |
| $T_{11}$ | 44000 | 2-5×¾ | 7.5 | 5870 | 5870 | 8.000 |
| $P_1$ | 441.200 | 2-20×16 | 640 | 690 | 680 | 800 |
| $P_2$ | 64.250 | 1-14×15 | 210 | 310 | 350 | 600 |
| $P_3$ | 369.100 | 2-19×15 | 570 | 650 | 670 | 800 |
| $P_4$ | 270.000 | 2-16×15 | 480 | 560 | 580 | 750 |
| $P_5$ | 177.100 | 2-14×15 | 420 | 420 | 440 | 680 |
| $P_6$ | 92.400 | 2-14×15 | 420 | 220 | 300 | 680 |
| | | | Laterals | | | |
| Top 1 | 104.400 | 12×10 | 120 | 870 | 840 | 1000 |
| 2 | 90.900 | 12×10 | 120 | 750 | 730 | " |
| 3 | 78.000 | 10×10 | 100 | 780 | 750 | " |
| 4 | 65.700 | 10×10 | 100 | 660 | 630 | " |
| 5 | 53.900 | 8×10 | 80 | 670 | 630 | " |
| 6 | 42.600 | 8×10 | 80 | 530 | 500 | " |
| 7 | 31.700 | 6×10 | 60 | 530 | 480 | " |
| 8 | 21.400 | 6×10 | 60 | 360 | 370 | " |

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CONSTRUCTION DEPARTMENT.

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| Bar | Str. | dimen. | area | pr. ▫" | Buck pr. ▫" | Safe pr. ▫" |
|---|---|---|---|---|---|---|
| | | | Laterals | | | |
| Bott. | | | | | | |
| 1 | 46.400 | 1⅞" upset | 275' | 16800 | 16700 | 15000 |
| 2 | 40.200 | " | " | 14600 | 13700 | " |
| 3 | 42.900 | " | " | 15600 | 12300 | " |
| 4 | 24.200 | ½ " | 18' | 13400 | 11200 | " |
| 5 | 8.100 | ¼ " | 12' | 6700 | 5700 | " |
| 1° | 2100 | 6×12 | 72' | 300 | 320 | 440 |
| 2° | 18300 | 6×12 | 72' | 250 | 250 | " |
| 3° | 14100 | 6×12 | 72' | 200 | 170 | " |
| 4° | 8400 | 5×12 | 60' | 120 | 100 | 350 |
| 5° | 2800 | 5×10 | 50' | 60 | 60 | " |
| | | | End Sway | | | |
| | 138.100 | 14×14 | 196' | 700 | 640 | 600 |
| | 88.500 | 2-1¾" upset | 48' | 18500 | 18600 | 15000 |
| | | | Floorbeam | | | |
| 94000 lbs | panel ld. | — fiber | | +6700 | 6800 | 7500 |
| | | | | −720 | 7700 | 8000 |
| shear on web | | 47000 / 12.80" | | =3670 | 3760 | 4000 |
| | | | Stringers | | | |
| | | | | | N.P.R. | |
| 279000 | lbs / moment | 4-10"×18" | fiber | | 1550 | 1200 |

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

Genl. a.a. – 5 St. Paul, Minn. 188

| | pin | str. in lbs. | dimen. | fiber str. pr. □" | wrot. iron | |
|---|---|---|---|---|---|---|
| | K | 520.000 | 4 3/8 □ | 63000' | 15000 | see graphical plan. |
| | I | 857.000 | " | 104.000' | " | " |
| Bot. | | | | | | |
| chd. | H | 112.000 | " | 13.500' | " | " |
| | G | 84.000 | " | 10.000' | " | " |
| | L | 62.000 | 4 3/8 □ | 7500' | 15000 | " |
| middle | M | 245.000 | " | 30.000' | " | " |
| | N | 86.000 | " | 10.500' | " | " |
| | A | 84.000 | 5/8 □ | 9.200' | 15.000 | " |
| Top | B | 101.000 | 4 3/8 | 12.300' | " | " |
| | C | less | " | less | " | " |
| chd. | D | " | " | " | " | " |
| | E | " | " | " | " | " |

Shearing strains found within safe limits.

2M. 5-25-84. P. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

St. Paul, Minn. 188

Gen. Aa. 6

## Notes.

1°— There is no diagonal sway bracing between main posts, and none between end "intermediates"

2°— Bott. chd. eybars are 5" deep and 37½ ft. long. When supported at the ends, there is a strain on outside fiber of 8430 lbs. due to its own weight. An alternate design would make them one half that length, connected by a pin, and suspended from the pin above.

3°— The maximum pitch of rivets in floorbeam is 16½ in. (bott. flange) The usual limit is 6 in.

4°— Top lateral braces (12"×10", 10"×10" etc) are connected by a half-lap at center, instead of the usual way.

5°— Guard rails (8"×9") rise 4" above the level of the back rails. Bolts 2" more.

6°— No provision for splicing stringers.

etc.

Respectfully yours

H. J. Howe

Asst. Engr.

65-2

White River Bridge

Howes' Report

on Strain sheet

NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

2M. d1-12-84. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

No. of chapter 7

St. Paul, Minn. Feby 4 1884

Genl. A. Anderson
Engr-in-Chf.

Dear sir,

I have examined re-arrangement of bars on pins "I" and "K" and find the bending strains 17000 lbs and 11500 lbs pr □" respectively. Pin "M" not mentioned.

Bearing on pins in all cases less than 12000 lbs pr □"

2°. Track stringers if made two panels long (10"x18"-37'6") breaking joints, will be strong enough. Ties are 7" deep, as shown.

3°. Diagonal bracing is generally used on deck bridges at each panel point, not because of definite strains that come upon it, but for those which might come upon it in extreme cases, on account of poor material and workmanship; or ill adjustment of essential members. As regards its relation to the posts,— some experiments

2M. 21-12-84. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

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Genl. a.a. St. Paul, Minn. 188

at 2) Watertown Arsenal show that the final deflection of built beams tested to their ultimate strength is almost invariably in the direction of the long diameter.

For that reason, if generally true, — diagonal bracing would seem to be needed, if the stiffening rods shown on plan (in the plane of the truss) are needed.

4. The dead weight of long eyebars (37'6") adds, according to my calculations, 1600 lls to maximum chord strains. (fibre stress)

Said strain applies also to previous handling (during rolling and transportation) particularly if the flat side is horizontal, depth 1". This strain (42150 lls pr □") is five times the other, depth 5".

5. Packing Keys should be slightly tapered to insure an even bearing throughout.

Respectfully yrs. H. J. Howe.
Asst. Engr

White River

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

Genl. A. A. St. Paul, Minn. 188

3.)

It may not be out of place to say that the number of templets and shapes might be reduced without greatly increasing the weight of iron. This applies to the chord boxes, diagonals, floorbeams, and some lesser forms.

The following gives the variation in flanges of floorbeams.

| | | Top flange | |
|---|---|---|---|
| flrbms | bet. main posts | 2-5"×3½"×⅞" L | pl 10⅜"×¼" |
| " | at end | do | do. |
| " | bet. intermed. posts | do | pl 10⅜×5/16 |
| | | Bot. flange | |
| flrbms | bet. main posts | 2-5"×3½"×½" | pl 10⅜"×½" |
| " | bet. intermed. posts | do | do. |
| " | at end | do | pl 10⅜×7/16 |

The main source of special details is the position of the floorbeams below the top chord. From this follows the position of the laterals — joint-box connections of

2M. 11-12-84. C. D. 64.

# NORTHERN PACIFIC RAILROAD COMPANY.

CONSTRUCTION DEPARTMENT.

St. Paul, Minn. 188

Genl. Ass.

both 4) floorbeams and laterals — "tightening apparatus" etc. — the latter not necessarily however,

Resply

H.J.H.

[65-3]

Bill of Material. 6-3

# White River Bridge

## Bill of Bolts and Rods.

| No of Pieces | Designation | Dimensions: Section Inches. | Dimensions: Length Feet and inches Giving. | No. of Washers Cast Iron | Weight in pounds: Wrought I. | Weight in pounds: Cast. I. |
|---|---|---|---|---|---|---|
| 8 | Bolts. Head and nut. | 1 1/8" diam. | 3 ft. 9 1/2" | 16 | 115 | 37 8 |
| 8 | " Nut at each end. | 1 1/8" " | 2' - 11 1/4" | 8 | 93 | 18 4 |
| 4 | " Head and nut. | 1 1/8" " | 2' - 10" | 8 | 43 | 18 4 |
| 36 | " " " | 1 1/8" " | 2' - 0" | 48 | 311 | 111 |
| 36 | " Nut on each end. | 1 1/4" " | 3' - 7 1/2" | — | 627 | — |
| 96 | " Head and nut. | 1" " | 3' - 8 3/4" | 192 | 1061 | 336 |
| 24 | " " " " | 1" " | 1' - 11 7/8" | 24 | 207 | 42 |
| 48 | " " " " | 7/8" " | 1' - 11 3/4" | 48 | 226 | 44 |
| 12 | " " " " | 1 1/8" " | 1' - 7 1/2" | 24 | 89 | 50 |
| 4 | " " " " | 1 1/8" " | 1' - 9" | 8 | 31 | 14 |
| 8 | " " " " | 1" " | 1' - 9" | 16 | 47 | 28 |
| 16 | " " " " | 1 1/8" " | 2' - 5 1/2" | 16 | 162 | 28 |
| 108 | " " " " | 7/8" " | 2' - 9 1/2" | 216 | 679 | 190 |
| 16 | " " " " | 1" " | 2' - 9 3/4" | 32 | 160 | 56 |
| 4 | " " " " | 1" " | 1' - 5" | 8 | 20 | 14 |
| 12 | " " " " | 1" " | 1' - 5 3/4" | 24 | 62 | 42 |
| 40 | " " " " | 1" | 1' - 5 3/8" | 40 | 310 | 70 |
| 44 | " " " " | 1" " | 1' - 3 3/4" | 88 | 209 | 154 |
| 44 | " " " " | 7/8" " | 1' - 3 1/2" | 88 | 143 | 77 |
| 64 | " " " " | 1" " | 1' - 0 3/8" | 64 | 204 | 112 |
| 136 | " " " " | 7/8" " | 1' - 6 3/4" | 136 | 521 | 121 |
| 160 | " " " " | 3/4" " | 2' - 10 3/8" | 320 | 738 | 250 |
| 192 | " " " " | 3/4" " | 1' - 9 3/8" | 384 | 576 | 300 |
| 16 | " " " " | 3/4" " | 0' - 11 1/4" | 32 | 54 | 25 |
| 4 | " " " " | 7/8" " | 1' - 1 1/2" | 8 | 12 | 14 |
| 8 | "  | 7/8" " | 0' - 1 1/2" | — | 11 | — |
| 8 | "  | 7/8" " | 0' - 1 1/4" | — | 10 | — |
| 4 | " Head and nut | 7/8" " | 0' - 7 1/2" | 4 | 8 | 3 |
| 4 | " " " " | 7/8" " | 0' - 8" | 4 | 9 | 4 |
| 2 | " " " " | 7/8" " | 0' - 7" | 2 | 4 | 2 |
| 4 | " " " " | 7/8" " | 0' - 8 1/2" | 8 | 9 | 7 |
| 8 | "  | 7/8" " | 0' - 1" | — | 10 | — |
| 12 | " Head and nut. | 3/4" " | 0' - 7 3/8" | 24 | 23 | 19 |
| 6 | " " " " | 3/4" " | 1' - 1 3/8" | 12 | 13 | 9 |
| 4 | " " " " | 1 1/8" " | 1' - 10" | 8 | 32 | 18 |
| 8 | " " " " | 1 1/8" " | 3' - 3 3/8" | 8 | 104 | 18 |
| 20 | " " " " | 7/8" " | 0' - 3 1/8" | — | 45 | — |
| 16 | "  " " | 7/8" " | 0' - 1 5/8" | — | 23 | — |
| 20 | " Head and nut | 1 1/8" " | 3' - 5" | 40 | 268 | 93 |
| 8 | " " " " | 1 1/8" " | 3' - 3 3/4" | — | 100 | — |
| 4 | " " " " | 1 1/8" " | 1' - 10" | 8 | 32 | 18 |
| 4 | " " " " | 1 1/8" " | 1' - 5" | 8 | 28 | 19 |
| 4 | " " " " | 1" " | 1' - 11 3/4" | 8 | 26 | 14 |
| 4 | " " " " | 1" " | 1' - 8" | 8 | 18 | 14 |
| 4 | " " " " | 3/4" " | 1' - 9 7/8" | 8 | 13 | 6 |
| 4 | " " " " | 1" " | 1' - 9 3/4" | 8 | 22 | 19 |
| 12 | " " " " | 1" " | 2' - 5 3/4" | 24 | 93 | 56 |
| 4 | " " " " | 1" " | 4' - 1 3/8" | 8 | 48 | 19 |
| 4 | Rods - 2 nuts, upset ends | 1 3/4" " | 16' - 1 1/2" | — | 588 | — |
| 12 | " - 2 nuts. | 3/4" " | 19' - 4 7/8" | 24 | 352 | 19 |
| 8 | " 2 " upset ends | 1 3/4" " | 21' - 7" | 16 | 1536 | 214 |
| 4 | " 2 " " " | 1" " | 14' - 9" | — | 167 | — |

For lateral rods and horizontal stay rods between posts see sheet 44.

For pins and Eye Bars see sheet 46.

Buck & McNulty
Engineers
New York Dec. 18-84

# White River Bridge N. P. R. R.

## Bill of Timber

| Designation | | No. of Pieces | Dimensions | | Length |
|---|---|---|---|---|---|
| Upper Chords | ✓ | 8 | 11" | 22" | 36 ft. 6 in. |
| | ✓ | 4 | 10" | 22" | 36 ft. 6 in. |
| | ✓ | 12 | 12" | 22" | 37 ft. 6 in. |
| | ✓ | 24 | 14" | 22" | 37 ft 6 in. |
| Posts. | ✓ | 8 | 16" | 20" | 38 ft 10 in. |
| | ✓ | 8 | 15" | 19" | 37 ft. 10 in. |
| | ✓ | 8 | 15" | 16" | 38 ft 0 in. |
| | ✓ | 12 | 15" | 14" | 38 ft 2 in. |
| End Post Brace | ✓ | 4 | 16" | 16" | 43 ft. 3 in. |
| Short Posts | ✓ | 16 | 15" | 14" | 18 ft 2 in. |
| Transverse struts | ✓ | 6 | 6" | 12" | 16 ft 8 in. |
| | ✓ | 2 | 5" | 12" | 15 ft. 3 in. |
| | ✓ | 1 | 5" | 10" | 15 ft 4 in. |
| Diagonal Braces. | ✓ | 8 | 10" | 12" | 25 ft. 2 in. |
| | ✓ | 8 | 10" | 10" | 25 ft 2 in. |
| | ✓ | 8 | 8" | 10" | 25 ft 2 in. |
| | ✓ | 8 | 6" | 10" | 25 ft 2 in. |
| | ✓ | 6 | 8" | 6" | 23 ft 2 in. |
| | ✓ | 12 | 8" | 3" | 23 ft. 2 in. |
| | ✓ | 4 | 14" | 14" | 23 ft 3 in. |
| | ✓ | 8 | 8" | 14" | 23 ft 3 in. |
| Track stringers. | ✓ | 32 | 9" | 18" | 37 ft 6 in. |
| Ties | ✓ | 160 | 7" | 9" | 9 ft 0 in. |
| | ✓ | 80 | 7" | 9" | 14 ft 5 in. |

| Designation | | No. of Pieces | Dimensions | | Length |
|---|---|---|---|---|---|
| Guard Timbers. | ✓ | 16 | 8" | 9" | 37 ft 6 in. |
| Sidewalk | ✓ | 64 | 1½" | 12" | 18 ft 9 in. |
| Packing Blocks. | ✓ | 12 | 9" | 20" | 1 ft 6 in. |
| | ✓ | 4 | 9" | 20" | 3 ft 9 in. |
| | ✓ | 4 | 9" | 12" | 6 ft 0 in. |
| | ✓ | 4 | 12" | 12" | 11 ft 0 in. |
| | ✓ | 8 | 7½" | 22" | 2 ft 5 in. |
| | ✓ | 24 | 7¼" | 22" | 1 ft 6 in. |
| | ✓ | 24 | 5¼" | 22 | 1 ft 6 in. |
| | ✓ | 48 | 2¼" | 22" | 1 ft 6 in. |
| | ✓ | 12 | 3¾" | 19" | 1 ft 7 in. |
| | ✓ | 12 | 3¾" | 16" | 1 ft 6 in. |
| | ✓ | 6 | 3¾" | 14" | 1 ft 6 in. |
| | ✓ | 4 | 3¾" | 19" | 1 ft 3 in. |
| | ✓ | 4 | 3¾" | 16" | 1 ft 3 in. |
| | ✓ | 6 | 3¾" | 14" | 1 ft 3 in. |
| | ✓ | 4 | 3¾" | 19" | 3 ft 2 in. |
| | ✓ | 4 | 3¾" | 16" | 3 ft 2 in. |
| | ✓ | 6 | 3¾" | 14" | 3 ft 2 in. |

Note. The timber to cut solid to the lengths given

Buck & McNulty

Engineers

New York, December 17, 1874

# White River Bridge. N.P.R.R.

## Bill of Timber.

| Designation | No Pieces | Dimensions | | Length. |
|---|---|---|---|---|
| Upper Chords | 8 | 11" | 22" | 36' 6" |
| | 4 | 10" | 22" | 36' 6" |
| | 12 | 12" | 22" | 37' 6" |
| | 24 | 14" | 22" | 37' 6" |
| Posts | 8 | 16" | 20" | 38' 10" |
| | 8 | 15" | 19" | 37' 10" |
| | 8 | 15" | 16" | 38' 0" |
| | 12 | 15" | 14" | 38' 2" |
| End post Brace | 4 | 16" | 16" | 43' 3" |
| Short Posts | 16 | 15" | 14" | 18' 2" |
| Transverse struts | 6 | 6" | 12" | 16' 8" |
| | 2 | 5" | 12" | 15' 3" |
| | 1 | 5" | 10" | 15' 4" |
| Diagonal Braces | 8 | 10" | 12" | 25' 2" |
| | 8 | 10" | 10" | 25' 2" |
| | 8 | 8" | 10" | 25' 2" |
| | 8 | 6" | 10" | 25' 2" |
| | 6 | 8" | 6" | 23' 2" |
| | 12 | 8" | 3" | 23' 2" |
| | 4 | 14" | 14" | 23' 3" |
| | 8 | 8" | 14" | 23' 3" |
| Track Stringers | 32 | 9" | 18" | 37' 6" |
| Ties | 160 | 7" | 9" | 9' 0" |
| | 80 | 7" | 9" | 14' 5" |
| Guard Timber | 16 | 8" | 9" | 37' - 6" |
| Sidewalk | 64 | 1½" | 12 | 18' - 9" |
| Packing Blocks | 12 | 9" | 20" | 1' - 6" |
| | 4 | 9" | 20" | 3' - 9" |

| Designation | No Pieces | Dimensions | | Length |
|---|---|---|---|---|
| Packing Blocks | 4 | 9" | 12" | 6' 0" |
| | 4 | 12" | 12" | 11' 0" |
| | 8 | 7¼" | 22" | 2' 5" |
| | 24 | 7¼" | 22" | 1' 6" |
| | 24 | 5¼" | 22" | 1' 6" |
| | 48 | 2¼" | 22" | 1' 6" |
| | 12 | 3¾" | 19" | 1' 7" |
| | 12 | 3¾" | 16" | 1' 6" |
| | 6 | 3¾" | 14" | 1' 6" |
| | 4 | 3¾" | 19" | 1' 3" |
| | 4 | 3¾" | 16" | 1' 3" |
| | 6 | 3¾" | 14" | 1 3" |
| | 4 | 3¾" | 19" | 3' 2" |
| | 4 | 3¾" | 16" | 3' 2" |
| | 6 | 3¾" | 14" | 3' 2" |

Note - The timber to cut solid to the lengths given.

Buck & McNulty.
Engineers.

New York
December 17th 1884

White River Bridge

Bills of Material

Buck & Mc Cuddy

| White River | Pound Price | | |
|---|---|---|---|
| Alden & Lassey | 3.64 | 368900 lbs @ 3 64/100 = $ | 13427.96 |
| New Jersey Iron & Steel Co | 3.80 | " @ 3 80/100 = $ | 14018.20 |
| | | 3 74/100 | 13796.86 |
| Rust & Coolidge | 3.84 | " @ 3 84/100 = $ | 14165.76 |
| Coffode & Saylor | 3.95 | " 3 95/100 = $ | 14571.55 |
| Passaic Roll mill Co | 3.96 | " 3 96/100 = $ | 14608.44 |
| Union bridge Co | 4.88 | " 4 88/100 = $ | 18002.32 |

# Northern Pacific Rail-Road.

Jannary 2nd. 1885. Summary of bids received for furnishing the iron work for one 300 ft. span, combination, single track, deck bridge, over White River, W.T. Cascade Div. Prices named are per pound, free on board cars at St. Paul, Minn. Delivery to be made by March 1st. 1885, and the iron work to be manufactured in accordance with plans and specifications drawn by Buck & McMilty, 53 Broadway, New York City, and under their Supervision

| | | | | |
|---|---|---|---|---|
| (1) | Alden & Lassig. Rochester, N.Y. | Dec. 30.'84 | $3\frac{64}{100}$ cents | Could proceed immediately with the work, and deliver all, in St. Paul in 50 to 60 days. |
| (2) | New Jersey Steel & Iron Co. by Fred. J. Slade, Treas. Trenton, N.J. | Dec. 29.'84. | $3\frac{80}{100}$ " | Ship in 5 weeks from receipt of order. |
| (3) | Rust & Coolidge 1st. Nat. Bk. Building, Chicago, Ill. | Dec. 30.'84 | $3\frac{84}{100}$ " | finished weight. |
| (4) | Cofrode and Saylor 257 So. Fourth St. Philadelphia, Pa. | Dec. 30.'84 | $3\frac{95}{100}$ " | |
| (5) | Passaic Rolling Mill Co. W.O. Fayerweather, Sect. & Treas. Paterson, N.J. | Dec. 27.'84 | $3\frac{96}{100}$ " | ship in 4 weeks from signing contract. If you want to secure your own frt. will make price, f.o.b. cars, Paterson, N.J. $3\frac{46}{100}$ ¢ per lb. |
| (6) | Union Bridge Co. by C. Macdonald. 52 Wall St. N. York. | Dec. 26.'84 | $4\frac{88}{100}$ " | |

65-4

White River Bridge

Summary of Bids

and rejected Bids

(1)

# ALDEN AND LASSIG.

DESIGNERS AND BUILDERS OF

JOHN F. ALDEN.
Rochester, N.Y.

M. LASSIG.
Chicago, Ills.

DESIGNERS & BUILDERS OF
WROUGHT IRON & STEEL
RAIL ROAD,
& HIGHWAY BRIDGES,
BOTH
PERMANENT & DRAW SPANS.
ALSO
ELEVATED RAIL ROADS,
IRON VIADUCTS, PIERS,
TURN-TABLES,

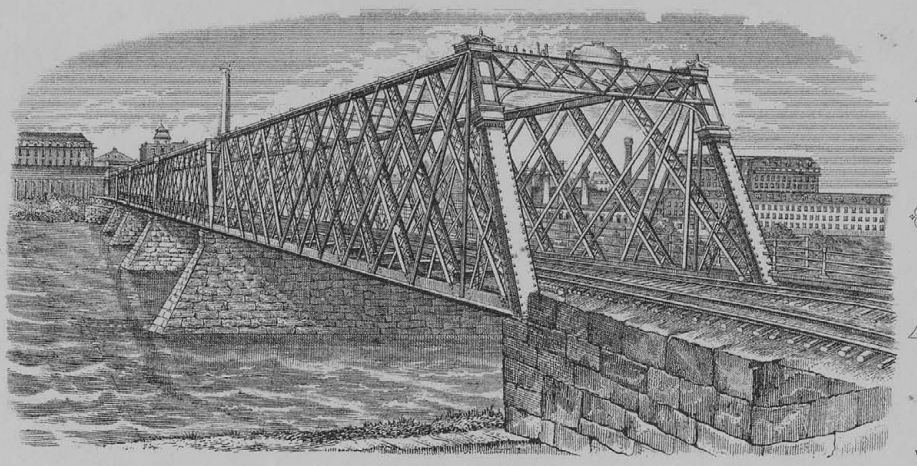

PLATE GIRDERS,
ROOFS, TANKS &
GENERAL IRON WORK
FOR BUILDINGS,
ALSO
CONTINUOUS RIVETED
WROUGHT IRON PIPE,
WITH EXPANSION JOINT.
CAPACITY OF WORKS:
1400 TONS PER MONTH.

**ALDEN & LASSIG,**
LESSEES OF
Leighton Bridge and Iron Works,
ROCHESTER, N.Y.

**LASSIG & ALDEN,**
Office, 53 Metropolitan Block.
Works, Clybourn & Wrightwood Avs
CHICAGO, ILLS.

Rochester, N.Y. Dec 30th 1884

Messrs Buck & McNulty.
53 Broadway N.Y.

Gentlemen.

We should be pleased to furnish f.o.b cars St. Paul (Northern Pacific Line) the iron for the 300 ft. Span Northern Pacific Bridge at 3.64 cents per pound - Could proceed immediately with the work in case same is awarded to us And deliver all at St. Paul in fifty to sixty days time - We hope to have the pleasure of furnishing the work, All to be in accordance with Your printed specifications and subject to Your approval and acceptance -

Very Truly Yours

Alden & Lassig.

(1)

White River Bridge
Proposal of Alden
and Lassig

(2)

Edward Cooper, Pres't
Edwin F. Bedell, Sec'y } New York.

Fred. J. Slade, Treas.
Joseph Stokes, Supt. } Trenton.
R. W. Raymond, Engineer.

Office of

# The New Jersey Steel & Iron Co.

Wrought Iron Beams, Channels, Angles, Tees, Rails, Merchant Iron, Chain, Rivets, Bolts, Horse Shoes &c.

Constructors of Bridges, Roofs and other Iron Structures.

N. Y. Office 17 Burling Slip
Cooper, Hewitt & Co.

Trenton, N.J. December 29th, 1884. 188

Buck & McNulty.,

New York.,

Gentlemen:-

We can furnish the wrought iron work for combination Truss Bridge across White River as per specification and plans shown us for 3.8 cents per pound delivered at St. Paul, Minn. and could ship in five weeks from receipt of order.

Yours truly

Fred. J. Slade
Treas.

(2)

White River Bridge
Proposal of New Jersey
Steel & Iron Co.

(4)

The
Philadelphia Bridge Works
GOFRODE & SAYLOR,
OFFICE 257 SOUTH FOURTH ST.
PHILADELPHIA, PA.

December 30th 1884.

Messrs Buck & Mc Nulty
Civil Engineers
New York

Gentlemen:—

We will agree to furnish and deliver f.o.b. Cars at St Paul, Minn. all the Ironwork for the Combination Truss Bridge across the White River, W. T. — in accordance with your drawings and as described in your Specifications for three and ninety-five one hundredths ($3.\frac{95}{100}$) cents per pound.

And we will hope to receive your order.

Very truly
Yours
Gofrode & Saylor

(40)

White River Bridge
Proposal of The
Phila Bridge Works

Watts Cooke, President. W. O. Fayerweather, Secy & Treas.

The Passaic Rolling Mill Co.

New York Office,
Room 45, Astor House.

Paterson, N.J. Dec 27. 1884

5

Mssrs Buck & McNulty

Gentlemen,

We will furnish the work called for in your specification & plans for Combination Mold across White River Washington Territory. for Cars of St Paul mines for $3\frac{96}{100}$ ¢ per pound.

We can ship the work from here in 4 weeks from receipt of drawings and signing of contract and will be glad to do your work.

If you want to secure your own for we will make price for Palmer $3\frac{46}{100}$ ¢ per lb.

Very Truly
W. O. Fayerweather Jr
Secy

White River Bridge
Proposal of The
Passaic Rolling Mill Co.

# Union Bridge Company.

(6)

Engineers and Constructors of Bridges,

Works:
ATHENS, PA.
(Late Kellogg & Maurice,)
Capacity, 14,000 tons.

52 Wall Street,

Works:
BUFFALO, N. Y.
(Late Central Bridge Works,)
Capacity, 12,000 tons.

New York, Dec. 26. 1884

Mess. Buck & McNulty,

53 Broadway, New York.

Gentlemen:

We would undertake to deliver the material indicated in your circular for a 300ft. deck combination bridge, at the rate of Four and Eighty eight hundredths ( 4.88 ) cents per lb. f.o.b. cars at St. Paul, Minn.

Yours truly

Union Bridge Co

per C. Macdonald Pt

(6)

White River Bridge
Proposal of Union
Bridge Co.

H. A. RUST. W. G. COOLIDGE.

OFFICE OF RUST & COOLIDGE,

ENGINEERS AND CONTRACTORS.

MANUFACTURERS AND BUILDERS OF

Bridges, Roofs & Turn Tables; Iron and Masonry Pneumatic Substructures.

FIRST NAT'L BANK BUILDING, COR. DEARBORN AND MONROE STS.

WORKS: COR. EGAN AND STEWART AVES.



White River Bridge

Dictated

Chicago, Aug. 30th, 1884.

Gen. A. Anderson, "Engr. in Chief"

Northern Pacific Railroad Co.

St. Paul, Minn,

Dear Sir:-

We herewith submit Special Designs, which we have prepared for a 300 feet Combination Deck Span Single Track Railway Bridge, for your Line, in accordance with either of which two Designs, as may be elected, we propose to furnish all materials, manufacture and erect in position, ready for Cross Ties, for the following named prices, viz:

For Bridge complete as per Plan "A", Thirty One Thousand Four Hundred Forty ($31.440.00) Dollars. = $104.80 ℔ ft

For Bridge complete as per Plan "B", Twenty Nine Thousand Eight Hundred Fifty ($29.850.00) Dollars. = 99.50

It may be that you would prefer that the Railroad Company should furnish the timber as also labor of framing same and erection of Bridge, in which event we submit the following prices for which we will furnish all the Iron Work for the Bridge, viz:

Iron Work for Bridge as per Plan "A", Twenty Thousand Two Hundred ($20.200.00) Dollars. = 67,33

Iron Work for Bridge as per Plan "B", Eighteen Thousand Eight Hundred Fifty ($18.850.00) Dollars. 62,83

Under the last named proposition we would, if desired, furnish one of our best Foremen to frame the timber and erect the Bridge, his pay and expenses to be born by the Railroad Company.

Tracing "C" exhibits Details applicable to either Plan; you will observe that we have made Special Design for Joint Boxes, which will all be entirely of Wrought Iron: the Top Chords are to be covered with galvanized iron.

Transportation of materials, tools, men and supplies, between points upon your Line and the Bridge Site, are to be furnished by your Company free of cost to us.

The entire work to be constructed under your supervision, and completed in all respects to your entire satisfaction and acceptance.

Respectfully Submitted,

Thos. H. Coolidge,

Inclosures:

A. Plan of Double Intersection Truss,

B. Plan of Rectangular Truss,

C. Details of Construction.

H. A. RUST. W. G. COOLIDGE.

OFFICE OF RUST & COOLIDGE,

ENGINEERS AND CONTRACTORS.

MANUFACTURERS AND BUILDERS OF

Bridges, Roofs & Turn Tables; Iron and Masonry Pneumatic Substructures.

FIRST NAT'L BANK BUILDING, COR. DEARBORN AND MONROE STS.

WORKS: COR. EGAN AND STEWART AVES.



Dictated

Chicago, Aug. 30th, 1884.

Gen. A. Anderson, "Engr. in Chief"

Northern Pacific Railroad Co.

St. Paul, Minn,

Dear Sir:-

The Plans for your long Combination Deck Span, which we hand you under this cover, embody the results of a careful study of the matter and comparison of various Designs.

We regard Design "B" with especial favor, by reason of the larger sections of Posts, and the uniting of the long diagonal tension members in such a way as to keep them certainly and rigidly in exact position for duty, and of obviating the necessity for the intermediate longitudinal member midway between the upper and lower Chords of Trusses respectively.

Yours truly,

Rust & Coolidge,

P.S.

There is about 103.M.Ft.B.M. Timber in Plan A. and 110.M.Ft.B.M. in Plan B.

Form No. 1.

# THE WESTERN UNION TELEGRAPH COMPANY.

This Company **TRANSMITS** and **DELIVERS** messages only on conditions limiting its liability, which have been assented to by the sender of the following message. Errors can be guarded against only by repeating a message back to the sending station for comparison, and the company will not hold itself liable for errors or delays in transmission or delivery of **Unrepeated Messages**, beyond the amount of tolls paid thereon, nor in any case where the claim is not presented in writing within sixty days after sending the message.

This is an **UNREPEATED MESSAGE**, and is delivered by request of the sender, under the conditions named above.

THOS. T. ECKERT, General Manager. NORVIN GREEN, President.

| NUMBER | SENT BY | REC'D BY | CHECK |
|---|---|---|---|
| 104 | HB | JB 7824 ans to SH | |

Received at the **WESTERN UNION BUILDING**, 195 Broadway, New York,

Feby 21 1885

Rec'd " 23 4

Dated Chicago 21 " 25 7

To Gen A Anderson Engineer in Chief

Northern Pacific RR Co

Mills Bldg - NY

White river bridge eyebars will be upset Die forged; We can commence immediately and complete whole job april first would

Form No. 1.

# THE WESTERN UNION TELEGRAPH COMPANY.

This Company **TRANSMITS** and **DELIVERS** messages only on conditions limiting its liability, which have been assented to by the sender of the following message. Errors can be guarded against only by repeating a message back to the sending station for comparison, and the company will not hold itself liable for errors or delays in transmission or delivery of **Unrepeated Messages**, beyond the amount of tolls paid thereon, nor in any case where the claim is not presented in writing within sixty days after sending the message.

This is an **UNREPEATED MESSAGE**, and is delivered by request of the sender, under the conditions named above.

THOS. T. ECKERT, General Manager. NORVIN GREEN, President.

| NUMBER | SENT BY | REC'D BY | CHECK |
|---|---|---|---|
| | | | 2 |

Received at the WESTERN UNION BUILDING, 195 Broadway, New York, Feby 21 1885

Dated

To

be ready for test in two weeks

Rust & Coolidge

Form No. 1.

# THE WESTERN UNION TELEGRAPH COMPANY.

This Company TRANSMITS and DELIVERS messages only on conditions limiting its liability, which have been assented to by the sender of the following message. Errors can be guarded against only by repeating a message back to the sending station for comparison, and the company will not hold itself liable for errors or delays in transmission or delivery of **Unrepeated Messages**, beyond the amount of tolls paid thereon, nor in any case where the claim is not presented in writing within sixty days after sending the message.

This is an **UNREPEATED MESSAGE**, and is delivered by request of the sender, under the conditions named above.

THOS. T. ECKERT, General Manager. NORVIN GREEN, President.

| NUMBER | SENT BY | RECD BY | | CHECK |
|---|---|---|---|---|
| 180 Ch | Ro | K | 12 25 P | Ans 942 8379 |

Received at ST. PAUL, MINN. 1/13 1884.

Dated Chicago Ill 3

To Gen C A Anderson

We want the work & will shade price one tenth cent per pound

Rust & Coolidge

Three and Eighty Four One Hundredths (3.84) cents per lb. finished weight.

The material to be manufactured and constructed in full accordance with the Printed General Specifications and the Detail Drawings (2o Sheets) furnished us.

Respectfully Submitted,

Rust & Coolidge

OFFICE OF RUST & COOLIDGE,

ENGINEERS AND CONTRACTORS.

MANUFACTURERS AND BUILDERS OF

Bridges, Roofs & Turn Tables; Iron and Masonry Pneumatic Substructures.

FIRST NAT'L BANK BUILDING, COR. DEARBORN AND MONROE STS.

WORKS: COR. EGAN AND STEWART AVES.

W. G. COOLIDGE.



(3)

Dictated

Chicago, Dec. 30th, 1884.

Ack Jan. 6 85

Gen. A. Anderson, "Engr.in Chief"

Northern Pacific Railroad Co.

St.Paul, Minn,

Dear Sir:-

We hereby propose and agree to furnish and deliver on board of cars to your Company at St.Paul, Minn; the Iron Work for a 300 feet Combination Truss Deck Bridge, across the White River, Washington Territory; for Three and Eighty Four One Hundredths (3.84) cents per lb. finished weight.

The material to be manufactured and constructed in full accordance with the Printed General Specifications and the Detail Drawings (20 Sheets) furnished us.

Respectfully ~~Submitted~~,

Rust & Coolidge

(3)

Cohilt River Bridge
Proposal of Rust
and Coolidge

Copy.

New York February 25th 1885.

Rust & Coolidge.

Chicago, Ill.

Gentlemen:

I have to-day telegraphed you acceptance of your proposal for the iron work of White River bridge as modified by your subsequent telegram making price 3 74/100 cents per pound delivered in St Paul or Minneapolis.

Soon as you can make ready for the required tests please notify Buck & Mc Nulty No. 53 Broadway New York, who will attend to the testing for the Railroad Co. They should have notice four days in advance.

Please put the work promptly under way, and have executed immediately.

Yours truly,

(signed) A. Anderson.

Copy sent W. G. Pearce, Asst. Disb.
May 11th. 1885

6.5-5

White River Bridge

Contract

Rust & Coolidge

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Recorded
Orig Rec page 191

[65-6]

# White Riv. Bdg.

| Sheet No | Descrip- | Sent to Bogue 12/23 | Rec'd from Buck. 12/22 | Sent Rust & Colidge 12/23 |
|---|---|---|---|---|
| 25 | Gen'l plan, elev. & endviews | 1 | 1 | 0 |
| 26 | Bot. chd. boxes | 1 | 2 | 1 |
| 27 | do. | 1 | 2 | 1 |
| 28 | Boxes at lower end intermed. posts | 1 | 2 | 1 |
| 29 | Panel. pts bot. chd. | 1 | 2 | 1 |
| 30 | Panel. pts, lower end intermed. posts | 1 | 2 | 1 |
| 31 | End box. top chd. | 1 | 2 | 1 |
| 32 | Floorbeam bet. main posts | 1 | 2 | 1 |
| 33 | Box at upper end. of End post | 1 | 2 | 1 |
| 34 | Panel pts of top chd. | 1 | 2 | 1 |
| 35 | Top chd boxes B & C | 1 | 2 | 1 |
| 36 | Floorbeam bet. intermed. posts | 1 | 2 | 1 |
| 37 | End floorbeam | 1 | 2 | 1 |
| 38 | End panel pt. top chds | 1 | 2 | 1 |
| 39 | Top chd joint boxes ~~D & E~~ | 1 | 2 | 1 |
| 40 | Detail of tightening apparatus (laterals) | 1 | 2 | 1 |
| 41 | Strut sheet (truss & laterals) unrevised / revised | 1 | 1 | 0 |
| 42 | Brace shoe at End post & top chd plates | 1 | 2 | 1 |
| | | 12/26 | 12/26 | 12/27 |
| 43 | Packing pl. top chd & posts | 1 | 2 | 1 |
| 44 | Lateral Rods | 1 | 2 | 1 |
| 45 | Panel pt "P" top chd. | 1 | 2 | 1 |
| 46 | Pins & Eye bars. | 1 | 2 | 1 |

49. — Bill for posts & lat. bracing

48. — " " Horiz Struts bet. chds

47. — Plan of Top chords

White River Bridge

S. Sm

Roll contains nos 25 — 49 incl

J.G.H.

366 St. Peter St

2/5 Sent Bogue roll nos 25-49 inclusive.

6226

White River Bridge

List & descrpt. of Plans

[L-59]

S.D.M.

There seems to be no provision for test samples, unless the Contr. pays for the whole (Proposals)

Also, the painting provides for linseed oil but no iron ore paint.

Respy

H.J.H.

# NORTHERN PACIFIC RAILROAD.

*Specifications for Wrought Iron Work of a Combination Truss Bridge across the White River, Washington Territory.*

## GENERAL DESCRIPTION.

The structure for which the Wrought Iron Work called for in these specifications is intended, is a Single Track, Combination Truss, Deck Bridge of 300 feet in length, composed of two parallel trusses 40 feet in depth, placed 18 feet apart from centre to centre of each. Each Truss has eight principal panels, 37 feet 6 inches long each, and sixteen sub-panels, 18 feet 9 inches long each.

The upper chords and posts of the trusses are of wood, and the remaining parts of wrought iron.

The deck, or floor, of the bridge consists of wrought iron floor beams let into and attached to the posts of the trusses, and supported by the floor beams, two lines of wooden stringers under the railroad track, wooden transverse ties, and guard rail.

The top lateral system is composed of wooden diagonal braces, the floor beams acting as ties.

The lower lateral system is composed of wooden struts between the feet of the principal posts, and diagonals of forged rods.

The wrought iron work will consist of 222,000 pounds of Eye-Bars, forming the lower chords and diagonals of the trusses. 52,500 pounds of angles and plates to form the joint boxes of the upper and lower chords. 67,100 pounds of riveted plate girders for the transverse floor-beams, and 27,300 pounds of rods, bolts, pins and washers for the lateral systems and for securing the wood parts to each other and to the iron work.

## QUALITY OF THE IRON.

The wronght iron used in tension-members shall be double rolled from the "muck-bar."

When tested in specimens having an observed length of ten inches and a sectional area of one square inch or less, the iron shall have an elastic limit of at least 26,000 pounds per square inch, and the portion observed shall have elongated at least 15 per cent. of its original length and have reduced its ruptured section at least 22 per cent. when tested to destruction. The fracture thus produced must be fine and fibrous, showing no granulation.

Specimens shall be capable of being bent cold without cracking, one hundred and eighty degrees to a curve of a diameter of one and a half thicknesses of the piece. When nicked with a sharp cold chisel and broken by bending the fracture must be clean and fibrous.

The iron must work satisfactorily while hot or at the forge.

Small specimens, cut from plate and angle iron, when tested with an observed length of eight inches, shall show an elastic limit of at least 25,000 pounds per square inch of section, and elongate at least twelve per cent. of their original length, showing a reduction of fifteen per cent. at the place of rupture. The ruptured section thus produced, or if produced by nicking and bending as above described, shall be clean and fibrous.

If full-sized bars are tested the results must be relatively satisfactory, according to their dimensions as compared with those of the small test specimens, and in all cases the fracture must be clean and fibrous.

No iron will be accepted specimens of which show bad welding, nor finished bars and shapes having ragged edges, ends too closely cropped, cold shuts, splinters, blisters, or other defects which in the opinion of the Engineers may render such bars or shapes unsuitable for their intended purposes.

## RIVETED WORK.

In riveted work the parts shall be punched with sharp punches and dies, the holes being one-sixteenth of an inch larger than the rivets intended for them, and so accurately spaced that when the several parts are assembled the rivet will pass through hot without ramming or injurious drifting. The several parts shall be kept tightly bolted together while being riveted.

All the joint boxes must be neatly fitted together to allow of fitting them to the necessary notches in the wood-work with neatness and accuracy, and to insure a fair bearing against the timber. Any imperfections in this respect the contractor must remedy by planing whenever the Engineers may require it, but no extra compensation will be allowed therefor.

The holes for the turned pins shall be bored to diameter one-fiftieth of an inch greater than that of the pins intended for them, and the distances and angles of the axes of such pin holes from points and planes of reference shall agree accurately with those given in the drawings furnished by the Engineers. The pins shall be turned truly cylindrical to the diameters and lengths given in said drawings

## FORGED WORK.

The enlarged screw-ends of rods and heads of eye-bars shall be formed by such a process of upsetting or die-forging as shall be satisfactory to the Engineers. No welding in the body of the bars will be permitted.

All screw threads must be full and true and fitting neatly.

Eye-bars must be of the required lengths, so that the pin holes when bored in the centres of the heads shall be accurately the distances apart shown by the drawings. The pin holes in the bars must be at right angles to the planes of the heads, and no head shall be thinner than the body of the bar, nor in any place exceed that thickness by more than an eighth of an inch.

## WORKMANSHIP.

All workmanship must be fully up to the highest standard of Bridge-work at the present time, and in all respects satisfactory to the Engineers.

Machine finished portions of the work shall be treated to a coating of white lead and tallow before shipment.

All parts to be joined together shall receive a coat of raw linseed oil before assembling and all completed work shall, before being sent out from the shop, receive a thorough coat of raw linseed oil.

## PROPOSALS.

Proposals for this work will be at so much per pound for the entire Iron work, more or less, regardless of the part considered. The price to include all materials, workmanship, testing, patterns, etc., and to include its delivery on board cars to the Northern Pacific Railroad Company, at Saint Paul, Minnesota, in a condition satisfactory to the Engineers, ~~on or before~~

* ~~the~~ ~~day of~~ ~~1885.~~

* Delivered on board cars, at works where manufactured by March 1st. 1885 at the latest.

65-87.

White River Bridge

Letters and

telegram Buck &

McNulty

Form No. 1.

# THE WESTERN UNION TELEGRAPH COMPANY.





| NUMBER | SENT BY | REC'D BY | CHECK |
|---|---|---|---|
| Ch 1047 | Ca | In | 28 paid |

Received at St Paul Minn 350 P December 30 1884

Dated, New York 30

To Gen A Anderson

SDM

The lowest bid received is that of Alden & Lassig three and sixty four hundredths cents per pound f o b St paul we enclose all bids with letter

Buel & Manuty

OFFICE OF
BUCK & McNULTY,
CIVIL AND MECHANICAL ENGINEERS,
53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.



Dec. 30th 1884.

Ack 1.3.84

Gen. A. Anderson,
Engineer in Chief N.P.R.R.
St. Paul Minn.

Dear Sir

We have telegraphed you the lowest bid we have received for the wrought iron work of White River bridge.

We herewith enclose the originals of all the bids received from parties whom we invited to bid. All good establishments.

We suppose that Kust & Coolidge will send their bid directly to you. If so please notify us of what action we are to take — to whom you award the contract and such other directions as you have to impart.

Very respectfully yours
Buck & McNulty.

OFFICE OF
BUCK & McNULTY,
CIVIL AND MECHANICAL ENGINEERS,
53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.



Dec. 17th " 1884

Ans "26 "

SOM

Gen. A. Anderson.
Engineer in Chief N.P.R.R. Co.
St. Paul, Minn.

Dear Sir,

We have sent the complete sets of drawings for White River bridge iron work excepting one sheet of lower lateral rods, one of bottom plate of end posts, one of joint at top of short posts, and one showing ends of each variety of pin and eye bar head. These will be sent as soon as blue prints are ready.

We have sent two sets to you and forwarded one set in your care for Mr. Bogue.

Will send copies of specifications along with this letter.

We received your letter of Nov. 24th " and should have answered it at once but that we were working on the drawings and expected to get them done by the end of the month and then make the announcement of their expresament in our reply. We have lost no time that we could avoid, but as you will see, (owing to the peculiarities of the work) we had to make many drawings — more than we expected, but we could not get along without them.

Every detail has been carefully studied

OFFICE OF
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53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.



Gen. Anderson

with a view to making the structure as perfect as possible The joints are all arranged to allow of tightening up as the timber shrinks. The upper lateral braces are bolted to the track stringers where they intersect, thus materially aiding each other. The arrangement for tightening the braces, is designed to make the floor beams serve as ties This was to avoid having to bore large holes through the posts to admit of passing rods through from one side to the other. It does not save much in weight.

Should you like these details, it will not be much trouble to effect such modifications of them as to adapt them to such various spans as you may have occasion to want them for.

We also send you a bill of timber required so that it can be got out.

As soon as the iron work is let we will send drawings for framing the timber, and also a measuring pole to use as standard to secure proper camber.

We conclude from your letter and from your remarks at Chicago that it may be your wish to put the work into the hands of Rust & Coolidge. It is immaterial to us further than that if we are to inspect the work we could more easily attend to it at an eastern shop. Cofrode and Saylor would like to bid on it

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53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. MCNULTY.



Gen Anderson.

and as they have very little work on hand now, they would put it through promptly and they do good work.

You spoke of having the work done about Februaray If the work should go into the shops next week, it could be shipped by the first week in February. The timber could be framed in the interval and the falsework be made ready to erect the structure as soon as the iron should arrive.

In the specifications you may be surprised to observe that we have omitted the specification for ultimate strength We do this for the reason, that it is liable to give trouble and also that if the iron meets the other requirements the ultimate strength must be all right.

We have omitted to fill out the dates in the specifications.

We telegraph you today as follows:-

"We expressed two sets of drawings for ironwork of white River bridge to your address. Will you notify Rust & Coolidge. Shall we invite any proposals".

Very respectfully yours

Buck & McNulty.

OFFICE OF
BUCK & McNULTY,
CIVIL AND MECHANICAL ENGINEERS,
53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.



Dec 20th 1884

Ans Dec 26
SDM

Gen. A. Anderson
Engineer in Chief N.P.R.R. Co.
St. Paul

We send you by express
two sets of the remaining drawings for iron work
of White River bridge. Also bill of bolts and round
rods for the same. The timber bill we have sent
directly to Mr. Bogue.

(41) We enclose a strain shut to replace the one sent
the other day and off from which the lower chord stresses
had been left.

Very respectfully yours
Buck & McNulty

Plans recd 12/26

Ft Paul 2

A. anderson

Bids

Mishaps on white River
bridge are alt'd as follows
Alden and Lassig Jaud and 3 64 176
100 Kate nullify New Jersey Iron and steel
Co Jaud and 3 Jaguban 80 Kate nullify 100
rust and Coolidge Jaud and 3 84
100 Kate nullify Coffrode Jaud and soy lor 3 Jaud
and Jury 95 Kate nullify 100 passaic rolling
mills Co Jaud and 3 Justify 96 Kate nullify 100
union bridge Company 4 Jamaica and
Junior 88 Kate 100 nullify 6 alleged Mishaps in

[hound].

all. alts per pounds on bless
cars at St Paul classify delivery made agatha
first.

A D Mason

OFFICE OF
BUCK & McNULTY,
CIVIL AND MECHANICAL ENGINEERS,
53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.

White River
Print
Pat

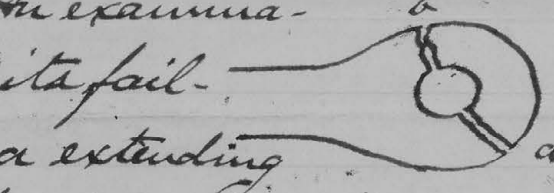
March 26th 1885.

Gen. A. Anderson
Engr. in Chief N.P. R.R. Co.
St. Paul Minn.

Dear Sir

I enclose the report of results of tests of eye bars for White River. Am disappointed in the results.

The full sized specimen cut from the stock from which these bars are made gave, as you will see, exceptional results. That as well as the specimens nicked and broken by bending did not appear to have a trace of crystalization The eye bar No. 2011 which broke in the head was stretching finely and promised first rate results when the head gave way. An examination revealed the fact that its failure was due to a flaw at a extending




from the outside of the head to a depth of over ½ inch. The fracture on the side a was fibrous throughout showing that it was broken slowly. That at b has a crystaline appearance which may have been caused by its instantaneous rupture after "a" parted.

The eye bar 2012 broke as you will see

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53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. MC NULTY.



without much stretch or reduction. Its ruptured section beginning at one edge and extending to ~~two thirds~~ three fifths the width was entirely crystaline, the remaining portion being fibrous. The break occurred where it generally does in bars that break in the body - not far from the head, or about where, in forming the head, the bar is subjected to a considerable heat without having any work put upon it.

I do not see how this can be remedied unless the upsetting process is made to extend as far in the direction of the body as the heat of the metal will allow and then hammer it down to the correct size at the same heat that shapes the head.

Notwithstanding the results I am inclined to think that the bars are better than the average bars that are in bridges. and I feel sure that they would be perfectly safe. The stock is as good as I ever saw. Abbot says it is the best he ever saw.

Respectfully yours
L L Buck

Bucktail Creek
notes
White River Bridge

| | One Truss. Bridge |
|---|---|
| Upper Chord Wood | 16998 ft. B.M. |
| Posts | 17606 " |
| Long Stringers in Truss | 7876 |
| Packing Pieces | 192 |
| Upper Lateral Struts | 2830 |
| Lower do. | 1289 |
| Portal Struts | 1250 |
| Intermediate do. | 1024 |
| Floor System | 19262 |
| | 68327 / x 2 = 136654 ft. B.M. for Bridge |

| | One Truss |
|---|---|
| End Boxes Upper chord | 5186 # ✓ |
| Boxes " " | 13041 " ✓ |
| Packing Pieces " | 5742 " ✓ |
| End Boxes Lower chord (inc. Rollers) | 10224 " ✓ |
| Pedestal Castings | 10000 " ✓ |
| Attachments for floor beams 1st Panel | 1456 " ✓ |
| Boxes, Lower chord | 8925 ✓ |
| Joints at middle of Truss | 786 ✓ |
| Pins do. do | 2192 ✓ |
| Bolts for packing blocks End posts | 828 ✓ |
| Bolts & Castings at middle of posts | 484 ✓ |
| Upper Lateral Rods | 1288 ✓ |
| " Transverse " | 1029 ✓ |
| Int. Rods | 1326 ✓ |
| Lower Lat. Rods | 6370 ✓ |
| Bolts in floor | 451 ✓ |
| Lower Chord Bars | 53492 ✓ |
| ~~Upper~~ Diagonals numbers | 56,190 ✓ |
| | 178,518 x 2 = 357,020 # ✓ |

136654
#20
$2733080
Cast 2 — 525.15
Wrought 2 — 10173.37
$13431.60
$44.73

Figures given to Cal. A. $46.50

If stress in chord bars is increased to 12000 # per □" wt of truss = 89153 # and 17831
Original to 11550 " = 97722. -- 14658
Possible saving on truss 10,000
Calling wt of wood 40 # per cu. ft. Wood = 455058 # 42489 #

21006
2½ #
42012
10503
525.15

W. Truss = 336014
Cast " = 21006
812078 #
Jobert 42489
7.69589

307020
336014
42489
29352.5 # Wrought Truss
3½4
87057.5
14676.2
$10173.37

OFFICE OF
BUCK & McNULTY,
CIVIL AND MECHANICAL ENGINEERS,
53 BROADWAY, NEW YORK.

LEFFERT L. BUCK. GEORGE W. McNULTY.

April 4th 1885.

R. 6 "
a. 9 "

Gen. A. Anderson
Engr in Chief N.P.R.R. Co.
St. Paul, Minn.

Dear Sir

I enclose the results of tests of last two bars from N.J. Steel & Iron Co. selected from bars for White River bridge.

No. 2049 although it broke in the eye, gave such high results and was so near the ultimate of the material that it is satisfactory.

No. 2050 acted singularly, it having broke in the enlarged portion of the body 9 inches from center of eye; at which point its section was .75 square inch greater than the body section. This can be accounted for on no other supposition than that the pin hole was not on the center line of the body, which would cause it to tear apart from excentric stress. Neither specimen showed the least flaw and both exhibit a fibrous fracture.

I have stated the result of the tests to N.J. S. & I. Co. and that our acceptance of the bars of this order will be based upon a rigid inspection of every bar. Also that such bars as are found to be imperfect in any of the particulars which appear

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LEFFERT L. BUCK. GEORGE W. MCNULTY.



Gen. Anderson

to have affected the results of tests of specimens will be liable to rejection.

There is no use in testing any more of the bars. It appears to me that more depends upon a careful inspection of materials and workmanship to obtain good eye bars than in the results of tests of full sized bars. Let the tests indicate the points that must be observed carefully in inspection of finished bars. We know what to look out for and shall watch sharply for such defects.

Respectfully yours
L L Buck

[65-8]

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

**Report of** TESTS MADE FOR Mc Buck & Mc Nulty

New York, April 2nd 1885

A. V. Abbott
Engineer in Charge.
per Brown

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness, in | Area in sq. in | STRESS Tension in Pounds per Square Inch. ON SPECIMEN. Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Elastic Limit. | Maximum. | Ultimate. | STRAIN Elongation in Feet. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wrt Iron | | 2049 | | | Eye Bar | Full Size | C to C of Pin 13.32 Under Gauge 11. | 5.035 | 1.017 | 5.121 | 12000 | | | | | | Gauge 11. | | 1.30 | | | 11.82 | — | — | — | — | | Diameter of Pin Holes 4.40" 4.40"<br>Metal at sides " " 3.960 4.025 3.920 3.945<br>" " back 4.360 4.330<br>Thickness of Eyes 1.114 1.112<br>Elongation in Pin Holes .20<br>Fracture of Bars with Crystalline spots<br>Flaw in Eye |
| | | | | | | | | | | | | 24000 | | | | | | .00005 | | | | | | | | | | | |
| | | | | | | | | | | | | 48000 | | | | | | .00020 | | | | | | | | | | | |
| | | | | | | | | | | | | 72000 | | | | | | .00040 | | | | | | | | | | | |
| | | | | | | | | | | | | 96000 | | | | | | .00056 | | | | | | | | | | | |
| | | | | | | | | | | | | 100000 | | | | | | .00059 | | | | | | | | | | | |
| | | | | | | | | | | | | 104000 | | | | | | .00062 | | | | | | | | | | | |
| | | | | | | | | | | | | 108000 | | | | | | .00065 | | | | | | | | | | | |
| | | | | | | | | | | | | 112000 | | | | | | .00068 | | | | | | | | | | | |
| | | | | | | | | | | | | 116000 | | | | | | .00071 | | | | | | | | | | | |
| | | | | | | | | | | | | 120000 | | | | | | .00075 | | | | | | | | | | | |
| | | | | | | | | | | | | 124000 | | | | | | .00080 | | | | | | | | | | | |
| | | | | | | | | | | | | 128000 | | | | | | .00085 | | | | | | | | | | | |
| | | | | | | | | | | | | 132000 | | | 25776 | | | .00090 | | | | | | | | | | | |
| | | | | | | | | | | | | 136000 | | | | | | .00100 | | | | | | | | | | | |
| | | | | | | | | | | | | 140000 | | | | | | .00115 | | | | | | | | | | | |
| | | | | | | | | | | | | 144000 | | | | | | .00180 | | | | | | | | | | | |
| | | | | | | | | | | | | | 243240 | | | 47499 | | | | | | | | | | | | |

Bridge

White River Bridge

Metal Tests

From Buck & McNulty

Apl 4th 1885

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

## Report of TESTS MADE FOR Messrs Buck & McCarthy

New York, April 2nd 1885

A. V. Abbott
Engineer in Charge.
per Brown

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in ft. | Breadth or Diameter in in. | Thickness in in. | Area in sq. in. | STRESS Torsion in Pounds PER SQUARE Inch. ON SPECIMEN Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Inch. Elastic Limit. | Maximum. | Ultimate. | STRAIN Elongation in Feet. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. in | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W.I. Iron | | 2050 | | | Eye Bar | Full Size | C&C 9 Rin 1355 Under Range 11. | 5.055 | 1200 | 6.066 | 24000 | | | | | | Range Set | | .74 | | | 6.73 | — | — | — | — | | Diameter of Pin Holes 4.40" 4.40"<br>Metal at ends " " 3.955 3.870 3.795 3.910<br>" " back " " 4.345 4.315<br>Thickness of Eyes 1.262 1.292<br>Elongation of Pin Holes .16 .16<br>Fracture slightly crystalline<br>Broke in enlarged portion<br>of bar. |
| | | | | | | | | | | | | 48000 | | | | | | .00015 | | | | | | | | | | | |
| | | | | | | | | | | | | 72000 | | | | | | .00029 | | | | | | | | | | | |
| | | | | | | | | | | | | 96000 | | | | | | .00045 | | | | | | | | | | | |
| | | | | | | | | | | | | 120000 | | | | | | .00060 | | | | | | | | | | | |
| | | | | | | | | | | | | 124000 | | | | | | .00064 | | | | | | | | | | | |
| | | | | | | | | | | | | 128000 | | | | | | .00067 | | | | | | | | | | | |
| | | | | | | | | | | | | 132000 | | | | | | .00070 | | | | | | | | | | | |
| | | | | | | | | | | | | 136000 | | | | | | .00074 | | | | | | | | | | | |
| | | | | | | | | | | | | 140000 | | | | | | .00078 | | | | | | | | | | | |
| | | | | | | | | | | | | 144000 | | | 23739 | | | .00082 | | | | | | | | | | | |
| | | | | | | | | | | | | 148000 | | | | | | .00090 | | | | | | | | | | | |
| | | | | | | | | | | | | 152000 | | | | | | .00104 | | | | | | | | | | | |
| | | | | | | | | | | | | | 250160 | | | 41240 | | | | | | | | | | | | | |

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

**Report of** TESTS MADE FOR Messrs Buck & McDuffee

New York, Nov 25 1885

A.W. Abbott
Engineer in Charge.
per Bowen

1 B.

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness, in | Area in sq. in. | STRESS in Pounds per Square Inch. ON SPECIMEN. Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Elastic Limit. | Maximum. | Ultimate. | STRAIN. Elongation in Feet. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. in. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W Rowe | | 2012 | | | Eye Bar | Full Size | C&C | 5045 | 1.277 | 6.442 | 4000 | | | | | | Gauge 8" | | 1.33 | | | 6.87 | .4821 | 1.284 | 5.621 | 12.74 | 27,000,000 | Diameter of Pin Hole 4.40" 4.40"<br>Distance at back " " 4.300 4.405<br>" " side " " 3.760 3.825 3.765 3.825<br>Thickness of Eye 1.305 1.306<br>Elongation in Pin Holes .30 .34<br>Fracture 3/4 crystalline & 1/4 fibrous<br>Broke about 2" from Eye.<br>Diameter of Pin 1/50" smaller than that of Pin Hole. |
| | | | | | | | | | | | | 8000 | | | | | | .0000 | | | | | | | | | | | |
| | | | | | | | | | | | | 12000 | | | | | | .0007 | | | | | | | | | | | |
| | | | | | | | | | | | | 16000 | | | | | | .0012 | | | | | | | | | | | |
| | | | | | | | | | | | | 20000 | | | | | | .0017 | | | | | | | | | | | |
| | | | | | | | | | | | | 24000 | | | | | | .0023 | | | | | Average | 1.166 | | | | | |
| | | | | | | | | | | | | 48000 | | | | | | .0043 | | | | | | | | | | | |
| | | | | | | | | | | | | 72000 | | | | | | .0063 | | | | | | | | | | | |
| | | | | | | | | | | | | 96000 | | | | | | .0083 | | | | | | | | | | | |
| | | | | | | | | | | | | 120000 | | | | | | .0103 | | | | | | | | | | | |
| | | | | | | | | | | | | 124000 | | | | | | .0112 | | | | | | | | | | | |
| | | | | | | | | | | | | 128000 | | | | | | .0116 | | | | | | | | | | | |
| | | | | | | | | | | | | 132000 | | | | | | .0120 | | | | | | | | | | | |
| | | | | | | | | | | | | 136000 | | | | | | .0125 | | | | | | | | | | | |
| | | | | | | | | | | | | 140000 | | | | | | .0132 | | | | | | | | | | | |
| | | | | | | | | | | | | 144000 | | | | | | .0140 | | | | | | | | | | | |
| | | | | | | | | | | | | 148000 | | | | | | .0148 | | | | | | | | | | | |
| | | | | | | | | | | | | 152000 | | | 23095 | | | .0156 | | | | | | | | | | | |

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

New York, ..... 188

5-13

**Report of** TESTS MADE FOR M .....

..... Engineer in Charge.

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness, in | Area in sq. | STRESS Tension in Pounds Inch. ON SPECIMEN Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Elastic Limit. | Maximum. | Ultimate. | STRAIN Elongation in Feet. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 15000 | | | | | | .0175 | | | | | | | | | | | |
| | | | | | | | | | | | | 16000 | | | | | | Running | | | | | | | | | | | |
| | | | | | | | | | | | | | 27850 | | | 43235 | | | | | | | | | | | | | |

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

New York, 1885

**Report of** TESTS MADE FOR M

Engineer in Charge.

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness, in | Area in sq. | STRESS. Tension in Pounds per Square Inch. ON SPECIMEN. Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Inch. Elastic Limit. | Maximum. | Ultimate. | STRAIN. Elongation in Feet. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 140000 | | | | | | .0150 | | | | | | | | | | | |
| | | | | | | | | | | | | 14000 | | | | | | .012 | | | | | | | | | | | |
| | | | | | | | | | | | | | 24368 | | | 44779 | | | | | | | | | | | | | |

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

**Report of** TESTS MADE FOR M/s Buck & McNulty

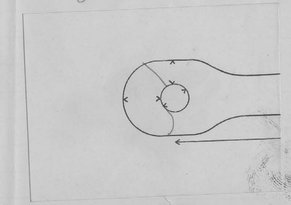
New York, March 25 1885

A. Abbott
Engineer in Charge.
per Bown

STRESS Tensile in Pounds per Square Inch. STRAIN Elongation in 8 Ins.

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness in | Area in sq. | STRESS ON SPECIMEN. Elastic Limit. | Maximum. | Ultimate. | STRESS PER SQUARE Inch. Elastic Limit. | Maximum. | Ultimate. | STRAIN Indicated at Elastic Lim. | Set. | Ultimate. | STRAIN Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wrt Iron | | 2011 | | | Eye Bar | Full Size | C&C 1 Pin 17.22 Under Gauge 15. | 5.060 | 1.075 | 5.440 | 12000 | | | | | | Gauge 8" | | 1.33 | | | 8.87 | | | | | |
| | | | | | | | | | | | | 24000 | | | | | | .0010 | | | | | | | | | | |
| | | | | | | | | | | | | 36000 | | | | | | .0020 | | | | | | | | | | |
| | | | | | | | | | | | | 48000 | | | | | | .0032 | | | | | | | | | | |
| | | | | | | | | | | | | 60000 | | | | | | .0047 | | | | | | | | | | |
| | | | | | | | | | | | | 72000 | | | | | | .0067 | | | | | | | | | | |
| | | | | | | | | | | | | 84000 | | | | | | .0089 | | | | | | | | | | |
| | | | | | | | | | | | | 96000 | | | | | | .0085 | | | | | | | | | | |
| | | | | | | | | | | | | 100000 | | | | | | .0065 | | | | | | | | | | |
| | | | | | | | | | | | | 104000 | | | | | | .0092 | | | | | | | | | | |
| | | | | | | | | | | | | 108000 | | | | | | .0096 | | | | | | | | | | |
| | | | | | | | | | | | | 112000 | | | | | | .0100 | | | | | | | | | | |
| | | | | | | | | | | | | 116000 | | | | | | .0104 | | | | | | | | | | |
| | | | | | | | | | | | | 120000 | | | | | | .0110 | | | | | | | | | | |
| | | | | | | | | | | | | 124000 | | | | | | .0116 | | | | | | | | | | |
| | | | | | | | | | | | | 128000 | | | | | | .0130 | | | | | | | | | | |
| | | | | | | | | | | | | 132000 | | | | | | .0130 | | | | | | | | | | |
| | | | | | | | | | | | | 136000 | | | 25000 | | | .0138 | | | | | | | | | | |

Diameter of Pin Holes 4.40" 4.40"
Metal at back " " 4.320 4.32
" " side " " 3.840 3.780 3.885 4.000
Thickness of Eye 1.166 1.138
Elongation of Pin Hole .30
Fracture Fibrous
" Crystalline.
Broke in Eye
Pin Diameter 1/10" smaller than that of Pin Hole.



DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

New York, ..... 188

**Report of** TESTS MADE FOR M.....

Engineer in Charge.

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in | Breadth or Diameter in | Thickness, in | Area in sq. | STRESS in Pounds ON SPECIMEN. Elastic Limit. | Maximum. | Ultimate. | STRESS in Pounds PER SQUARE Inch. Elastic Limit. | Maximum. | Ultimate. | STRAIN in Inches and Decimals of an Inch. Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in | Thickness in | Area in sq. | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 116000 | | | | | | .00100 | | | | | | | | | | | |
| | | | | | | | | | | | | 120000 | | | | | | .00107 | | | | | | | | | | | |
| | | | | | | | | | | | | 124000 | | | | | | .00112 | | | | | | | | | | | |
| | | | | | | | | | | | | 128000 | | | | | | .00120 | | | | | | | | | | | |
| | | | | | | | | | | | | 132000 | | | 2429 6 | | | .00127 | | | | | | | | | | | |
| | | | | | | | | | | | | 136000 | | | | | | .00142 | | | | | | | | | | | |
| | | | | | | | | | | | | | 26,880 | 26,000 | | 4930 6 | 4914 | | | | | | | | | | | |

65-8

White River Bridge

Metal Tests

From Buck & McNulty

Mch 25. 1885

DEPARTMENT OF
TESTS AND EXPERIMENTS,
OFFICE, 84 THOMAS ST.

# FAIRBANKS & CO.

## Report of TESTS MADE FOR Mc Buck & McEnulty

New York, Nov 25 1885

A. W. Abbott
Engineer in Charge.
Jas Brown

STRESS Tension in Pounds per Square Inch — STRAIN Elongation in Test

| SOURCE. | MATERIAL. | Mark on Specimen. | Test Number. | Page of Record. | Page of Ledger. | SHAPE. Original. | SHAPE. Test Piece. | DIMENSIONS OF TEST PIECE. Length in ℄ | Breadth or Diameter in ℄ | Thickness in ℄ | Area in sq. ℄ | ON SPECIMEN Elastic Limit. | Maximum. | Ultimate. | PER SQUARE Inch Elastic Limit. | Maximum. | Ultimate. | Indicated at Elastic Lim. | Set. | Ultimate. | Per Cent. of Length at Elastic Lim. | Set. | Ultimate. | DIMENSION OF FRACTURE. Breadth or Diameter in ℄ | Thickness in ℄ | Area in sq. ℄ | Reduction per cent. | Modulus of Elasticity. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W'l Dunn | | | 2005 | | | Eye Bar Block | Full Size | 1 | 3.063 | 1073 | 5.433 | 4000 | | | | | | Longest | | .33 | | | 33 | 4.505 .900 .910 | .923 | 4.104 | 24.46 | | Broke at stretch mark Fracture fibrous. |
| | | | | | | | | | | | | 8000 | | | | | | Shortest | | | | | | | | | | | |
| | | | | | | | | | | | | 12000 | | | | | | Average | | .911 | | | | | | | | | |
| | | | | | | | | | | | | 16000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 20000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 24000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 28000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 32000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 36000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 40000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 44000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 48000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 52000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 70000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 100000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 104000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 108000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 112000 | | | | | | | | | | | | | | | | | |

[65-9]

Oversize strain diagrams comprising this subfile have been filed in the oversize box at the end of the series.

[GS-10]

[65-10]

WHITE RIVER BRIDGE.

Cascade Branch, N. P. R. R.

Erected 1885.

DESCRIPTION.

Single track, combination truss, deck bridge, 300 feet in length consisting of two trusses 18 feet apart, centre to centre, 8 principal panels 18ft.6in.each; Wrought iron floor beams, Wooden track stringers.

COST

| | |
|---|---|
| L. L. Buck, Designs, and superintendence of manufacture of iron work, | $500.00 |
| Rust & Coolidge, 333,095 lbs. Iron at 3.74 cents, delivered in St. Paul, | 13691.95 |
| 136,112 feet B. M. Lumber, | 1092.11 |
| Hoffman & Bates, Erecting and painting At $16.00, | 4800.00 |
| Salaries and Wages, Engineers and Inspectors, | 750.00 |
| Incidental expenses and extra work, | 539.35 |
| O. R. & N. Co. freight charges, | 396.10 |
| N. P. R. R. freight charges, at 1 cent per ton per mile, | 3768.81 |
| Total Cost, | $25538.32 |

or $85.13 per lineal foot.

WHITE RIVER BRIDGE.

Cascade Branch, N. P. R. R.

Erected 1883.

DESCRIPTION.

Single track, combination truss, deck bridge, 300 feet in length, consisting of two trusses 18 feet apart, centre to centre & principal panels 18ft. 6in. each. Wrought Iron Floor Beams, Wooden track stringers.

COST.

L. L. Buck, Designs, and superintendence of manufacture of iron work,.....$500.00

Rust & Coolidge, 330,095 lbs. Iron at 3.74 cents, delivered in St. Paul,..... 13691.95

134,113 feet B. M. Lumber,..... 1092 11

Hoffman & Bates, Erecting and painting, at $16.00, ..... 4800.00

Salaries and Wages, Engineers and Inspectors,..... 750.00

Incidental expenses and extra work,..... 539.35

O. R. & N. Co. freight charges,..... 396.10

N. P. R. R. freight charges, at 1 cent per ton per mile,... 3768.81

Total Cost,..... $25538.32

or $85.13 per lineal foot.

#25538.32

| TIME SENT | SENDER | RECEIVER |
|---|---|---|
| ....M. | | |

TIME FILED ....M.

NORTHERN PACIFIC R. R.

# TELEGRAM.

| RECEIVED FROM | TIME RECEIVED | SENDER | RECEIVER |
|---|---|---|---|
| | ....M. | | |

☞ Receiving Operators are required to write all Messages in INK, and enter date in full.

FROM ..... TO .....

DATED ..... 188 .... AT .....

Mason M Left Cabin 15. 6.40 21.40 27.40 6.00

Boyn

Mate 10.11 Boyn 79.50 Add 69 39

Extra mate 109.40 339.40 230.00 69.39 6 305.39 25232.91 25,538.30

300 ) 25538.30 ( 85.13
2400
1538
1500
383
300
830

# Cost of White River Bridge

Voucher No.

| | | | |
|---|---|---|---|
| 1708 | L. D. Mason - Expense on Plans | 133 | ✓ |
| 2220 | L. L. Buck - Making designs | 500 00 | ✓ |
| 2273 | A. Anderson - Sundry expenses | 15 00 | ✓ |
| 2288 | Mach Dept Labor on bolts | 15 00 | ✓ |
| 2560 | Rust & Colclyr - Iron (366,095 lbs) @ 3.74 f.o.b.c. St. Paul | 13,691 95 | ✓ |
| 3081 | Mach Dept labor on bolts & rods ~~3½¢~~ | 640 | |
| 3083 | Mach Dept 289 lbs bolts @ 3½¢ | 10 11 | |
| 3145 | C R & P Co. Frt Charges on Treasure | 20 | ✓ |
| 3292 | Hoffman & Balt. Erecting 300 ft span @ 16.00 ~~Final Estimate~~ | 480 00 | ✓ |
| 3048 | C R & P Co. Frt on 12 car loads Iron Wallula to Portland ~~2 Cars~~ | 395 83 | ✓ |
| 2794 | R. Bennett Extra Work | 27 69 | |
| 2829 | R. Bennett (2 Bridges 65' Pony & 91' Truss @ 8.00) Lumber &c | 81 71 | |
| 3199 | R. Bennett Lumber 644 2 ft Bm @ 8.50 | 54 84 | ✓ |
| 2653 | A. J. Rhodes & Co. 49,617' Lumber 14 Cars @ 8.00 | 396 93 | ✓ |
| 2655 | D. G. Linville 79,819' " 14 Cars @ 8.00 | 638 55 | ✓ |
| 3025 | D. G. Linville 224' " @ 8.00 | 1 79 | ✓ |
| | 136,112' " | | |
| | Add estimated proj charges to Iron Bridges Ground | 75 00 | ✓ |
| | | $21,387 40 | |

1035.48
54.84
1090.32
1.79
1092.11
0

Add A. P. Frgt 12 cars Iron St Paul to Wallula 3131.69
" " " Portland to Rainier 316.24
14 " Lumber Mill Creek to Rainier (11.64) 162.96
14 " " Timlock to Rainier (11.24) 157.92

| | |
|---|---|
| 3768 81 | ✓ |
| $25,156 21 | |

Add

| | | | |
|---|---|---|---|
| 3015 | Whittier, Fuller & Co. | Paint & Lead | 76 70 ✓ |
| | | | $25,232 91 |

from Mr Bogue Memo. 12.2.86.

| | | |
|---|---|---|
| Exp on plans | 1 33 | ✓ |
| Making plans | 500 | ✓ |
| Sundry expenses | 15 | ✓ |
| Labor Mach Dept | 27 40 | |
| Iron | 1 369 195 | ✓ |
| Lumber 136112 | 1092 11 | ✓ |
| Extra work | 339 40 | |
| Paint | 76 70 | ✓ |
| Material, Mach Dept. | 37 67 | |
| Plates & bolts | 41 83 | |
| Freight & erecting | 4800 | ✓ |

Cost of

White River Bridge

10/20/83

(Truss only)

Freight. ORdn 396 10 V

" Pio 3768 81 V

" Pio 7570 V

Total expenditure 25538.30

300) 25-338.30

$85.13 per Cin Pt.

500. 3-15-84. C. D. 92.

N. P. R. R. CO.

6.510 ENGINEER'S OFFICE.

No. Cost of Bridge.

Name White River

Date Cascade Branch,

Subject N.P.R.R.

188

Referred to

White River Bridge —

Oregon Fir, dry say 4 lbs per ft. B. M,

Quantity. 137,000 ft × 4 = 548,000 lbs. dry

137.000 × 5,5 = 753.500 —

Green lbs
366.095 = 122.032 lbs iron per lin ft.
3.00

Dry Green lbs
548.000 = 182.667 lbs wood " " "
300
3,046,99

366.095
548.000
914.095

2 | 914.095
2 | 457.047
300 | 1523 lbs per lin ft. one truss

Bush & McN, assume 1,200 lbs per lin ft

# Statement of cost of Superstructure White River Bridge 300 foot span

| Vouchers G.V. No | Tacoma | Name | For what | Amount | | | |
|---|---|---|---|---|---|---|---|
| 1708 | | D. D. Mason | Express on plans | | 1 | 33 | . |
| 2220 | | L. L. Buck | Making plans | | 500 | | . |
| 2273 | | A. Anderson | Sundry Expenses | | 15 | | . |
| 2288 | 1183 | Machinery Dept. | Labor | | 15 | | . |
| 2560 | | Rust & Coolidge | 366094# Iron @ 3 7/4 | 13 | 691 | 95 | . |
| 2655 | 1253 | D. G. Auslie | 79819' Lumber | | 638 | 55 | . |
| 2653 | 1254 | A. J. Rhoades | 49617' " | | 396 | 93 | . |
| 2794 | 1369 | N. Bennetts | Extra work, piling material | | 27 | 69 | . |
| 3015 | 1441 | Whittier Fuller & Co. | Paint | | 76 | 70 | X |
| 3025 | 1457 | D. G. Auslie | 224' Lumber | | 1 | 79 | . |
| 3083 | 1506 | Mach. Dept | Material | | 10 | 11 | . |
| 3081 | 1507 | Mach. Dept | Labor | | 6 | 40 | . |
| 3196 | 1533 | Thompson Sch & Co. | Plates and Bolts | | 41 | 83 | X |
| 3199 | 1534 | N. Bennetts | Lumber 6452' | | 54 | 84 | . |
| 3219 | 1537 | Hoffman & Bates. | Extra work | | 31 | 71 | X |
| 3292 | 1580 | Hoffman & Bates | Framing & erecting 300'@16 | 48 | 00 | | . |
| 3281 | 1590 | Mach Dept | Labor | | 6 | | X |
| 3282 | 1591 | Mach. Dept | Material | | 27 | 56 | X |
| 3145 | | C. R. & N. Co | Frt on Measure from Buck | | | 25 | . |
| 3048 | | C. R. & N. Co | " on 12 cars iron Wallula Port. | | 395 | 85 | . |
| | | Add estimated proportion of general charges to Truss Bridges on this section | | | 750 | | |
| | | Total amount charged Bridging Truss | | | | | 21769 49 |
| | | Add | | | | | |
| | | N.O. Freight 12 cars Iron St Paul to Wallula | | 3 | 13 | 69 | |
| | | " " 12 " " Portland & So Prairie | | | 316 | 24 | |
| | | " " 14 " Lumber, Rail Switch " @ 11/64 | | | 162 | 96 | |
| | | " " 14 " " Wrinlock " " @ 11/28 | | | 157 | 92 | |
| | | Total amount charged Traffic Charges. | | | | | 3768 81 |
| | | Total cost of Bridge superstructure. | | | | | $25538 30 |

Tacoma Nov 6th 1885.

# Statement of cost of Superstructure White River Bridge 300 feet

| Voucher | | For What | Amount | Tacoma | |
|---|---|---|---|---|---|
| 1708 | | S. D. Mason - Express on Plans | 133 ✓ | | |
| 2220 | | L. L. Buck - Making plans | 50000 ✓ | | |
| 2273 | | A. Anderson - Sundry expenses | 1500 ✓ | | |
| 2288 | 1183 | Machinery Dept - | 1500 ✓ | | 15 |
| 2560 | | Rust & Coolidge - 366095# Iron @ 3.74 | 1369195 ✓ | 1369 | 195 |
| 3081 | 1507 | Machinery Dept | 640 ✓ | | 640 |
| 3083 | 1506 | Machinery Dept | 1011 ✓ | | 1011 |
| 3145 | | C. R. & N. Co. - Freight on measure from Rock | 25 ✓ | | |
| 3292 | 1524 1541 1526 1580 | Hoffman & Bates - Framing & Erecting 300' @ #16 | 480000 ✓ | 4800 | |
| 3048 | | C. R. & N. Co. - Freight on 12 Cars Iron Wallula to Portland | 39583 ✓ | | |
| 2794 | 1369 | A. Bennett - Extra work piling materials | 2769 ✓ | | 2769 |
| 2829 | 1374 | A. Bennett - 915 Lumber | 8171 ✓ | 300+ Bridge 2 Trusses 78' Skid be Wt. Oak | |
| 3199 | 1534 | A. Bennett - 6452' " | 5484 ✓ | | 5484 |
| 2653 | 1254 | G. J. Rhodes & Co. 49,617' " (4 Cars) | 39693 ✓ | | 39693 |
| 2655 | 1253 | D. G. Linville - 79819' " (14 Cars) | 63855 ✓ | | 63855 |
| 3025 | 1457 | D. G. Linville - 224 " | 179 ✓ | | 179 |
| | | Total Lumber 137027' | | | |
| | | An estimated proportion of general charges to Truss Bridging on this section | 7500 | | |
| | | Total amount charged Bridging, Truss | | | 2,138740 |
| Add | | | | | |
| | | N. P. Freight 12 Cars Iron St Paul to Wallula | 31369 | | |
| | | " " 12 " " Portland to Ainsworth | 31624 | | |
| | | " " 14 " Lumber mill switch to Ainsworth @ 11.64 | 16296 | | |
| | | " " 14 " Pinlock to " " @ 11.25 | 15792 | | |
| | | Total amount charged Freight Charges | | | 376881 |
| | | Total cost of Bridge Superstructure | | | 2515621 |

## U. P. B's statement

| | | | |
|---|---|---|---|
| Total cost without freight & incidentals | | 2012064 | |
| Add estimated pro. of general charges to Truss Bridging | | 50000 | 2071264 |
| Add S. D. M. 1.33 L. L. Buck 500.00 A. Anderson 15.00 C. R. & N. 1.25 | | 51658 | |
| Add C. R. & N. freight on iron | | 39583 | |
| Add N. P. Freight | | 376881 | 468124 |
| Total cost as per Bogue's figures | | | 2539388 |

Bogue $ 25393.86
St. Paul $ 25156.21
diff. $ 237.67 probably cost of paint used.
300 feet — $26000 or $88.66 per lin. ft.

White River
Bridge
11-1-85

# Timber in White River Bridge

Von 3199 Nelson Bennett

| | | | |
|---|---|---|---|
| 1 | Pcs | 9"x21"-16' | 252' |
| 4 | " | 10"x12"-24' | 960' |
| 4 | " | 10"x12-25' | 1000' |
| 8 | " | 8x10-25' | 1333' |
| 8 | " | 10x10-25' | 1667' |
| 8 | " | 6x10-25 | 1000' |
| 1 | " | 9x20-16 | 240' |

6452 } not included in Bucks bills of timber

Von 2653 A. J. Rhodes & Co ✓

| | | | |
|---|---|---|---|
| 6 | Pcs | 6x12-16$^{8}$ | 600' |
| 2 | " | 5x12-15$^{3}$ | 152' |
| 1 | " | 5x10-15$^{4}$ | 64 |
| 8 | " | 10x12-25$^{2}$ | 2013' |
| 8 | " | 10x10-25$^{2}$ | 1678' |
| 8 | " | 8x10-25$^{2}$ | 1348' |
| 8 | " | 6x10-25$^{2}$ | 1006' |
| 6 | " | 6x8-23$^{2}$ | 556' |
| 12 | " | 3x8-23$^{2}$ | 556' |
| 4 | " | 14x14-23$^{2}$ | 1519' |
| 8 | " | 8x14-23$^{3}$ | 1736' |
| + 32 | " | 9x18-37$^{6}$ | 16200 |
| 160 | " | 7x9-9 | 7560 |
| 80 | " | 7x9-14$^{5}$ | 6055 |
| 16 | " | 8x9-37$^{6}$ | 3600 |
| 64 | " | 1½x12-18$^{2}$ | 1800' |
| 12 | " | 9x20-1$^{6}$ | 270 |
| 4 | " | 9x20-3$^{9}$ | 225 |
| 4 | " | 9x12-6 | 216 |
| 4 | " | 12x12-11 | 528 |
| 8 | " | 7½x22-2$^{5}$ | 265 |
| 24 | " | 7½x22-1$^{6}$ | 478 |
| 24 | " | 5¼x22-1$^{6}$ | 346 |
| 48 | " | 2¼x22-1$^{6}$ | 297 |
| 12 | " | 3¾x19-1$^{7}$ | 113 |
| 12 | " | 3¾x16-1$^{6}$ | 90 |
| 6 | " | 3¾x14-1$^{6}$ | 39' |
| 4 | " | 3¾x19-1$^{3}$ | 29 |
| | Ford | | 49339' |

6452' } included in Bucks bills of material

| | | | | | |
|---|---|---|---|---|---|
| | | Brot Ford | | 6452' | |
| Von. 2653 | | Carried | | 49339' | |
| | 4 | Pcs | $3\frac{3}{4} \times 16 - 1\frac{3}{2}$ | 25' | |
| | 6 | " | $3\frac{3}{4} \times 14 - 1\frac{3}{2}$ | 32' | |
| | 4 | " | $3\frac{3}{4} \times 19 - 3\frac{2}{2}$ | 75' | |
| | 4 | " | $3\frac{3}{4} \times 16 - 3\frac{2}{2}$ | 63' | |
| | 6 | " | $3\frac{3}{4} \times 14 - 3\frac{2}{2}$ | 83' 49617' | |
| Von. 2655 | | D. G. Ainslie | | | included in Bucks Bill of material |
| | 8 | Pcs | $11 \times 22 - 36\frac{6}{6}$ | 5889' | |
| | 4 | " | $10 \times 22 - 36\frac{6}{6}$ | 2676' | |
| | 12 | " | $12 \times 22 - 37\frac{6}{6}$ | 9900' | |
| | 24 | " | $14 \times 22 - 37\frac{6}{6}$ | 23100' | |
| | 8 | " | $16 \times 20 - 38\frac{10}{10}$ | 8195' | |
| | 8 | " | $15 \times 19 - 37\frac{10}{10}$ | 7188 | |
| | 8 | " | $15 \times 16 - 38$ | 6080' | |
| | 12 | " | $15 \times 14 - 38\frac{2}{2}$ | 8015' | |
| | 16 | " | $15 \times 14 - 18\frac{2}{2}$ | 5086 | |
| | 4 | " | $16 \times 16 - 43\frac{3}{3}$ 3690 | 79819' | |
| Von. 3025 | | D. G. Ainslie | | | not included in Bucks bill of material |
| | 4 | Pcs | $4 \times 19 - 3$ | 76' | |
| | 4 | " | $4 \times 16 - 3$ | 64' | |
| | 6 | " | $4 \times 14 - 3$ | 84 224' | |
| | | Total Timber | | 136,112' | |

White River Bridge

White River Bridge

Statement

Cost of Superstructure

Nov 1885.