



Northern Pacific Railway Company.
Engineering Department Records.

Copyright Notice:

This material may be protected by copyright law (U.S. Code, Title 17). Researchers are liable for any infringement. For more information, visit www.mnhs.org/copyright.

Form 1757

7-12-11 5M RP

N. P. RY. CO.

OFFICE OF

Chief Engineer

FILE NO.

3677

SUBJECT:

TALAMANCA TENINO

Concrete plant

- Auburn -

closed

December 31-18

See File 5799

36 77

3677
MFC

Saint Paul, November 7, 1918.

Mr. A. R. Cook,
Principal Asst. Engineer,
Tacoma, Washington.

Dear Sir:-

Referring to your letter of November second to Mr. Stevens in regard to two cars of 1-1/8" bar steel shipped from St. Cloud to Auburn.

I hand you herewith a copy of that portion of the General Storekeeper's requisition No. 4916 which covers rods to be delivered to the Auburn plant for the manufacture of reinforced concrete products. The first six items covering 1-1/8" rods were rolled by the Great Northern Railroad and shipped from Saint Cloud. The remainder of the material is to be furnished from new billets and delivered in the next few months.

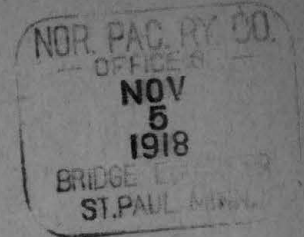
Yours truly,

Bridge Engineer.

Encl.

Cy-HES ✓

UNITED STATES RAILROAD ADMINISTRATION
W. B. MCGILL, Director General
NORTHERN PACIFIC RAILWAY



Re Two cars of 1-1/8" bar steel.

Tacoma, Washington, November 3, 1918.

Mr. H. E. Stevens,
Chief Engineer,
St. Paul, Minnesota.

*Miss W
make copy of
Regin
OEW*

Dear Sir:-

Referring to your wire of the 31st inst.,
M-1-68 advising that the two cars of 1-1/8" bar steel
consigned to the Northern Pacific Railway Company from
St. Cloud to Auburn, applied on GSK 4916.

I understand that the material covers a re-
quisition made early in May by the Bridge Engineer.
Will you please furnish me with copy of same and here-
after arrange that I may be furnished with copies of
requisitions covering material intended for the Auburn
Concrete Plant?

Yours truly,

W:E

A. R. Cook
Principal Assistant Engineer.

*7C ✓ Please note Can you furnish copy
requisition*

11-5

11/5

OFFICE OF
ENGINEERING
NOV 1918
ST. PAUL, MINN.

- 1 -

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 13590

St. Paul, Minn., Oct. 30, 1918 19

To A. R. Cook, Principal Ass't. Engr., Tacoma, Wn.

CEMENT.

Sample Washington Portland Cement

Shipped to Tacoma, Wn.

Specification No. E-108

Test Request No. 77, 9/18/18.

From Car, Initials and No. G.W. 54001

Sent in by A.R. Cook,

Amount Represented

S. A. No. --

FINENESS

Passing No. 100 Sieve

" " 200 "

--

%

--

85

%

SETTING

Initial Set

2

hrs.

30

min.

Final "

5

hrs.

55

min.

SOUNDNESS

Air Pat

--

days

--

hrs.

Cold Water

--

days

--

hrs.

Hot Water

--

days

5

hrs.

O.K.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.

-- lbs. sq. in.

-- lbs. sq. in.

-- lbs. sq. in.

Average

--

lbs. sq. in.

7 DAYS

Neat -- in air -- in water.

-- lbs. sq. in.

-- lbs. sq. in.

-- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat

Sand 220 lbs. sq. in.

222 lbs. sq. in.

239 lbs. sq. in.

Average

227

lbs. sq. in.

28 DAYS

Neat -- in air -- in water.

-- lbs. sq. in.

-- lbs. sq. in.

-- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat.

Sand 301 lbs. sq. in.

311 lbs. sq. in.

325 lbs. sq. in.

Average

312

lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 24.2 per cent.

Water used for Sand 10.0 per cent.

Water used for Pats 24.2 per cent.

The above Cement:

From Washington Portland Cement Co.,

for use in manufacturing concrete pipe, piles & slabs,

meets specification requirements.

(3)

(5)

copy in file 11/2

H. G. BURNHAM.

Engineer of Tests

NORTHERN PACIFIC RAILWAY COMPANY. OFFICE OF ENGINEER OF TESTS.

REPORT NO. 13591

St. Paul, Minn., Oct. 30, 1918 19

To A. R. Cook, Principal Ass't. Engr., Tacoma, Wn.

CEMENT.

Sample Washington Portland Cement

From Car, Initials and No. G.N. 53254

Shipped to Tacoma, Wn.

Sent in by A. R. Cook

Specification No. E-108

Amount Represented

Test Request No. 77, 10/18/18

S. A. No. --

FINENESS

Passing No. 100 Sieve -- % --

" " 200 " 87 %

SETTING

Initial Set 3 hrs. 15 min.

Final " 5 hrs. 50 min.

SOUNDNESS

Air Pat -- days -- hrs.

Cold Water -- days -- hrs.

Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.

-- lbs. sq. in. }

-- lbs. sq. in. } Average -- lbs. sq. in.

-- lbs. sq. in. }

7 DAYS

Neat -- in air -- in water.

-- lbs. sq. in. }

-- lbs. sq. in. } Average -- lbs. sq. in.

-- lbs. sq. in. }

Sand=

% of Neat

Sand 230 lbs. sq. in. }

243 lbs. sq. in. } Average 243 lbs. sq. in.

252 lbs. sq. in. }

28 DAYS

Neat -- in air -- in water.

-- lbs. sq. in. }

-- lbs. sq. in. } Average -- lbs. sq. in.

-- lbs. sq. in. }

Sand=

% of Neat.

Sand 353 lbs. sq. in. }

335 lbs. sq. in. } Average 338 lbs. sq. in.

326 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 24.2 per cent.

Water used for Sand 10.0 per cent.

Water used for Pats 24.2 per cent.

The above Cement:

From Washington Portland Cement Co.,
for use in manufacturing concrete pipe, piles & slabs,
meets specification requirements.

14-b (3)
HBS (5)

copy in cc 11/2

J. G. BURHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.
OFFICE OF ENGINEER OF TESTS.

REPORT NO. 13592St. Paul, Minn., Oct. 30, 1918 19To A. R. Cook, Principal Ass't. Engr., Tacoma, Wn.

CEMENT.

Sample Washington Portland Cement
Shipped to Tacoma, Wn.
Specification No. E-108
Test Request No. 76, 9/16/18.

From Car, Initials and No. G.N. 51597Sent in by A.R. Cook,

Amount Represented

S. A. No. --

FINENESS

Passing No. 100 Sieve

--

%

--

" " 200 "

85.5

%

SETTING

Initial Set

1

hrs.

32

min.

Final "

5

hrs.

20

min.

SOUNDNESS

Air Pat

--

days

--

hrs.

Cold Water

--

days

--

hrs.

Hot Water

--

days

5

hrs.

OK.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.-- lbs. sq. in.-- lbs. sq. in.-- lbs. sq. in.

Average

--

lbs. sq. in.

7 DAYS

Neat -- in air -- in water.-- lbs. sq. in.-- lbs. sq. in.-- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat

Sand 277 lbs. sq. in.262 lbs. sq. in.251 lbs. sq. in.

Average

263

lbs. sq. in.

28 DAYS

Neat -- in air -- in water.-- lbs. sq. in.-- lbs. sq. in.-- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat.

Sand 360 lbs. sq. in.343 lbs. sq. in.321 lbs. sq. in.

Average

341

lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.4 per cent.Water used for Sand 9.7 per cent.Water used for Pats 22.4 per cent.

The above Cement;
From Washington Portland Cement
for use in manufacturing concrete pipe, piles & slabs,
meets specification requirements.

14-b (3)

HES ;(5)

Copy in 7C 1/2

A. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 13593

St. Paul, Minn., Oct. 30, 1918 19

To A. R. Cook, Principal Ass't. Engr., Tacoma, Wn.

CEMENT.

Sample Washington Portland Cement
 Shipped to Tacoma, Wn.
 Specification No. E-108
 Test Request No. 76, 9/16/18.

From Car, Initials and No. G.N. 340151

Sent in by A.R. Cook

Amount Represented

S. A. No.

FINENESS

Passing No. 100 Sieve

" " 200 "

--

%

--

85.5

%

SETTING

Initial Set

2

hrs. 25

min.

Final " "

6

hrs. 40

min.

SOUNDNESS

Air Pat

--

days --

hrs.

Cold Water

--

days --

hrs.

Hot Water

--

days 5

hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.

--- lbs. sq. in.
 --- lbs. sq. in.
 --- lbs. sq. in.

Average

--

lbs. sq. in.

7 DAYS

Neat -- in air -- in water.

--- lbs. sq. in.
 --- lbs. sq. in.
 --- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat

Sand 266 lbs. sq. in.
 270 lbs. sq. in.
 274 lbs. sq. in.

Average

270

lbs. sq. in.

28 DAYS

Neat -- in air -- in water.

--- lbs. sq. in.
 --- lbs. sq. in.
 --- lbs. sq. in.

Average

--

lbs. sq. in.

Sand=

% of Neat

Sand 359 lbs. sq. in.
 348 lbs. sq. in.
 380 lbs. sq. in.

Average

361

lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.0 per cent.

Water used for Sand 9.7 per cent.

Water used for Pats 22.0 per cent.

The above Cement;
 From Washington Portland Cement
 for use in manufacturing concrete pipe, piles & slabs,
 meets specification requirements.

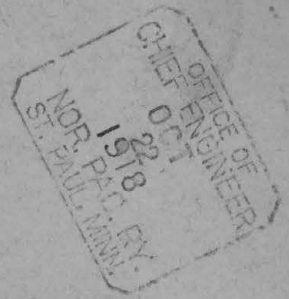
14-b (3)
 RES: (5)

copy in JC 11/2

H. G. BURNHAM,

Engineer of Tests.

UNITED STATES RAILROAD ADMINISTRATION
W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY



Re Auburn Concrete
Plant Report.

Tacoma, Washington, October 19, 1918.

Mr. H. E. Stevens,
Chief Engineer,
St. Paul.

Dear Sir:

As per your wire B-14 of the 18th inst. I enclose here-
with duplicate copy of my report covering the Auburn Concrete
Plant.

Yours truly,

A. R. Cochrane
Principal Assistant Engineer.

W-d

encl.

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY

Re Auburn Concrete Plant
report for year 1917.

Tacoma, Washington, October 11, 1918.

Mr. H. E. Stevens,
Chief Engineer,
St. Paul.

Dear Sir:

Pursuant to your telegram of September 23rd, B-12, regarding average capacity for plant manufacturing pipe, piling and slabs at Auburn, I am enclosing to you herewith a report which covers the matter and which is fairly accurate, inventory of material on hand having been taken, kind and cost of material tabulated and checked.

Yours truly,

(Signed) A. R. COOK.

Principal Assistant Engineer.

ARC-d

encl.

UNITED STATES RAILROAD ADMINISTRATION
W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY

Tacoma, Washington, October 2, 1918.

Mr. A. R. Cook, Princ. Asst. Engr.,
Tacoma, Washington.

Dear Sir:

Referring to Mr. Stevens' wire of date September 23rd, B-12, re Auburn Concrete Plant.

Approximate average capacity each month with average force based on 1917 production and force, as follows:

127 pcs. 24" pipe
60 " 36" "
12 concrete slabs
36 " piles

Quantity of each item which will be manufactured during 1918:

800 pcs. 24" pipe	6400 lin ft
400 " 36" "	3200 " "
37 single slabs	
10 double "	
35 pcs. 30 ft. piles	1050 " "
45 " 24 " "	1080 " "
73 " 20 " "	1460 " "
27 " 15 " "	405 " "
	<u>3995</u> " "

Quantity of each item expected to have left over after all orders now on hand are filled.

199 pcs. 24" pipe
188 " 36" "
9 " 48" "
31 single track slabs
10 double " "
35 - 30 ft concrete piling
2 - 25 " " "
10 - 20 " " "
47 - 15 " " "

Total cost of operation of plant from January 1st to September 30th, 1918, inclusive is \$38518.17 of which \$1414.50 is charge-

UNITED STATES RAILROAD ADMINISTRATION
W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY

able to Investment Account.

Statement of output for 1918 and inventory of stock and material on hand, show credits \$43926.66 of which \$591.45 is credit to Investment Account.

This leaves a profit of \$5710.89 or practically 15% of operation costs for plant depreciation and renewal. During 1917 depreciation was charged at 22% of operation costs or practically 48% of plant investment.

Labor costs for 1918 are approximately 40% more than for 1917 as per comparison of September 1918 and same time based on rates for last part of 1917.

Statement attached shows average prices for material for 1918 and 1917.

Malthine paper is only item which shows decrease and this probably due to difference in grade of paper used. Have shown on statements attached the approximate cost for 1918 product.

Cost of 24" and 36" pipe is considerably above established price used for charging out 1918 product, while cost of piles and slabs is below established price.

These statements do not include any N.P. freight charges on raw material.

Output of plant probably could be increased by providing some additional equipment to facilitate handling as outlined in Mr. Farmer's report of date September 25th.

Yours truly,

(Signed) C. E. Springer.

UNITED STATES RAILROAD ADMINISTRATION
W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY

Auburn, Wash., September 25, 1918.

Mr. A. R. Cook,
Princ. Asst. Engr.,
Tacoma, Wash.

Dear Sir:

Replying to your letter of the 24th inst. referring to approximate average of pipe, piling and slabs that can be made in one month with the working force I have; will say, my average this year per month has been about as follows:

127 pcs 24" pipe
60 " 36" "
12 concrete slabs
36 concrete piling.

It does not matter as to the length of piling as I only have 9 forms and can only pour twice a week.

Following is a list of pipe, piling and slabs being made this year:

800 pcs 24" pipe
400 " 36" "
37 single track slabs
10 double " "
35 - 30 ft concrete piling
45 - 24 " " "
73 - 20 " " "
27 - 15 " " "

There will be left in stock at end of season after all orders are filled, unless we receive more shipping orders:

199 pcs 24" pipe
188 " 36" "
9 " 48" "
31 single track slabs
10 double " "
35 - 30 ft concrete piling
2 - 25 " " "
10 - 20 " " "
47 - 15 " " "

UNITED STATES RAILROAD ADMINISTRATION
W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY

With some improvements of which I will suggest, I am sure I can make quite an increase in my average per month with my same labor force.

First - We need a new hoisting engine with a swing drum; so I could swing derrick with it instead of using two men to pull it around when loading, therefore I could load pipe and screen sand and gravel at the same time, making a gain of about 40 pipe per mo.

Second - If we could install another derrick so we could pick up pipe from our present storage ground and set them back, it would double our storage capacity as the present one we have only holds about 250 pipe, and this enlarging of storage ground could be made with very little cost. Sometimes we have trouble getting cars for loading and run short on shipping orders, consequently filling up our ground and hinders work to full capacity.

Third - If we could have about 400 lineal feet of 30 lb steel rails to lay a track on each side of a concrete piling and 8 old hand car wheels, to make 2 sets of tracks, I could run them astride the piling and under swing the piling and run it out on to another storage ground making us more storage ground and saving quite a bit of time and cost in loading and handling of piling.

With these improvements I am sure I could bring my average per month about:

150 pcs. 24" pipe
100 " 36" "
48 concrete piling
12 concrete slabs

W. H. Farmer,

Plant Superintendent.

UNITED STATES RAILROAD ADMINISTRATION
 W. G. MCADOO, DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILWAY COMPANY.
 OFFICE OF ENGINEER OF TESTS.

2-16-18 3M RP

3677

REPORT NO. 13408St. Paul, Minn., Sept. 21, 1918.19To A. B. Cook, Principal Ass't. Engr., Tacoma, Wash.

CEMENT.

(#34803 + 2583)

Sample Olympic
 Shipped to Auburn, Wash.
 Specification No. E-108
 Test Request No. 75, 8/12/18.

From Car, Initials and No. P.A.R. 8.2.1.
 Sent in by A.R. Cook,
 Amount Represented 4 samples
 S. A. No.

FINENESS

Passing No. 100 Sieve -- % --
 " " 200 " 82.6 %

SETTING

Initial Set 1 hrs. 24 min.
 Final " 6 hrs. 34 min.

SOUNDNESS

Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.
 lbs. sq. in. }
 lbs. sq. in. } Average -- lbs. sq. in.
 lbs. sq. in. }

7 DAYS

Neat -- in air -- in water.
 lbs. sq. in. }
 lbs. sq. in. } Average -- lbs. sq. in.
 lbs. sq. in. }
 Sand = -- % of Neat
 Sand 322 lbs. sq. in. }
376 lbs. sq. in. } Average 354 lbs. sq. in.
365 lbs. sq. in. }

28 DAYS

Neat -- in air -- in water.
 lbs. sq. in. }
 lbs. sq. in. } Average -- lbs. sq. in.
 lbs. sq. in. }
 Sand = -- % of Neat.
 Sand 412 lbs. sq. in. }
430 lbs. sq. in. } Average 425 lbs. sq. in.
432 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 23.1 per cent.
 Water used for Sand 9.8 per cent.
 Water used for Pats 23.1 per cent.

The above Cement:
 From the Olympic Portland Cement Company,
 For use in manufacturing concrete pipe,
 piles and slabs.
 Meets specification requirements.

Copy Mr. F.C.

14-B

cc: HES (5).

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 13409

St. Paul, Minn., Sept. 21, 1918. 19

To A. R. Cook, Principal Ass't. Engr., Tacoma, Wash.

CEMENT.

Sample Olympic From Car, Initials and No. C. & E. I. #2589
 Shipped to Auburn, Wash. Sent in by A. R. Cook,
 Specification No. E-108 Amount Represented 4 samples
 Test Request No. 75, 8/12/18. S. A. No. _____
FINENESS Passing No. 100 Sieve -- % --
 " " 200 " 84.1 % --
SETTING Initial Set 1 hrs. 55 min.
 Final " 6 hrs. 55 min.
SOUNDNESS Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

7 DAYS

Neat -- in air -- in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand= _____ % of Neat
 Sand 267 lbs. sq. in. }
297 lbs. sq. in. } Average 291 lbs. sq. in.
310 lbs. sq. in. }

28 DAYS

Neat -- in air -- in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand= _____ % of Neat
 Sand 326 lbs. sq. in. }
378 lbs. sq. in. } Average 362 lbs. sq. in.
382 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 23.1 per cent.
 Water used for Sand 9.8 per cent.
 Water used for Pats 23.1 per cent.

The above Cement:
 From Olympic Portland Cement Company,
 For use in manufacturing concrete pipe,
 piles and slabs.
 Meets specification requirements.

14-B

cc: HES (5)

H. G. BURNHAM,

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 13305

St. Paul, Minn., Sept. 3rd, 1918.

To L. M. Perkins, Engineer Maintenance of Way.

CEMENT.

Sample Olympic
 Shipped to Tacoma, Wash.
 Specification No. E-108
 Test Request No. 72

From Car, Initials and No 96779
 Sent in by Ass't Engr., Tacoma, Wash.
 Amount Represented _____
 S. A. No. _____

FINENESS Passing No. 100 Sieve _____ %
 " " 200 " 85 %
SETTING Initial Set 3 hrs. 20 min.
 Final " 7 hrs. 35 min.
SOUNDNESS Air Pat. _____ days _____ hrs.
 Cold Water. _____ days _____ hrs.
 Hot Water. _____ days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat _____ in air _____ in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

7 DAYS

Neat _____ in air _____ in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand= _____ % of Neat
 Sand 377 lbs. sq. in. }
375 lbs. sq. in. } Average 372 lbs. sq. in.
365 lbs. sq. in. }

28 DAYS

Neat _____ in air _____ in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand= _____ % of Neat
 Sand 467 lbs. sq. in. }
445 lbs. sq. in. } Average 445 lbs. sq. in.
423 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 22.0 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats 22.0 per cent.

The above cement
 from Bellingham, Washington,
 to be used in manufacturing concrete pipe,
 piles and slabs,
 meets Specification requirements.

14-B (3)

HES: (5)

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 13306

St. Paul, Minn., Sept. 3rd, 1918.

To L. M. Perkins, Engineer Maintenance of Way.

CEMENT.

Sample Olympic From Car, Initials and No. 97309
 Shipped to L. M. Perkins, Sent in by A. E., Tacoma, Wash.
 Specification No. E-108 Amount Represented
 Test Request No. 72 S. A. No. ---
FINENESS Passing No. 100 Sieve --- % ---
 " " 200 " 86 % ---
SETTING Initial Set 3 hrs. --- min.
 Final " 8 hrs. 30 min.
SOUNDNESS Air Pat --- days --- hrs.
 Cold Water --- days --- hrs.
 Hot Water --- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat --- in air --- in water.
--- lbs. sq. in. }
--- lbs. sq. in. } Average --- lbs. sq. in.
--- lbs. sq. in. }

7 DAYS

Neat --- in air --- in water.
--- lbs. sq. in. }
--- lbs. sq. in. } Average --- lbs. sq. in.
--- lbs. sq. in. }
 Sand = % of Neat
 Sand 347 lbs. sq. in. }
348 lbs. sq. in. } Average 351 lbs. sq. in.
357 lbs. sq. in. }

28 DAYS

Neat --- in air --- in water.
--- lbs. sq. in. }
--- lbs. sq. in. } Average --- lbs. sq. in.
--- lbs. sq. in. }
 Sand = % of Neat
 Sand 437 lbs. sq. in. }
429 lbs. sq. in. } Average 441 lbs. sq. in.
458 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 22.0 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats 22.0 per cent.

The above cement
 from Bellingham, Washington,
 to be used in manufacturing concrete pipe,
 piles and slabs,
 meets specification requirements.

14-B

HES: (5)

Copy HTC
 HEC

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 12972

St. Paul, Minn., July 11, 1918. 19

To L. M. Perkins, A. E. So. Tacoma

CEMENT.

Sample Olympic
 Shipped to Tacoma
 Specification No. E -108
 Test Request No. 71

From Car, Initials and No. 94944 N.P.
 Sent in by L.M.P.
 Amount Represented
 S. A. No.

FINENESS

Passing No. 100 Sieve. %
 " " 200 " 80.2 %

SETTING

Initial Set 2 hrs. 10 min.
 Final " 5 hrs. 50 min.

SOUNDNESS

Air Pat. days hrs.
 Cold Water days hrs.
 Hot Water days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat in air in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

7 DAYS

Neat in air in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

Sand=

% of Neat

Sand 299 lbs. sq. in. }
319 lbs. sq. in. } Average 315 lbs. sq. in.
327 lbs. sq. in. }

28 DAYS

Neat in air in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

Sand=

% of Neat.

Sand 424 lbs. sq. in. }
418 lbs. sq. in. } Average 400 lbs. sq. in.
358 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 23.1 per cent.
 Water used for Sand 9.8 per cent.
 Water used for Pats 23.1 per cent.

The above Cement from South Tacoma to be used for concrete pipe, piles and slabs meet specification requirements.

LMP(1)
 HES(5)

14-D-(3)

Bopm 7C

J. H. Branch
 Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

3677

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 12971

St. Paul, Minn., July 11, 1918. 19

To L.M. Perkins A.E. So. Tacoma

CEMENT.

Sample Olympic
 Shipped to So. Tacoma
 Specification No. E. 108
 Test Request No. 71

From Car, Initials and No. 95480 N.P.

Sent in by L.M.P.

Amount Represented

S. A. No.

FINENESS

Passing No. 100 Sieve

" " 200 "

79.8

%

SETTING

Initial Set

2

hrs.

3

min.

Final "

5

hrs.

48

min.

SOUNDNESS

Air Pat.

days

hrs.

Cold Water

days

hrs.

Hot Water

days

5

hrs.

O.K.

TENSILE STRENGTH

24 HOURS

Neat in air in water.

lbs. sq. in.

lbs. sq. in.

lbs. sq. in.

Average

lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

lbs. sq. in.

lbs. sq. in.

lbs. sq. in.

Average

lbs. sq. in.

Sand=

% of Neat

Sand

346

lbs. sq. in.

314

lbs. sq. in.

291

lbs. sq. in.

Average

317

lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

lbs. sq. in.

lbs. sq. in.

lbs. sq. in.

Average

lbs. sq. in.

Sand=

% of Neat

Sand

371

lbs. sq. in.

383

lbs. sq. in.

401

lbs. sq. in.

Average

385

lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 23.1 per cent.

Water used for Sand 9.8 per cent.

Water used for Pats 23.1 per cent.

The above Cement from South Tacoma to be used for concrete pipe, piles and slabs meets specification requirements.

L.M.P.(1)
 H.E.S.(5)
 14-D(3)

Copy m K

A. G. B. Branch
 Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 12876

St. Paul, Minn., June 14th, 1918. 19

To L.M. Perkins, Eng. M. of W., Tacoma.

CEMENT.

Sample Olympic From Car, Initials and No. N.P. 35529
 Shipped to Eng. M. of W. Tacoma Sent in by L.M. Perkins
 Specification No. E-108 Amount Represented --
 Test Request No. 70 S. A. No. --

FINENESS Passing No. 100 Sieve -- % --
 " " 200 " 80.6% % 00

SETTING Initial Set 3 hrs. 30 min.
 Final " 7 hrs. 10 min.

SOUNDNESS Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat -- in air -- in water.
-- lbs. sq. in. }
-- lbs. sq. in. } Average -- lbs. sq. in.
-- lbs. sq. in. }

7 DAYS

Neat -- in air -- in water.
-- lbs. sq. in. }
-- lbs. sq. in. } Average -- lbs. sq. in.
-- lbs. sq. in. }

Sand = -- % of Neat

Sand 270 lbs. sq. in. }
306 lbs. sq. in. } Average 287 lbs. sq. in.
291 lbs. sq. in. }

28 DAYS

Neat -- in air -- in water.
-- lbs. sq. in. }
-- lbs. sq. in. } Average -- lbs. sq. in.
-- lbs. sq. in. }

Sand = -- % of Neat.

Sand 442 lbs. sq. in. }
490 lbs. sq. in. } Average 460 lbs. sq. in.
449 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 21.6 per cent.
 Water used for Sand 9.6 per cent.
 Water used for Pats 21.6 per cent.

The above cement:
 From Tacoma, Wash.
 To be used in manufacturing concrete pipe, piles, etc.
 Meets specification requirements.

Cy. HES (5) ✓

Wm M. Hae

H. G. BURNHAM,

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. **12875**St. Paul, Minn., **June 14th, 1918.**To **L. M. Perkins, M. of W. Eng., Tacoma, Wash.**

CEMENT.

Sample **Olympic** From Car, Initials and No. **N.P. 31467**
 Shipped to **Tacoma, Wash.** Sent in by **L.M. Perkins, Eng. M. of W. Tacoma**
 Specification No. **E-108** Amount Represented **--**
 Test Request No. **70** S. A. No. **--**

FINENESS Passing No. 100 Sieve **--** % **--**
 " " 200 " **80.7** % **--**
SETTING Initial Set **3** hrs. **40** min.
 Final " **7** hrs. **--** min.
SOUNDNESS Air Pat. **--** days **--** hrs.
 Cold Water **--** days **--** hrs.
 Hot Water **--** days **5** hrs. **O.K.**

TENSILE STRENGTH

24 HOURS

Neat **--** in air **--** in water.
 -- lbs. sq. in. }
 -- lbs. sq. in. } Average **--** lbs. sq. in.
 -- lbs. sq. in. }

7 DAYS

Neat **--** in air **--** in water.
 -- lbs. sq. in. }
 -- lbs. sq. in. } Average **--** lbs. sq. in.
 -- lbs. sq. in. }
 Sand = % of Neat
 Sand **335** lbs. sq. in. }
315 lbs. sq. in. } Average **314** lbs. sq. in.
292 lbs. sq. in. }

28 DAYS

Neat **--** in air **--** in water.
 -- lbs. sq. in. }
 -- lbs. sq. in. } Average **--** lbs. sq. in.
 -- lbs. sq. in. }
 Sand = % of Neat.
 Sand **466** lbs. sq. in. }
411 lbs. sq. in. } Average **439** lbs. sq. in.
441 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats **20.9** per cent.
 Water used for Sand **9.5** per cent.
 Water used for Pats **20.9** per cent.

The above cement:
 From Tacoma, Wash.
 To be used in manufacturing concrete pipe, piles, etc.
 Meets specification requirements.

Cy. HES (5) ✓

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS

REPORT NO. 12772

St. Paul, Minn., May 18, 1918. 19

To L. M. Perkins, Ass't. Engineer, Tacoma, Wn.

CEMENT.

Sample. Olympic Portland Cement
 Shipped to. Auburn, Wn.
 Specification No. E-108
 Test Request No. 69, 4/18/18.

From Car, Initials and No. N.P. 42406
 Sent in by Ass't. Engr., Tacoma
 Amount Represented. Not shown
 S. A. No. --

FINENESS Passing No. 100 Sieve %
 " " 200 " 72.80 %
 SETTING Initial Set 3 hrs. 47 min.
 Final " 6 hrs. 42 min.
 SOUNDNESS Air Pat. 1 days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat in air in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

Sand=

% of Neat

Sand 318 lbs. sq. in. }
 382 lbs. sq. in. } Average 332 lbs. sq. in.
 297 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

Sand=

% of Neat

Sand 423 lbs. sq. in. }
 430 lbs. sq. in. } Average 447 lbs. sq. in.
 482 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 22.2 per cent.

Water used for Sand 9.7 per cent.

Water used for Pats 22.2 per cent.

The above Cement:
 From Billingham, Wn.
 To be used in manufacturing concrete pipe, piles, slabs, etc.
 Meets specification requirements.

14-H

cc: HES (5)

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 12773

St. Paul, Minn., May 28, 1918. 19

To L. M. Perkins, Ass't, Engineer, Tacoma, Wn.

CEMENT.

Sample. **Olympic Portland Cement**
 Shipped to **Auburn, Wn.**
 Specification No. **E-108**
 Test Request No. **69, 4/15/18.**
 From Car, Initials and No. **N.P. 7415**
 Sent in by **Ass't. Engr., Tacoma.**
 Amount Represented **Not shown**
 S. A. No. **--**

FINENESS
 Passing No. 100 Sieve **79.93** %
 " " 200 " **6** %

SETTING
 Initial Set **3** hrs. **40** min.
 Final " **6** hrs. **50** min.

SOUNDNESS
 Air Pat **--** days **--** hrs.
 Cold Water **--** days **--** hrs.
 Hot Water **--** days **5** hrs. **O.K.**

TENSILE STRENGTH

24 HOURS

Neat in air in water.
 lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }

7 DAYS

Neat **24 Hrs.** in air **6 Days** in water.
 lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }
 Sand= % of Neat
 Sand **252** lbs. sq. in. }
272 lbs. sq. in. } Average **268** lbs. sq. in.
280 lbs. sq. in. }

28 DAYS

Neat **24 Hrs.** in air **27 Days** in water.
 lbs. sq. in. }
 lbs. sq. in. } Average lbs. sq. in.
 lbs. sq. in. }
 Sand= % of Neat
 Sand **400** lbs. sq. in. }
432 lbs. sq. in. } Average **425** lbs. sq. in.
443 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats **22.2** per cent.
 Water used for Sand **9.7** per cent.
 Water used for Pats **22.2** per cent.

The above Cement:
 From Bellingham, Wn.
 To be used in manufacturing concrete pipe, piles, slabs, etc.
 Meets specification requirements.

14-H

cc: HES (5) ✓

H. G. BURNHAM

Engineer of Tests.

Copy to
HCC

3677

Tacoma, Wash., April 26, 1918.

Mr. J. D. Koren,
Division Engineer,
Spokane, Washington.

Dear Sir:-

Pasco Division Form 134 covers at Station 384+04
on the Naches Branch, 34 lineal feet 14" concrete pipe syphon.
This is also covered on Pasco Division requisition #313;

I have eliminated this item from the requisition
referred to and wish you would advise me just what pipe should
be furnished also advise Superintendent so that special requisition
can be made to cover, as it is of course not a pipe which we
make at Auburn.

Yours truly,

LMP-ML

Engineer of Maintenance of Way.

CC H.E.Stevens. ✓

CHIEF OF
AGENCY
198
NOV 198
ST. PAUL, MINN.
R.F.C. RY

3677

On Fargo Division. April 11, 1918.

Mr. L. M. Perkins,
Engineer Maintenance of Way,
Tacoma, Wash.

Dear Sir:-

Your letter of the 5th giving estimated cost of concrete pipe to be made at the Auburn Plant in 1918.

I think the prices you have worked out are O.K. and you may use them.

You should, however, keep the same careful record of costs that we have done heretofore, as this data will be needed for comparison with the prices we are estimating and also for use in making up prices for next season's work. In case of a radical and unexpected difference in cost we would want to make an adjustment in the accounts.

Yours truly,

HES-0

Chief Engineer.



Tacoma, Washington, April 5th, 1918.

Mr. H. E. Stevens,
Chief Engineer,
St. Paul, Minnesota.

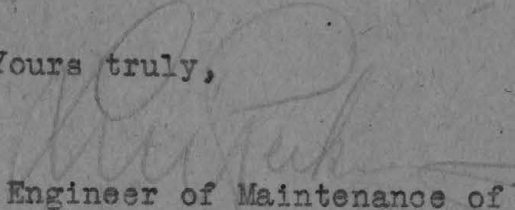
Dear Sir:-

When in St. Paul, I talked to Mr. Burt and with Mr. Cribbs, regarding prices on concrete pipe for 1918. Apparently to comply with instructions for crossing accounts on Improvement work and reporting them within six months of the time of completion to the I.C.C., we must bill pipe out about as fast as shipped. This will mean setting a price on it in advance. I am attaching a statement of unit prices showing the 1917 prices, the estimated 1918 prices and the recommended price for billing. The 1917 price is self explanatory. The 1918 price estimated is made up by applying the prices for material for 1918 and for labor to the units of portion assumed in 1917, and a statement is attached, estimated operation costs for 1918, showing these in detail. Third statement is attached showing the prices on material for 1918 which we used. In making up the 1918 prices we figured as last year on 23% depreciation based on the operation cost. May we use the recommended 1918 prices

HES. (Sheet #2.)

for billing 1918 pipe and other products and if not what
should we use?

Yours truly,


Engineer of Maintenance of Way.

LMP-e

UNIT PRICES

		<u>1917 price</u>	<u>Estimated 1918 price</u>	<u>Recommended 1918 price.</u>
24" pipe	per foot	\$ 1.32	\$ 1.52	\$ 1.60
36" "	"	1.77	2.04	2.10
30' piling	"	.96	1.47	1.55
25' "	"	.90	1.40	1.50
20' "	"	.99	1.50	1.60
15' "	"	1.03	1.53	1.60
Single slabs	per slab	122.66	128.77	135.00
Double "	"	108.28	116.09	125.00

ESTIMATED OPERATION COSTS FOR 1918.

24" pipe	- 804 pcs.	- 6432 ft.
36" "	290 "	2320 "
30' piles	25 "	750 "
25' "	36 "	900 "
20' "	10 "	200 "
15' "	73 "	1095 "
Single slabs	73 "	
Double "	21 "	

	-----per foot-----						-----per slab-----	
	24"	36"	30'	25'	20'	15'	Single	Double
Cement	..3539	.5150	.1385	.1374	.1385	.1373	25.75	22.64
Sand & Gravel	.0858	.1287	.0459	.0463	.0468	.0458	8.58	7.55
Mesh	.2233	.2991						
Bars	.1262	.1772	.5686	.5779	.5881	.5824	44.66	39.81
#16 wire	.0044	.0048					.2682	.2590
#11 wire			.0002	.0021	.0027	.0035		
Labor	.2568	.2961	.3065	.2479	.3088	.3364	13.25	13.07
Royalty	.0500	.0500						
Malthine paper							.5616	.5714
General	.1476	.1973	.1423	.1357	14.55	.14.82	12.48	11.25
Depreciation	1.2480	1.6682	1.2020	1.1473	1.2304	1.2536	105.5498	95.1504
	.2746	.3670	.2648	.2524	.2707	.2758	23.22	20.93
	1.5226	2.0352	1.4668	1.3997	1.5011	1.5294	128.7698	116.0804

AVERAGE PRICES

		<u>1917</u>	<u>1918</u>
Cement	per sack	\$ 0.43	\$ 0.51
Mesh	" foot	0.00107	0.00107
Bars	" Cwt.	3.252	3.781
Wire	" "	4.41	4.83
Malthine Paper	" roll	4.00	4.08

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 11673

St. Paul, Minn., Dec. 12, 1917. 19

To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample Olympic Portland Cement

From Car, Initials and No. N.P. 33887

Shipped to Auburn, Wn.

Sent in by Engr. M. of W., Tacoma

Specification No. #108

Amount Represented Not shown

Test Request No. 62, 10/17/17

S. A. No.

FINENESS

Passing No. 100 Sieve

%

" " 200 "

79.2

%

SETTING

Initial Set

5

hrs.

min.

Final "

6

hrs.

55

min.

SOUNDNESS

Air Pat

days

hrs.

Cold Water

days

hrs.

Hot Water

days

5

hrs.

O.K.

TENSILE STRENGTH

24 HOURS

Neat in air in water.

lbs. sq. in. }
 lbs. sq. in. } Average
 lbs. sq. in. }

lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

lbs. sq. in. }
 lbs. sq. in. } Average
 lbs. sq. in. }

lbs. sq. in.

Sand=

% of Neat

Sand 306 lbs. sq. in. }
 325 lbs. sq. in. } Average
 290 lbs. sq. in. }

307

lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

lbs. sq. in. }
 lbs. sq. in. } Average
 lbs. sq. in. }

lbs. sq. in.

Sand=

% of Neat.

Sand 363 lbs. sq. in. }
 390 lbs. sq. in. } Average
 435 lbs. sq. in. }

396

lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.9 per cent.

Water used for Sand 9.7 per cent.

Water used for Pats 22.9 per cent.

The above Cement:

From Bellingham, Wn.

To be used for manufacturing concrete pipe, piles & slabs.

Meets specification requirements.

14-H

cc: HES (5)

Copy Engr
MTC

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 11672

St. Paul, Minn., St. Paul, Dec. 13, 1917.

To L. M. Perkins, Engineer Maintenance of Way, Tacoma.

CEMENT.

Sample Olympic Portland Cement
 Shipped to Auburn, Wn.
 Specification No. E-108
 Test Request No. 62, 10/17/17.

From Car, Initials and No. N.P. 48756
 Sent in by Engr. M. of W., Tacoma
 Amount Represented Not shown
 S. A. No. _____

FINENESS

Passing No. 100 Sieve _____ %
 " " 200 " 80.0 %

SETTING

Initial Set 4 hrs. 30 min.
 Final " 6 hrs. 20 min.

SOUNDNESS

Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat _____ in air _____ in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

Sand=

% of Neat

Sand 270 lbs. sq. in. }
270 lbs. sq. in. } Average 267 lbs. sq. in.
260 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

Sand=

% of Neat

Sand 375 lbs. sq. in. }
380 lbs. sq. in. } Average 415 lbs. sq. in.
490 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 22.4 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats 22.4 per cent.

The above Cement:
 From Bellingham, Wn.
 To be used for manufacturing concrete pipe, piles & slabs
 Meets specification requirements.

14-H

cc: HES (5) ✓

*Copied
MFL*

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 11204

St. Paul, Minn., Oct. 11, 1917. 19

To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample. Olympic Portland Cement From Car, Initials and No. N.P. 38013
 Shipped to Auburn, Wn. Sent in by Engr. M. of Way, Tacoma, Wn.
 Specification No. E-108 Amount Represented Not shown
 Test Request No. 53, 8/30/17. S. A. No. _____

FINENESS Passing No. 100 Sieve _____ %
 " " 200 " 85.0 %

SETTING Initial Set 1 hrs. 15 min.
 Final " 5 hrs. 00 min.

SOUNDNESS Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat _____ in air _____ in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand = _____ % of Neat

Sand 261 lbs. sq. in. }
286 lbs. sq. in. } Average 286 lbs. sq. in.
310 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.
 _____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }
 Sand = _____ % of Neat

Sand 446 lbs. sq. in. }
411 lbs. sq. in. } Average 421 lbs. sq. in.
406 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 23.3 per cent.
 Water used for Sand 9.8 per cent.
 Water used for Pats. 23.3 per cent.

The above Cement:
 From Bellingham, Washington.
 To be used in manufacturing concrete piles & slabs.
 Meets specification requirements.

14-H

cc: HES (5)

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 11203

St. Paul, Minn., Oct. 11, 1917

To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample Olympic Portland Cement From Car, Initials and No. N.P. 29056
 Shipped to Auburn, Wn. Sent in by Engr. M. of Way, Tacoma, Wn.
 Specification No. B-108 Amount Represented Not shown
 Test Request No. 53, 8/30/17. S. A. No. _____

FINENESS Passing No. 100 Sieve. _____ %
 " " 200 " 80.0 %

SETTING Initial Set. 3 hrs. 15 min.
 Final " 5 hrs. 30 min.

SOUNDNESS Air Pat. -- days -- hrs.
 Cold Water -- days -- hrs.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat _____ in air _____ in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

Sand=

% of Neat

Sand 322 lbs. sq. in. }
342 lbs. sq. in. } Average 335 lbs. sq. in.
340 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

_____ lbs. sq. in. }
 _____ lbs. sq. in. } Average _____ lbs. sq. in.
 _____ lbs. sq. in. }

Sand=

% of Neat.

Sand 420 lbs. sq. in. }
417 lbs. sq. in. } Average 424 lbs. sq. in.
435 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 22.7 per cent.Water used for Sand 9.7 per cent.Water used for Pats. 22.7 per cent.

The above Cement:
 From Bellingham, Washington.
 To be used in manufacturing concrete piles & slabs.
 Meets specification requirements.

14-H

cc: HES (5)

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 11005

St. Paul, Minn., Sept. 21, 1917.19

To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample Olympic Cement
 Shipped to Auburn, Wn.
 Specification No. A.S.T.M.
 Test Request No. 47, 7/24/17.

From Car, Initials and No. N.P. 97854
 Sent in by Engr. M. of W., Tacoma, Wn.
 Amount Represented Not shown
 S. A. No. --

FINENESS Passing No. 100 Sieve 98.0 %
 " " 200 " 79.6 %
 SETTING Initial Set 2 hrs. 55 min.
 Final " 4 hrs. 55 min.
 SOUNDNESS Air Pat. 28 days -- hrs. OK.
 Cold Water 28 days -- hrs. OK.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air -- in water.
265 lbs. sq. in. }
275 lbs. sq. in. } Average 270 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.
496 lbs. sq. in. }
665 lbs. sq. in. } Average 581 lbs. sq. in.
 Sand = 58.0 % of Neat
 Sand 358 lbs. sq. in. }
315 lbs. sq. in. } Average 337 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.
585 lbs. sq. in. }
605 lbs. sq. in. } Average 595 lbs. sq. in.
 Sand = 62.4 % of Neat.
 Sand 380 lbs. sq. in. }
362 lbs. sq. in. } Average 371 lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.4 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats 22.4 per cent.

The above Cement:
 From Bellingham, Washington.
 To be used for manufacturing concrete pipes, etc.
 Meets specification requirements.

14-H

cc: HES (5) ✓

Copy in file
 ams

W. D. TURNHAM,

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 11004St. Paul, Minn., Sept. 21, 1917To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.**CEMENT.**

Sample <u>Olympic Cement</u>	From Car, Initials and No. <u>N.P. 95158</u>
Shipped to <u>Auburn, Wn.</u>	Sent in by <u>Engr. M. of W., Tacoma, Wn.</u>
Specification No. <u>A.S.T.M.</u>	Amount Represented <u>Not shown</u>
Test Request No. <u>47, 7/24/17.</u>	S. A. No. <u>--</u>
FINENESS	Passing No. 100 Sieve <u>98.0</u> %
	" " 200 " <u>79.0</u> %
SETTING	Initial Set <u>2</u> hrs. <u>35</u> min.
	Final " <u>4</u> hrs. <u>00</u> min.
SOUNDNESS	Air Pat <u>23</u> days <u>--</u> hrs. <u>OK.</u>
	Cold Water <u>23</u> days <u>--</u> hrs. <u>OK.</u>
	Hot Water <u>--</u> days <u>5</u> hrs. <u>OK.</u>

TENSILE STRENGTH**24 HOURS**

Neat <u>24 Hrs.</u>	in air <u>--</u>	in water.
<u>235</u> lbs. sq. in.	Average <u>271</u>	lbs. sq. in.
<u>307</u> lbs. sq. in.		

7 DAYS

Neat <u>24 Hrs.</u>	in air <u>6 Days</u>	in water.
<u>507</u> lbs. sq. in.	Average <u>527</u>	lbs. sq. in.
<u>547</u> lbs. sq. in.		
<u>547</u> lbs. sq. in.		
Sand <u>274</u> lbs. sq. in.	Sand=	<u>54.5</u> % of Neat
<u>300</u> lbs. sq. in.	Average <u>287</u>	lbs. sq. in.

28 DAYS

Neat <u>24 Hrs.</u>	in air <u>27 Days</u>	in water.
<u>600</u> lbs. sq. in.	Average <u>600</u>	lbs. sq. in.
<u>600</u> lbs. sq. in.		
<u>600</u> lbs. sq. in.		
Sand <u>381</u> lbs. sq. in.	Sand=	<u>60.3</u> % of Neat.
<u>363</u> lbs. sq. in.	Average <u>362</u>	lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.4 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats. 22.4 per cent.

The above Cement:
 From Bellingham, Washington.
 To be used for manufacturing concrete pipes, etc.
 Meets specification requirements.

14-H

cc: HES (5)

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10758

St. Paul, Minn., Aug. 20, 1917. 19

To L. M. Perkins, Engineer M. of Way, Tacoma, Wn.

CEMENT.

Sample	Olympic Portland Cement	From Car, Initials and No.	N.P. 97745
Shipped to	Auburn, Wn.	Sent in by	Engr. M. of W., Tacoma, Wn.
Specification No.	A.S.T.M.	Amount Represented	Not shown
Test Request No.	45, 6/28/17.	S. A. No.	
FINENESS	Passing No. 100 Sieve	98.2	%
	" " 200 "	78.5	%
SETTING	Initial Set	2	hrs. 25 min.
	Final "	3	hrs. 45 min.
SOUNDNESS	Air Pat	28	days -- hrs. OK.
	Cold Water	28	days -- hrs. OK.
	Hot Water	--	days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air -- in water.

238	lbs. sq. in.	Average	237	lbs. sq. in.
236	lbs. sq. in.			
237	lbs. sq. in.			

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

621	lbs. sq. in.	Average	596	lbs. sq. in.
	lbs. sq. in.			
570	lbs. sq. in.			

Sand= 49.3 % of Neat

Sand 273	lbs. sq. in.	Average	294	lbs. sq. in.
	lbs. sq. in.			
315	lbs. sq. in.			

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

705	lbs. sq. in.	Average	684	lbs. sq. in.
	lbs. sq. in.			
662	lbs. sq. in.			

Sand= 56.6 % of Neat.

Sand 395	lbs. sq. in.	Average	387	lbs. sq. in.
	lbs. sq. in.			
358	lbs. sq. in.			

GENERAL REMARKS:

Water used for Neats 24.6 per cent.
 Water used for Sand 10.1 per cent.
 Water used for Pats 24.6 per cent.

The above Cement:

From Bellingham, Wn.

To be used for Concrete pipe, piles & slabs, Auburn.

Meets specification requirements.

14-H

cc: HES (5)

*Copy and
note*

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10759

St. Paul, Minn., Aug. 20, 1917. 19

To L. M. Perkins, Engineer M. of W., Tacoma, Wn.

CEMENT.

Sample Olympic Portland Cement From Car, Initials and No. N.P. 97422
 Shipped to Auburn, Wn. Sent in by Engr. M. of W., Tacoma, Wn.
 Specification No. A.S.T.M. Amount Represented Not shown
 Test Request No. 45, 6/28/17. S. A. No. _____
FINENESS Passing No. 100 Sieve 98.0 %
 " " 200 " 82.8 %
SETTING Initial Set 3 hrs. 5 min.
 Final " 5 hrs. 55 min.
SOUNDNESS Air Pat. 28 days -- hrs. OK.
 Cold Water 28 days -- hrs. OK.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air -- in water.

332 lbs. sq. in. }
333 lbs. sq. in. } Average 344 lbs. sq. in.
355 lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

550 lbs. sq. in. }
550 lbs. sq. in. } Average 617 lbs. sq. in.
584 lbs. sq. in. }

Sand= 56.0 % of Neat

Sand 365 lbs. sq. in. }
365 lbs. sq. in. } Average 346 lbs. sq. in.
327 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

637 lbs. sq. in. }
637 lbs. sq. in. } Average 664 lbs. sq. in.
690 lbs. sq. in. }

Sand= 56.9 % of Neat.

Sand 370 lbs. sq. in. }
370 lbs. sq. in. } Average 378 lbs. sq. in.
386 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 24.6 per cent.
 Water used for Sand 10.1 per cent.
 Water used for Pats 24.6 per cent.

The above Cement:

From Bellingham, Wn.

To be used for concrete pipe, piles & slabs, Auburn
Meets specification requirements.

14-H

cc: HES (5)

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10759

St. Paul, Minn., Aug. 20, 1917. 19

To L. M. Perkins, Engineer M. of Way, Tacoma, Wn.

CEMENT.

Sample Olympic Portland Cement
 Shipped to Auburn, Wn.
 Specification No. A.S.T.M.
 Test Request No. 45, 6/28/17.

From Car, Initials and No. N.P. 97422
 Sent in by Engr. M. of W., Tacoma, Wn.
 Amount Represented Not shown
 S. A. No. _____

FINENESS

Passing No. 100 Sieve 98.0 %
 " " 200 " 82.8 %

SETTING

Initial Set 3 hrs. 5 min.
 Final " 5 hrs. 55 min.

SOUNDNESS

Air Pat. 28 days -- hrs. OK.
 Cold Water 28 days -- hrs. OK.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air -- in water.

232 lbs. sq. in. }
232 lbs. sq. in. } Average 244 lbs. sq. in.
255 lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

650 lbs. sq. in. }
650 lbs. sq. in. } Average 617 lbs. sq. in.
584 lbs. sq. in. }

Sand= 56.0 % of Neat

Sand 368 lbs. sq. in. }
368 lbs. sq. in. } Average 346 lbs. sq. in.
327 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

637 lbs. sq. in. }
637 lbs. sq. in. } Average 664 lbs. sq. in.
690 lbs. sq. in. }

Sand= 56.9 % of Neat.

Sand 370 lbs. sq. in. }
370 lbs. sq. in. } Average 378 lbs. sq. in.
386 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 24.6 per cent.
 Water used for Sand 10.1 per cent.
 Water used for Pats 24.6 per cent.

The above Cement:

From Bellingham, Wn.

To be used for concrete pipe, piles & slabs, Auburn
 Meets specification requirements.

14-H

cc: HES (5)

*Copy and
 mtc*

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10555

St. Paul, Minn., July 25, 1917. 19.

To L. H. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample.....	Cement	From Car, Initials and No.	H.P. 22713
Shipped to.....	Not known	Sent in by.....	Engr. H. of W., Tacoma
Specification No.	A. S. T. M.	Amount Represented.....	Not known
Test Request No.	Not known	S. A. No.	--
FINENESS	Passing No. 100 Sieve	96.0	%
	" " 200 "	81.0	%
SETTING	Initial Set	2	hrs. 25 min.
	Final "	5	hrs. 25 min.
SOUNDNESS	Air Pat.	28	days -- hrs. OK.
	Cold Water	28	days -- hrs. OK.
	Hot Water	--	days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat.....	24 Hrs.	in air	---	in water.
231	lbs. sq. in.	Average	239	lbs. sq. in.
---	lbs. sq. in.			
246	lbs. sq. in.			

7 DAYS

Neat.....	24 Hrs.	in air	6 Days	in water.
516	lbs. sq. in.	Average	509	lbs. sq. in.
---	lbs. sq. in.			
502	lbs. sq. in.			
Sand	295	lbs. sq. in.	Sand=	53.6 % of Neat
---	lbs. sq. in.	Average	273	lbs. sq. in.
250	lbs. sq. in.			

28 DAYS

Neat.....	24 Hrs.	in air	27 Days	in water.
627	lbs. sq. in.	Average	608	lbs. sq. in.
---	lbs. sq. in.			
589	lbs. sq. in.			
Sand	365	lbs. sq. in.	Sand=	61.2 % of Neat.
---	lbs. sq. in.	Average	372	lbs. sq. in.
378	lbs. sq. in.			

GENERAL REMARKS:

Water used for Neats.....	23.1	per cent.
Water used for Sand.....	9.8	per cent.
Water used for Pats.....	23.1	per cent.

The above Cement:
 From (not known)
 To be used for (not known)
 Meets specification requirements.

14-H

cc: HES (5)

Copy and

H. G.

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 10556

St. Paul, Minn., July 25, 1917. 19

To L. H. Perkins, Engineer Maintenance of Way, Tacoma, Wn.
CEMENT.

Sample Olympic Cement
 Shipped to Auburn, Wn.
 Specification No. A.S.T.M.
 Test Request No. 43, 6/8/17.
 FINENESS Passing No. 100 Sieve 98.4 %
 " " 200 " 81.6 %
 SETTING Initial Set 4 hrs. min.
 Final " 5 hrs. min.
 SOUNDNESS Air Pat 28 days hrs. OK.
 Cold Water 28 days hrs. OK.
 Hot Water 28 days hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air in water.
 lbs. sq. in. }
 315 lbs. sq. in. } Average 318 lbs. sq. in.
 320 lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.
 lbs. sq. in. }
 557 lbs. sq. in. } Average 586 lbs. sq. in.
 616 lbs. sq. in. }
 Sand= 42.8 % of Neat
 Sand lbs. sq. in. }
 276 lbs. sq. in. } Average 251 lbs. sq. in.
 225 lbs. sq. in. }

28 DAYS

Neat 24 Hrs. in air 27 Days in water.
 lbs. sq. in. }
 623 lbs. sq. in. } Average 609 lbs. sq. in.
 595 lbs. sq. in. }
 Sand= 63.5 % of Neat
 Sand lbs. sq. in. }
 363 lbs. sq. in. } Average 387 lbs. sq. in.
 410 lbs. sq. in. }

GENERAL REMARKS:

Water used for Neats 21.6 per cent.
 Water used for Sand 9.6 per cent.
 Water used for Pats 21.6 per cent.

The above Cement:
 From Bellingham, Washington
 To be used for manufacture of concrete pipes and slabs
 Meets specification requirements.

14-H

cc: HES (5)

Copy over
 m. 72

H. G. BURNHAM.

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10557

St. Paul, Minn., July 25, 1917

To L. M. Perkins, Engineer Maintenance of Way, Tacoma, Wn.

CEMENT.

Sample Olympic Cement From Car, Initials and No. N.P. 98195
 Shipped to Auburn, Wn. Sent in by Engr. M. of W., Tacoma.
 Specification No. A.S.T.M. Amount Represented Not shown
 Test Request No. 43, 6/6/17. S. A. No. --

FINESS Passing No. 100 Sieve 98.4 %
 " " 200 " 82.4 %

SETTING Initial Set 3 hrs. 53 min.
 Final " 5 hrs. 03 min.

SOUNDNESS Air Pat. 28 days -- hrs. OK.
 Cold Water 28 days -- hrs. OK.
 Hot Water -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air -- in water.

363 lbs. sq. in. }
363 lbs. sq. in. } Average 355 lbs. sq. in.
347 lbs. sq. in. }

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

590 lbs. sq. in. }
590 lbs. sq. in. } Average 541 lbs. sq. in.
492 lbs. sq. in. }

Sand 310 lbs. sq. in. }
310 lbs. sq. in. } Average 343 lbs. sq. in.
375 lbs. sq. in. }

Sand = 63.4 % of Neat

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

632 lbs. sq. in. }
632 lbs. sq. in. } Average 615 lbs. sq. in.
597 lbs. sq. in. }

Sand 335 lbs. sq. in. }
335 lbs. sq. in. } Average 371 lbs. sq. in.
405 lbs. sq. in. }

Sand = 60.3 % of Neat.

GENERAL REMARKS:

Water used for Neats 21.6 per cent.
 Water used for Sand 9.6 per cent.
 Water used for Pats 21.6 per cent.

The above Cement:
 From Bellingham, Washington
 To be used for manufacture of concrete pipe and slabs
 Meets specification requirements.

14-H

cc: MES (5)

H. G. BURNHAM

Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.
OFFICE OF ENGINEER OF TESTS.

3677

REPORT NO. 7632

St. Paul, Minn., Feb. 23, 1917. 19

To: L. M. Perkins, Eng'r. M. of Way. cc HES (5) ✓

CEMENT.

Sample	Olympic	From Car, Initials and No.	N.P. 216179
Shipped to	Auburn, Wash.	Sent in by	L. M. Perkins
Specification No.	A.S.T.M.	Amount Represented	---
Test Request No.	LMP 22	G. S. K. No.	---
FINENESS	Passing No. 100 Sieve	95.3	%
	" " 200 "	80.1	%
SETTING	Initial Set	3	hrs. 55 min.
	Final "	5	hrs. 25 min.
SOUNDNESS	Air Pat.	28	days -- hrs. O.K.
	Cold Water	28	days -- hrs. O.K.
	Hot Water	--	days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat	24	in air	---	in water.
	176	lbs. sq. in.	Average	179
	176	lbs. sq. in.		
	181	lbs. sq. in.		

7 DAYS

Neat	24 Hrs.	in air	6 Dys.	in water.
	698	lbs. sq. in.	Average	670
	641	lbs. sq. in.		
	641	lbs. sq. in.		
Sand	255	lbs. sq. in.	Sand=	40.6 % of Neat
	289	lbs. sq. in.	Average	272
	289	lbs. sq. in.		

28 DAYS

Neat	24 Hrs.	in air	27 Dys.	in water.
	744	lbs. sq. in.	Average	753
	761	lbs. sq. in.		
	761	lbs. sq. in.		
Sand	355	lbs. sq. in.	Sand=	48.1 % of Neat
	369	lbs. sq. in.	Average	362
	369	lbs. sq. in.		

GENERAL REMARKS:

Water used for Neats 23.1 per cent.
Water used for Sand 9.8 per cent.
Water used for Pats 23.1 per cent.

Above Cement:-

From Bellingham, Wash.
To be used in manufacturing concrete pipe.
Meets Specification requirements.

14-H

Copy sent to
MTC

L. M. Perkins
Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 7631

St. Paul, Minn., Feb. 23, 1917. 19

To L. M. Perkins, Eng'r. M. of Way. cc HES (5)

CEMENT.

Sample Plympic From Car, Initials and No. N.P. 21907
 Shipped to Auburn, Wash. Sent in by L. M. Perkins
 Specification No. A.S.T.M. Amount Represented ---
 Test Request No. LMP 23 G. S. K. No. ---

FINENESS Passing No. 100 Sieve 96.4 %
 " " 200 " 81.2 %

SETTING Initial Set 4 hrs. 30 min.
 Final " 5 hrs. 40 min.

SOUNDNESS Air Pat. 28 days -- hrs. O.K.
 Cold Water 28 days -- hrs. O.K.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air --- in water.

221 lbs. sq. in. }
203 lbs. sq. in. } Average 212 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Dys. in water.

693 lbs. sq. in. }
651 lbs. sq. in. } Average 672 lbs. sq. in.

Sand = 44.8 % of Neat

Sand 311 lbs. sq. in. }
290 lbs. sq. in. } Average 301 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Dys. in water.

701 lbs. sq. in. }
698 lbs. sq. in. } Average 700 lbs. sq. in.

Sand = 55.8 % of Neat.

Sand 346 lbs. sq. in. }
434 lbs. sq. in. } Average 390 lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 22.2 per cent.
 Water used for Sand 9.7 per cent.
 Water used for Pats 22.2 per cent.

Above Cement:-

Bellingham, Wash.

To be used in manufacturing concrete pipe.
 Meets Specification requirements.

14-H

copy sent
 m 72

L. M. Perkins
 Engineer of Tests.

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 7630

St. Paul, Minn., Feb. 23, 1917. 19

To: L. M. Perkins, Eng'r. M. of Way. cc HES (5)

CEMENT.

Sample Olympic From Car, Initials and No. N.P. 26607
 Shipped to Auburn, Wash. Sent in by L. M. Perkins
 Specification No. A.S.T.M. Amount Represented ----
 Test Request No. LMP 24 G. S. K. No. ---

FINENESS Passing No. 100 Sieve 94.7 %
 " " 200 " 79.0 %

SETTING Initial Set 3 hrs. 35 min.
 Final " 5 hrs. 15 min.

SOUNDNESS Air Pat 28 days -- hrs O.K.
 Cold Water 28 days -- hrs O.K.
 Hot Water -- days 5 hrs O.K.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air --- in water.

186 lbs. sq. in. }
174 lbs. sq. in. } Average 180 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Dys. in water.

671 lbs. sq. in. }
630 lbs. sq. in. } Average 651 lbs. sq. in.

Sand = 43.2 % of Neat

Sand 269 lbs. sq. in. }
293 lbs. sq. in. } Average 281 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Dys. in water.

682 lbs. sq. in. }
705 lbs. sq. in. } Average 697 lbs. sq. in.

Sand = 61.5 % of Neat

Sand 446 lbs. sq. in. }
410 lbs. sq. in. } Average 428 lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 23.3 per cent.
 Water used for Sand 9.8 per cent.
 Water used for Pats 23.3 per cent.

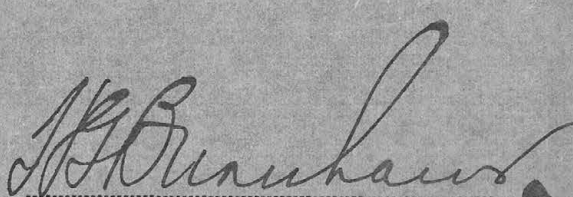
Above Cement:

From Bellingham, Wash.

To be used for manufacturing concrete pipes

Meets Specification requirements.

14-H


 Engineer of Tests.

Form 4296

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 7633

St. Paul, Minn., Feb. 23, 1917. 19

To: L. M. Perkins, Eng'r. M. of Way. cc HES (5)

CEMENT.

Sample Olympic From Car, Initials and No. N.P. 25835
 Shipped to Auburn, Wash. Sent in by L. M. Perkins
 Specification No. A.S.T.M. Amount Represented ---
 Test Request No. LMP 21 G. S. K. No. ---

FINENESS Passing No. 100 Sieve 95.3 %
 " " 200 " 77.8 %

SETTING Initial Set 5 hrs. -- min.
 Final " 6 hrs. -- min.

SOUNDNESS Air Pat 28 days -- hrs. O.K.
 Cold Water 28 days -- hrs. O.K.
 Hot Water -- days 5 hrs. O.K.

TENSILE STRENGTH

24 HOURS

Neat 24 Hrs. in air --- in water.

168 lbs. sq. in. }
189 lbs. sq. in. } Average 179 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Dys. in water.

636 lbs. sq. in. }
591 lbs. sq. in. } Average 614 lbs. sq. in.

Sand = 43.3 % of Neat

Sand 249 lbs. sq. in. }
282 lbs. sq. in. } Average 266 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Dys. in water.

782 lbs. sq. in. }
730 lbs. sq. in. } Average 756 lbs. sq. in.

Sand = 47.1 % of Neat

Sand 410 lbs. sq. in. }
301 lbs. sq. in. } Average 356 lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 24.2 per cent.
 Water used for Sand 10.0 per cent.
 Water used for Pats 24.2 per cent.

Above Cement:-

From Bellingham, Wash.
 To be used in manufacturing concrete pipe.
 Meets Specification requirements.

14-H

Copied
 A. H.

[Signature]

Engineer of Tests.

Northern Pacific Railway Company

OFFICE OF ENGINEER OF TESTS.

Report No. 7576St. Paul, Minn., February 15, 1917To L.M. Perkins, E.M. of W., Tacoma, Wash. cc HES (5)

CONCRETE COMPRESSION SPECIMENS.

Sent in by H.M. of W., TacomaRepresenting Work at Auburn Concrete PlantTest Request No. 26, 12/25/16

On

RESULTS OF COMPRESSION TESTS:

Test No.	Size	Area	Age	Mix	Maximum Load in Lbs.	Ultimate Strength Per Sq. In. in Lbs.
				1-2-3		
1	6x6x6	36	60 Da.	XXXXXX	83800	2328
2	"	"	"	"	72930	2026
3	"	"	"	"	65120	1809
4	"	"	"	"	56250	1563

REMARKS:

The above cubes evidence ultimate strength below that obtained upon the average cubes of 1-2-3 mix and 60 day age. The aggregate was made up of small rounded stones which probably accounts for the low results obtained

H. G. BURNHAM,

Engineer of Tests.

3677
Saint Paul, Minnesota. April 22, 1916.

WLD-0

Mr. A. M. Burt,

Chief Engineer of Maintenance of Way.

Dear Sir:-

Replying to your letter of the 17th instant and returning herewith Mr. Perkins' report relative to tests of concrete pipe manufactured at the Auburn plant to show the comparative strength of steamed and unsteamed pipe.

I attach copy of letter from Mr. Stevens to me of the 21st instant, with which I agree, suggesting that we will be safe in proceeding with the steaming process provided it is handled carefully by a competent foreman.

Yours truly,

COPY

Chief Engineer.

encl

Saint Paul, April 21, 1916.

Mr. W. L. Darling,
Chief Engineer.

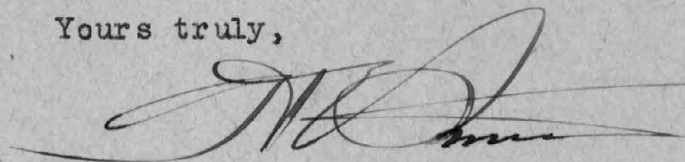
Dear Sir:

I have looked over the attached report from Mr. Perkins of April 13th covering the test of steamed and unsteamed pipe from the Auburn concrete plant and also witnessed the test of the unsteamed pipe.

It is true that these tests show little, if any, difference in ultimate strength of the two processes. Nevertheless the steamed pipe has a dead appearance and is full of small hair checks due I think to the accelerated setting and drying out of the concrete. Also as you know, there were some complaints of poor pipe, in fact extremely poor, received for use on the work, Wickersham to Sedro Wooley, Although I do not know that steaming had anything in particular to do with this poor pipe, it seems likely that it might have accounted for a part of it, especially if the steaming was not carefully done.

In view of the tests we have now made I think we would be safe in proceeding with the steaming process provided it is handled carefully by a competent foreman.

Yours truly,



Bridge Engineer.

HES
Cy-AMB
Encl

RECEIVED
OFFICE OF THE
BRIDGE ENGINEER
1916
APR 22
NOR. PAC. DIV.
ST. PAUL, MINN.

TEST, LOADING OF 24" AUBURN CONCRETE PIPE

	<u>STEAMED</u>	<u>UNSTEAMED</u>
	April 3	Feby. 14
1st cracks (Hair cracks on sides)	39000#	57200#
Cracks open top and bottom	65000#	65650#
Total load applied	97500#	94250#

Cracks approximately same for both pipe at total loading, and closed on removing the load so as to be barely perceptible.

7' pf pipe length loaded.

Saint Paul, Minnesota

April, 17th, 1916

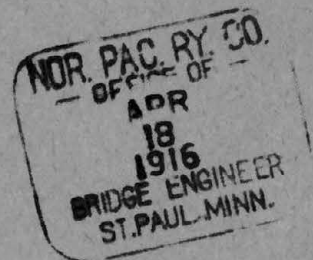
Mr. W. L. Darling,
Chief Engineer.

Dear Sir: -

Herewith record of test made on twenty-four inch reinforced concrete pipe made at Auburn. The tests were made to determine whether the process of steaming that we are using in connection with this plant had any serious detrimental effect. I think that the results show that the steamed pipe is of sufficient strength for our purposes.

Yours truly,

Amos
Chief Eng'r. of M. of W.



0-9-1-1-1

97

21

204

1945-1946

C O P Y

Tacoma, Washington, April 13, 1916.

Mr. A. M. Burt,

Chief Engineer of Maintenance of Way,

Saint Paul, Minnesota.

Dear Sir:-

I am handing you herewith a brief statement of the tests of concrete pipe manufactured at the Auburn plant and placed under test at Auburn Yard by loading of rail.

One pipe of each, steamed and unsteamed, was tested. Both pipes were approximately the same age - manufactured in the spring of 1915, and approximately ten months old. The loading was done in each case in the same manner. An 8 x 12 timber was cut to fit the outside of the pipe surface and placed longitudinally on the top of the pipe surface and placed longitudinally on the top of the pipe for a length of 7 feet, no load being placed on the bell. Rails were applied, balanced on this timber until cracking occurred.

The first cracks(which were hair cracks) apparently indicated merely tension in the concrete, with out slippage of the rods, occurred at a loading of 39,000 pounds for the steamed pipe, and 57,209 pounds for the unsteamed pipe, or approximately 5,570 and 7,890 pounds per lineal foot, respectively. The first signs of slippage of the rods (cracks opening considerably) were

at practically identical loading - 65,000 pounds or 9,286 pounds per lineal foot, for the steamed pipe, and 65,650 pounds, or 9,379 pounds per lineal foot, for the unsteamed pipe. The loads were continued to 97,500 pounds on the steamed pipe and 94,250 pounds on the unsteamed pipe, with no marked increase in the opening of the cracks. At this time, however, the bearing power of the soil in which the pipes were bedded had been exceeded and the pipes were sinking rapidly in the ground.

It is my opinion, from this test, that the practical difference between the steamed and unsteamed pipe is nothing, and that we are warranted in continuing the practice of steam-curing the pipe at Auburn.

Yours truly,

L.M.Perkins,

Engineer of Maintenance of Way.

LMP-w

encl

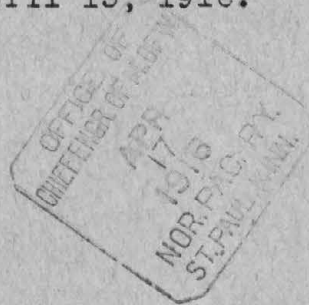
FROM OFFICE OF
ENGINEER OF MAINTENANCE OF WAY
TACOMA, WASH.

Tacoma, Washington, April 13, 1916.

Mr. A. M. Burt,

Chief Engineer of Maintenance of Way,

Saint Paul, Minnesota.



Dear Sir:-

I am handing you herewith a brief statement of the tests of concrete pipe manufactured at the Auburn plant and placed under test at Auburn Yard by loading of rail.

One pipe of each, steamed and unsteamed, was tested. Both pipes were approximately the same age - manufactured in the spring of 1915, and approximately ten months old. The loading was done in each case in the same manner. An 8 x 12 timber was cut to fit the outside of the pipe surface and placed longitudinally on the top of the pipe for a length of 7 feet, no load being placed on the bell. Rails were applied, balanced on this timber until cracking occurred.

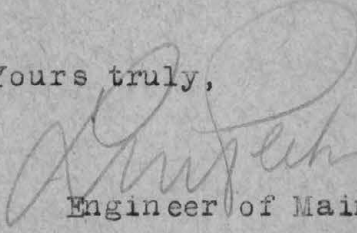
The first cracks (which were hair cracks) apparently indicated merely tension in the concrete, without slippage of the rods, occurred at a loading of 39,000 pounds for the steamed pipe, and 57,200 pounds for the unsteamed pipe, or approximately 5,570 and 7,890 pounds per lineal foot, respectively. The first signs of slippage of the rods (cracks opening considerably) were

#2.

~~a~~ practically identical loading - 65,000 pounds, or 9,286 pounds per lineal foot, for the steamed pipe, and 65,650 pounds, or 9,379 pounds per lineal foot, for the unsteamed pipe. The loads were continued to 97,500 pounds on the steamed pipe and 94,250 pounds on the unsteamed pipe, with no marked increase in the opening of the cracks. At this time, however, the bearing power of the soil in which the pipes were bedded had been exceeded and the pipes were sinking rapidly in the ground.

It is my opinion, from this test, that the practical difference between the steamed and unsteamed pipe is nothing, and that we are warranted in continuing the practice of steam-curing the pipe at Auburn.

Yours truly,


Engineer of Maintenance of Way.

LMP-w

encl.

TEST, LOADING OF 24" AUBURN CONCRETE PIPE

	<u>STEAMED</u>	<u>UNSTEAMED</u>
	April 3	Feby. 14
1st cracks (Hair cracks on sides)	39000#	57200#
Cracks open top and bottom	65000#	65650#
Total load applied	97500#	94250#

Cracks approximately same for both pipe at total loading, and closed on removing the load so as to be barely perceptible.

7' of pipe length loaded.

3677

Saint Paul, August -24- 1915. HES-M

CHIEF ENGINEER
AUG 25 1915
ST. PAUL

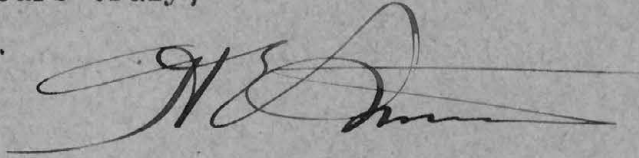
Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

As requested in your letter of June 19th and as per our previous conversation I took up with Mr. Burt the question of steaming pipe at the Auburn plant, and arranged with him to have six or eight pieces made up without using steam. Copy of Inspector McGilvrey's report dated August 2nd is attached. ✓

After the pipe is properly seasoned we will make some tests of comparative strength of pipe steamed and unsteamed.

Yours truly,



Bridge Engineer.

enc

3677

St. Paul, August 18th, 1915..

Mr. A. R. Cook,
Prin. Asst. Engr.,
Tacoma, Washington.

Dear Sir:-

Referring to your letter of July 19th and returning AS&MA Bills 7950, 7951 and 7953. I enclose also AS&MA Bills 8651 and 8649 covering freight on raw material on AS&MA Bills 7950 and 7951 as this material was used on Additions & Betterments. Also AS&MA Bill 8650 covering freight on AS&MA 7953, and bill 8648 covering interest on investment. Material on AS&MA 7953 was used on Joint work and also on Additions & Betterments.

Yours truly,

COPY
Chief Engineer.

r

Encl.

Auburn, Wash. August 2, 1915.

Mr. L. M. Perkins,
Engr Mtnc of Way.,
Tacoma, Wash.

Dear Sir:

Reporting on the matter of the experiment of casting eight pieces of 24" concrete pipe at Auburn Concrete plant without use of steam.

Four pieces were made on July 23rd and four more on July 24th. Average temperature for these days about 80° days and 70° nights.

In appearance and perfection of outline, these pipe are so far ahead of those made by steaming that there is no comparison. Every curve and corner comes from the form in perfect shape, and the concrete has an appearance of "life" and strength far different from the steamed pipe, the appearance of which is so clay-like and "dead".

No hairline cracks had developed in any of these pipe up to July 29th, when I saw them last; nor do I think that any will occur. It is my idea that these cracks are occasioned by forced shrinkage of concrete in steaming, before ultimate settlement has taken place.

The two runs were made 24 hours apart and the pipe was well set and in good hard shape to be removed from the forms in that length of time. In winter it would probably take longer than 24 hours to set up pipe, but I believe heating sand and gravel in bunkers before forming, which we are equipped to do, would give initial heat enough to set up

concrete at about the same rate as with summer temperature, and I do not believe this would result in any damage to pipe such as is encountered in steaming.

A little difficulty was encountered in lifting pipe from base, by occasion of inside form sticking more than when pipe are steamed, but this can be remedied at no great expense by using more bolts to secure inside cylinder to base. At present, only two bolts are used, but two more can be added to each form at a total cost of about \$10.00 to \$15.00 for four forms.

For these few pipe, of course, no difference in cost of operation would be noticed, except a slight saving of coal account of no steaming. The principal saving would come from using more forms and making all pipe at one operation, instead of splitting into two or three periods as at present.

Outside of results which could only be determined by an actual strength test, I would say this experiment was a decided success.

Yours truly,
(Signed) J. B. McGilvrey,
Inspector.

Tacoma, Washington, July 19, 1915.

OFFICE OF
CHIEF ENGINEER
JUL 22 1915
E-148
NOR. PAC. RY.
ST. PAUL, MINN.

Mr; W. L. Darling,
Chief Engineer.

Dear Sir:

I return herewith for correction A.S. & M.A. bills Nos. 7950, 7951 and 7953 covering value of concrete pipe furnished from the Auburn Plant. As bills 7950 and 7951 cover pipe furnished for Additions and Betterments freight on raw material should also be added. Bill 7953 covers pipe chargeable to Additions and Betterments and also used on joint work, and interest on investment and freight on raw material should be added. Please have corrections made and bill returned to me for voucher.

Yours truly,

W-P

Enc

A. R. Cook
Principal Assistant Engineer.

Mr W. L. Darling

Please find attached
person bill covering freight on
raw material & interest on investment
charges as requested by Mr Cook.
So early please.

Ed Park

Person

8. 18. 11.

X
Saint Paul, Minnesota. June 19, 1915.

WLD-0

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir:-

Referring to Mr. Clements' letter to you of the 16th instant: I suggest you discuss the question of steaming pipe at Auburn with Mr. Burt, with a view of reaching a conclusion as to whether to steam or not.

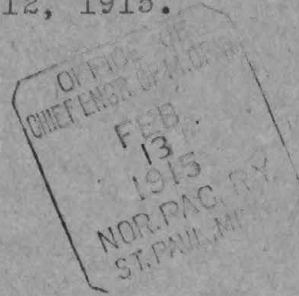
Yours truly,

Chief Engineer.

enc

3677

St. Paul, February 12, 1915.



Mr. W. L. Darling:

Replying to your letter of February 10th with reference to opening up the Auburn plant.

I think we had better figure on starting the plant about April 1st, putting on the necessary force about the middle of March to get it ready for opening on the former date.

LD

Mr. Burd

Not received

MD 7/15

*Mr. Darling
Noted*

AWB

2/15

ST. PAUL, MINN.
NOV. 24, 1915
1915
FEE
CHIEF OF ENGINEERING
OFFICE OF

X

3677

Saint Paul, Minnesota. February 10, 1915.

WLD-0

Mr. George T. Slade,
First Vice President.

Dear Sir:-

I attach a copy of letter from Mr. Burt to me of the 30th ult. relative to putting on a force to start up the Auburn Plant.

The pipes should ripen for thirty days before they are used, so that it would perhaps be sixty days after the plant is started before pipes could be furnished suitable for use. I do not know that any of the waterways require early attention; it will depend more, I believe, upon when the money is available. Will you please advise how I can answer Mr. Burt?

Yours truly,

Chief Engineer

enclosure

At Tacoma, Washington

January 30th, 1915

OFFICE OF
CHIEF ENGINEER
FEB 3 1915
NORTH PACIFIC RY
ST. PAUL, MINN.

Mr. W. L. Darling,

Chief Engineer,

St. Paul, Minn.

Dear Sir: -

It will be necessary to run the Auburn concrete plant about sixty days to take care of this seasons requirements. It is desirable to start the plant early in order that the pipe may be seasoned before being shipped out.

Would like to figure on starting the plant about March first, if this is satisfactory. This will mean that a few men will have to be put on February fifteenth to get the plant in shape to start work March first.

Yours truly,



Chief Eng'r. of M. of W.

3677

Saint Paul, November -20- 1914. HES-M

Mr. A. M. Burt,

Chief Engr Mtnc of Way.

Dear Sir:

I have just found that no action whatever was taken by your office regarding the requisition for portable crane for handling concrete pipe at the Auburn concrete plant, sent you with my letter of September 14th.

This requisition having been duly signed and prices obtained by the Purchasing Agent I had supposed that it was in order and that the work would go through. If it is your opinion that any further authority is necessary before ordering the material I should appreciate it if you would advise, so that we may if possible arrange for same.

Yours truly,

Bridge Engineer.

cc
WLD
CAC

3677

OFFICE OF
CHIEF ENGINEER
NOV
S-9312
1914
NOR. PAC. RY.
ST. PAUL, MINN.

Tacoma, Washington, November 9, 1914.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

Replying to yours of the 28th ultimo and referring to copy of Mr. Breedlove's letter dated October 24th re pipe used on the Thornwood Hill line change:

First, commenting on Mr. Breedlove's report of pipe laid at station 4620: I think that he refers to pipe laid at about station 4633, Willard Creek. Mr. Breedlove advises that the pipe was made in May, 1913, and shipped out ten days after. The pipe was not placed until September, 1913.

Second, two lines of 36" pipe at station 4583 and a single line at station 4612, which he also advises was made some time in May: I think that this refers to culverts at stations 4585 and 4613. He advises that this pipe was made some time in May, 1914. The pipe at culvert station 4585 was laid in February, 1914, and that at station 4613 was laid on September 26, 1913.

Referring to comments on foundation, I have to advise that in all places where culverts were placed all ~~sub~~ soil was removed and pipe laid on good, hard, substantial material. That when pipes were laid the backfill was tamped around the

pipe and pipe covered before any fill was deposited thereon, this being particularly necessary on account of height of trestle above the pipe, and the fact that it would not do to dump material directly onto the pipe. In all cases the contractor was cautioned to fill each side, letting the toes run over the pipe to a considerable depth before any fill was deposited directly over same.

I am satisfied that the pipe dried out too quickly and that ^{it} probably was given too much steam before taking off forms. Furthermore, I am of the opinion that the reinforcing was not in all cases put in in accordance with the stenciling on the pipe, and I believe that pipe elliptical in shape or oval is a much better form of construction than the round pipe. In many cases the culverts were not installed for several months after they were received from Mr. Breedlove, and some of them would not bear handling. One pipe was entirely destroyed, two others partially, in handling between the material yard and the location of the culvert. When pipe were received they were unloaded in the material yard and later when required loaded on narrow gauge trucks and hauled to the location where they were to be placed. This refers particularly to culverts at stations 4612 and 4633, and all pipe between stations 4700 and 4740.

Yours truly, *

ARC-P

A. R. Book
Principal Assistant Engineer.

St. Paul, Minnesota. October 28, 1914.

WLD-0

Mr. A. E. Cook,
Principal Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Please be referred to your report of June 29th last relative to pipe used on the Sedro Woolley to Wickersham job.

I hand you herewith copy of letter from Mr. Breedlove to me of the 24th instant. His conclusions are that improper foundation was provided, and that the pipe was used before it had time to thoroughly set.

If you have anything further on this I shall be very glad to have your conclusions.

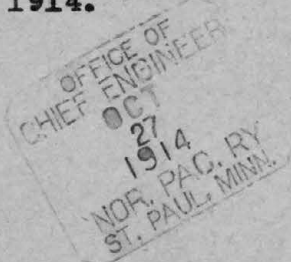
Yours truly,

Chief Engineer.

Encl.

Tacoma, Wash., October 24, 1914.

Mr. W. L. Darling,
Chief Engineer,
St. Paul, Minn.



Dear Sir:-

See your letter of July 7th and tracer of October 3rd about concrete pipe made for the Sedro-Woolley Line.

I have had Mr. McGilvrey make an examination of the pipe, and report on the conditions he found, and beg to advise as follows:

At Sta. 4620 pipe used was made on May 8th, 1914, and had been shipped out ten days after it was made, so that it clearly had not been seasoned enough to take any load.

At Sta. 4583, two lines of 36-inch pipe, and at Sta. 4612, single line of 36-inch pipe made sometime in May, 1914. The indications are that the pipe which was crushed in these places did not have a proper foundation and had not been protected before fill was made by blanket-ing and tamping along the sides to give a good bearing on the lower half of the pipe. At the first named station number three pieces were very badly cracked or crushed under the center line of the track in the south line, and eight pieces in the north line. Fill at this point is fine gravel and sand and about 50 feet deep. At Sta. 4612 a 36-inch single line of pipe under fill of about 25 feet

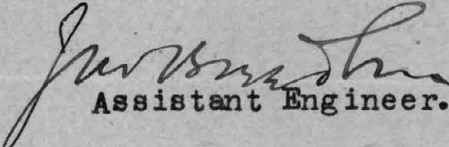
Mr. Darling -2-

10-24-14

there were four, and possibly five, pieces of pipe crushed under the center of the track.

I should say, judging from Mr. McGilvrey's report of conditions as he found them on the ground, that the trouble was a lack of proper foundation, and protection of the pipe before the fill was made.

Yours truly,


Assistant Engineer.

JCB-S

OFFICE OF
CHIEF ENGINEER
OCT 3
1914
NOR. PAC. RT.
ST. PAUL, MINN.

3671

Como, St. Paul, Minn., Oct. 2, 1914

A&T
Concrete

Report No. 2998

Mr. A. M. Burt,

C. E. M. of W.

Dear Sir:

Acknowledging your letter of Sept. 28th, together with correspondence from Mr. Perkins, relative to Test Report No. 2998, covering Concrete specimens, from Foreman, Auburn, correspondence returned herewith:

These test cubes should show from 2200 to 2400 lbs. per sq. in. for the 28 day test, and from 2700 to 2900 lbs. per sq. in. upon the 3 mos. test.

I am forwarding you under separate cover representative specimen from one of these test cubes, for your personal examination, and you will note that the Concrete does not appear to grade very uniformly in size; also that the concrete appears to be porous to a considerable extent, as if the same had been made up too wet. All cubes, with the exception of the one mentioned in the report as slightly damaged, were received in good condition.

Yours truly,

H. G. BURNHAM
Engineer of Tests

14-P cc WLD, WJB, LMP and JBMCCG

Northern Pacific Railway Company.

OFFICE OF ENGINEER OF TESTS.

Report No.

3237

St. Paul, Minn.,

Sept 25th

1914

To

W.L. Darling

cc WJB - HMB - PMP - MCG

CONCRETE COMPRESSION SPECIMENS.

Sent in by

Freeman

Representing Work at

Auburn

Test Request No.

3

On

Concrete Plant.

RESULTS OF COMPRESSION TESTS:

Test No.	Size	Area	Age	Mix	Maximum Load in Lbs.	Ultimate Strength Per Sq. In. in Lbs.
1	6x6	36 sq in	28 days	4 1/2 x 8 x 14	49450	1374
2	"	"	28	"	39820	1106
3	"	"	3 mo.	"	51040	1418
4	"	"	3 mo	"	57160	1588

REMARKS:

Above Concrete made from Superior brand Cement furnished by F.T. Crowe Co. Tacoma.

H.G. Burnham

Engineer of Tests.

14.11

St. Paul, Minnesota. October 3, 1914.

REG-0

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

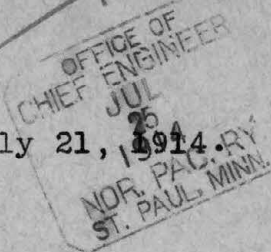
Please refer to my letter of July 7th enclosing correspondence with Mr. Burt relative to poor pipe made at Auburn.
Will be glad to have reply.

Yours truly,

Chief Engineer.

(COPY)

3677
Tacoma, July 21, 1914.



Mr. A. R. Cook,
Prin. Asst. Engineer,
Tacoma.

Dear Sir:

9/10
Please note attached copies of letters from A. M. Burt and Mr. Darling about concrete pipe used on the Sedro-Woolley job. Can you give me the dates pipe was made which failed? Mr. Darling has asked me to look this matter up. Will you please advise promptly.

Yours truly,

JCB-A

(Sgd) J. C. Breedlove.

Assistant Engineer

Copy to Mr. Darling ✓

Mr. Darling:

Please note.

J.C.Breedlove.

3677
St. Paul, Minnesota. July 7, 1914.

WLD-0

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Wash.

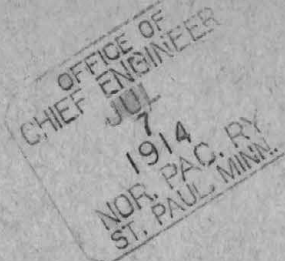
Dear Sir:-

7/25
Please note the attached copies of letters from myself to Mr. Bart of the 2nd inst. and his reply of the 3rd, relative to the poor pipe made at Auburn. This was made under your direction: Will you please investigate and advise as to cause, also say who is in charge of the work?

Yours truly,

Chief Engineer.

Encl



Saint Paul, July 3, 1914.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

Referring to the attached in regard to pipe used
on the Sedro Woolley job:

You will note that this pipe was made last year
while the plant was under the charge of the Construction
Department. We have been making a special effort to make
good pipe at the plant this year, having learned something
from our failures at Glendive last summer, and our this
year's product is I believe all first-class,

Yours truly,

Chief Eng'r of M. of W.

St. Paul, Minnesota. July 2, 1914.

WLD-0

Mr. A. M. Burt,

Chief Engineer Maintenance of Way.

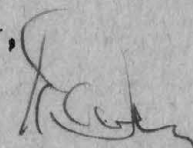
Dear Sir:-

Mr. Cook's report of the 29th ultimo relative to pipe used for the Sedro Woolley to Wickersham job, has this statement:

"Mr. Taylor reports that this pipe is some of the pipe received from Auburn last, and is very poor pipe; the cement seems to be lacking and mixture of sand and gravel too lean in sand; two of these pipe have not even stood the handling and have crumbled up at several points. This is no doubt the case with pipe in Willard Creek fill that was cracked."

This is similiar to the trouble we had with the pipe at Glendive. It is evidently the fault of the men in charge of the plant.

Yours truly,


Chief Engineer.

Cy to H E Stevens

OFFICE OF
CHIEF ENGR. of W. of W.

JUL

3

1914

NOR. PAC. RY.
ST. PAUL, MINN.

3677
St. Paul, Minnesota. July 2, 1914.

WLD-0

Mr. A. M. Burt,

Chief Engineer Maintenance of Way.

Dear Sir:-

Mr. Cook's report of the 29th ultimo relative to pipe used for the Sedro Woolley to Wickersham job, has this statement:

"Mr. Taylor reports that this pipe is some of the pipe received from Auburn last, and is very poor pipe; the cement seems to be lacking and mixture of sand and gravel too lean in sand; two of these pipe have not even stood the handling and have crumbled up at several points. This is no doubt the case with pipe in Willard Creek fill that was cracked."

This is similiar to the trouble we had with the pipe at Glendive. It is evidently the fault of the men in charge of the plant.

Yours truly,

Chief Engineer.

Cy to H E Stevens

2677
St. Paul, Minn., April 3rd, 1914

File 10-267

Mr. W. Darling,
Chief Engineer.

Dear Sir:-

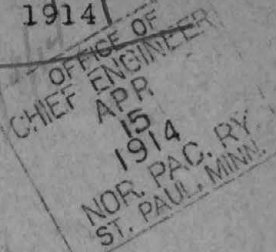
Referring to your letter of March 31st relative to reinforcing bars shipped from Duluth to Glendive Concrete Plant and reshipped to Auburn Concrete Plant.

Beg to advise that this expense bill was included in bill versus Construction Department file 809(11) Tacoma-Tenino Line dated March 21st, amount \$8691.20.

Yours truly,

cmd-c

W. S. Taylor
Auditor Agencies.



St. Paul, Minn., March 31, 1914.

Mr. W. S. Tayler,
Auditor Agencies.

Dear Sir:-

Referring to my letter of February 9th, relative
to reinforcing bars shipped from Duluth to Glendive Concrete
Plant and reshipped to Auburn Concrete Plant.

Please advise references to bill covering freight from
Duluth to Glendive.

Yours truly,

REG-B

Chief Engineer.

St. Paul, Minn., Feb. 9, 1914.

Mr. W. S. Tayler,
Auditor Agencies.

Dear Sir:-

Referring to yours of the 23rd Ult. file 2-460 and file attached, relative to reinforcing bars shipped from Duluth to Glendive Concrete Plant and reshipped to Auburn concrete plant.

Construction Department (F809-11 Tacoma-Tenino Line) should pay freight from Duluth to Glendive on shipment covered by Glendive-Auburn WB 751 July 25, 1913. See copy of freight bill attached. Please include in next bill, or advise.

Yours truly,

REG-B

Chief Engineer.

Tacoma, February 4, 1914.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I return herewith file sent me with your letter of January 27th about the assessment of freight charges on reinforcing steel shipped from Duluth to Glendive and afterward forwarded to Auburn:

I presume, under the ruling of the Auditor, that charges should be assessed on the shipment from Duluth to Glendive. Will you please arrange to have included in the next AD bill for freight charges?

Yours truly,

PLA-A

J. B. Edwards
Assistant Engineer.

St. Paul, Minn., Jan. 27, 1914.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Replying to yours of December 8th and referring to file attached relative to reinforcing bars shipped from Duluth to Glendive Concrete Plant and re-shipped to Auburn Concrete Plant upon which you claim a through rate.

The Auditor of Freight Receipts advises that the through rate will not apply on above shipments, as special rule in Tariff states that all car load shipments so stopped will be subject to the rate to and from point at which stop is made.

Presume charges as assessed will have to stand. Please advise.

Yours truly,

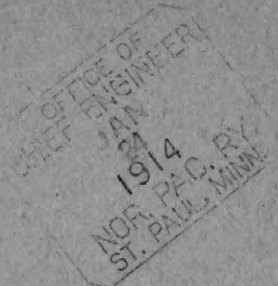
REG-B
Copy AMB

Chief Engineer.

Refers to Mr. Cribb's letter of Nov. 24th.

St. Paul, Minn. Jany 23rd, 1914

File 2-460



Mr. W. L. Darling,

Chief Engineer.

Dear Sir:-

Referring to your letter of Dec. 23rd regarding re-inforcing bars shipped from Duluth to Glendive Concrete Plant and re-shipped to Auburn Concrete Plant, on which Asst. Engineer Breedlove advises through rate should apply.

Note Auditor Freight Receipts' letter of Jany 21st file E-17-25241 from which you will note that carload shipments stopped enroute to partly unload are subject to the rate to and from points ~~whi~~ at which stop is made.

Yours truly,

M. J. Saylor
Auditor Agencies.

wpc-d

QMB
Ppr
St. Paul, Minn. Jan. 21, 1914.

File E-17-25241

Mr. W.S. Tayler,
Auditor Agencies,

Dear Sir:-

Replying to yours of the 26th ult. attached relative to re-inforcing bars shipped from Duluth to Glendive Concrete Plant and there partly unloaded and then re-shipped from Glendive to Auburn Concrete Plant.

The through ^{rate} will not apply on above shipment. Special rule in Tariff states that all carload shipments so stopped will be subject to the rate to and from point at which stop is made.

Yours truly,

W. H. Richards

Auditor Freight Receipts.

St. Paul, Minn. Dec. 26th, 1913

File 2-7031

Mr. Wm Richards,

Aud. Freight Receipts.

Dear Sir:-

I hand you herewith some correspondence received from Chief Engineer Darling with his letter of Dec. 23rd regarding re-inforcing bars shipped from Duluth to Glendive Concrete Plant, and then re-shipped from Glendive to Auburn. Concrete Plant.

Mr. Darling is asking whether the through rate Duluth to Auburn should apply. It appears from attached papers that some of these bars were unloaded at Glendive and the balance of the car forwarded to Auburn.

With prompt return of this file kindly advise.

Yours truly,

H. A. Layden
Auditor Agencies.

@

wpc-d

St. Paul, Minn., Dec. 23, 1913.

Mr. W. S. Taylor,
Auditor Agencies.

Dear Sir:-

Referring to file attached relative to reinforcing bars shipped from Duluth to Glendive Concrete Plant ^{re} and shipped to Auburn Concrete Plant upon which Assistant Engineer Breedlove claims a through rate should apply.

Car 38508 was billed from Duluth to Glendive, July 14th and rebilled to Auburn July 25th.

Car 43641 was billed from Glendive to Auburn July 4th, but the material was originally received at Glendive in another car.

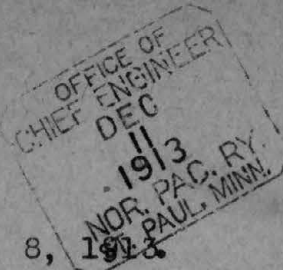
In view of above please advise if Construction Department is entitled to a through rate.

Yours truly,

CDP-B

Chief Engineer.

Tacoma, Wash., Dec. 8, 1913



Mr. W. L. Darling,
Chief Engineer,
St. Paul, Minn.

Dear Sir:

Returning herewith file sent me with your letter
of December 2nd in regard to Duluth to Glendive No. 9489
covering ship--ment of corrugated bars in NP car 38508.

I think the proper way to handle the freight on
this shipment now would be to charge Construction with the
rate from Duluth to Auburn and allow credit for the freight
so far paid as shown by Glendive to Auburn W/B dated 7/25
No. 751, NP car 38508, amount \$115.46 and Glendive to Auburn
W/B 7/4 No. 122, NP car 46341 amount \$74.69; total \$190.15.

As you remember, Mr. Chapman made shipment of rein-
forcing rods on July 4th for emergency use, and car 38508
was stopped at Glendive and he removed ^{rods} an equivalent ^{to} amount
of rods which he shipped July 4th. This shipment originated
at Buffalo, and Construction Department should be charged the
N.P. proportion of the through rate Buffalo to Auburn. Copies
of way bills Glendive to Auburn referred to above attached.

yours truly,

J. C. Price de viz
Assistant Engineer.

PLA-3
enc

St. Paul, Dec. 2nd, 1913..

12/28
Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Herewith memo of November 24th from Mr. Cribbs with waybill 9489 Duluth to Glendive covering corrugated bars in NP 38508. With the return of papers will you please advise if you were billed freight from Glendive to Duluth on the balance of the bars which were not removed at Glendive.

Yours truly,

Chief Engineer.

REC R

Encl.

3477
6-E-1
Tacoma, March 18, 1914.
OFFICE OF
CHIEF ENGINEER
1914
NOR. P.C. RY.
ST. PAUL, MINN.

Mr. E. C. Blanchard,
General Manager,
Tacoma.

COPY

Dear Sir:

I hand you herewith three copies of my Requisition for Authority for Expenditure No. 2 covering Auburn concrete pipe and pile manufacturing plant, amount of AFE \$13141.82. This A.F.E. is prepared in accordance with a letter of the Chief Engineer dated February 18th, 1914, copy of which is attached, and the above amount represents the present value as determined by joint check by Mr. Perkins and myself. The detail of valuation is attached to A.F.E. and shows in addition to the present value the original or new value. The depreciation of \$2387.07 has been taken care of in charges to pipe and piles shipped out during the operation of the plant in the two years it was handled by the Construction Department.

This plant was turned over to you for operation by Mr. Perkins on March 1st, 1914, and this A.F.E. is part of the transfer record. Will you therefore kindly approve and have approved by Mr. Perkins and forwarded to St. Paul in the regular manner?

Bills for the value of the plant to the same amount as covered by this A.F.E. have been sent to Mr. Perkins, also bills for surplus material turned over and not a part of the plant.

Yours truly,

(Signed) J. C. Broadlove

JCB-A

Copy to Mr. Darling

Assistant Engineer

St. paul, Minn., Feb. 18, 1914.

COPY

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Referring to your letter of the 9th instant concerning turning over the concrete plant at Auburn to the Operating Department. I have discussed the matter with Mr. Mayer and his idea is that an A.F.E. should be made to cover the present value of the plant to be turned over to the Operating Department, which should be agreed upon before A.F.E. is prepared. The estimate should show its cost from which depreciation should be deducted to give present value. When A.F.E. is made a bill should be put through for the value of the plant to be charged against the A.F.E. and credited Construction. In addition bills should be made against the Store Department for any surplus material turned over, not part of the plant. please arrange accordingly.

Yours truly,

REG-B
Copy G.J.M.

(Sgd) W. L. Darling
Chief Engineer.



REQUISITION FOR AUTHORITY FOR EXPENDITURE

Applicant's No. 2 Eng. Dept. No. _____ Comptroller's No. _____
On Puget Sound Div'n or _____ Dept. State of Wash. Val. Sec. No. _____
Location _____

Authority is requested for an expenditure of \$ 13,141.82 chargeable approximately as follows: (Distribution to be made in General Office, St. Paul.)

To Optg. Exps. \$ _____ To Addns. and Betts. \$ 13,141.82 To _____ \$ _____

For { new work
additions
removals
maintenance

At _____

{ In Budget
Not in Budget
On Form 134

Consisting of Concrete pipe and pile manufacturing plant and sand and gravel screens.

Plant located at Auburn, Wash.

The location is on ~~not on~~ this company's property and is not ~~in~~ joint territory. To secure required rights it will be necessary nothing

If required by Accounting Department, a detailed estimate will be furnished promptly after approval. The expenditure is recommended for the following reasons: (if space is not sufficient continue on back.)

This plant was authorized in connection with the construction of the Tacoma-Tenino Line, but not as a part of the general authority covering that work---and has since been operated by the Construction Department. This A. F. E. is to cover the transfer of plant made to the Operating Department on March 1, 1914. Amount noted on this A.F.E. covers value of plant on March 1st, 1914, depreciation being agreed upon by joint check made by Engineer Maintenance of Way and Assistant Engineer of Tacoma-Tenino Line.

Work should be commenced Completed in order to complete by Completed
and be done by company force ~~contract~~ under charge of Construction Department

Signature and Title { _____ Date of { March 18, 1914
of Applicant { _____ Requisition { Assistant Engineer

APPROVED By

_____	_____	_____
Genl. Supt.	Engr. M. of W.	Chief Engr. M. of W.
_____	_____	_____
Chief Engr., Mech. Supt. or Supt. Telg.	_____	General Manager.
_____	_____	_____
Third Vice President.	_____	Second Vice President.
_____	_____	_____
Comptroller.	President.	Date of Final Approval { 191 <u>4</u>

COMPTROLLER'S RECORD OF NOTICE OF APPROVAL AND OF COMPLETION

Form 1345 issued _____ 191_____ Work begun _____ 191_____ Work finished _____ 191_____

This form, made in triplicate, should be used for requesting authority for special expenditures. When the Applicant is a Division Superintendent, or other subordinate of a General Superintendent, the authority of the latter must first be obtained before making out a Requisition on this form; in the case of others the authority of the head of the department interested must be obtained. When made, the requisition signed and dated must be sent in duplicate to the General Superintendent, or other head of department, for approval, and should be passed on to the other officers interested, in order, as shown on the face of the blank. One copy should be retained by the Applicant for file and reference. Except in emergencies, under authority of the head of the department, or of one of the executive officers of the company, work for which authority is requested should not be begun until Notice of Approval (Form 1345) has been received. Work for which right of way arrangements are to be made, or deposits by other parties, should not be begun until such matters have been adjusted. Estimates, personally signed, should be made, in sufficient detail to show kinds of material, quantities, all other items, and prices; if part of the cost is to be charged others, special instructions must be obtained regarding prices to be used, transportation, trackage, equipment rental, etc. These estimates should show in detail how derived, the total cost, deduction to be charged, and not for which authority is requested; operating expenses and capital charges. When a detailed estimate is required by the Accounting Department, a supplementary notice will be issued by the Comptroller to those interested in the distribution of the accounts. In order to show location, when necessary, a plat should be attached; new work being shown in color, preferably red. Under recommendations, full explanation and statement of present situation and of all items involved in the improvement desired should be made, and in particular for the following - (a) traffic - necessity, results and advantages; (b) operating necessity, resulting improvement in service, and economy; (c) agreements, or other considerations affecting the undertaking; and (d) disadvantages, or difficulties that may ensue.

INSTRUCTIONS

NORTHERN PACIFIC RAILWAY COMPANY

AUBURN CONCRETE PLANT

INVENTORY

JANUARY 24, 1914.

P L A N T

Tools, Equipment, Etc.

Per Cent
of New

Present Value
Material Freight

1	Single Blade axe,	80	.65	
7	Picks with handles	75	1.70	
1	8" concrete hoe	50	.25	
1	8" Sledge,	80	.80	
1	Dietz #2 Lantern	50	.58	
100'	Armored hose, 3/4",	60	10.83	
24'	Plain hose, 3/4",	50	3.00	
4	K&J wheel barrows,	(2-100 New		
		(2- 70	17.85	
1	Steel tray mortar barrow	70	5.60	
1	Oil burner head light	80	15.29	
4	Track chisels,	80	1.72	
1	10" Jack screw	80	3.80	
1	Track Jack	75	3.75	
7	3/4" S Wrenches	90	2.20	
1	12" Monkey wrench	80	.42	
1	10" " "	80	.34	
2	36" Pipe "	85	5.50	
1	18" " "	80	.70	
1	14" " "	80	.52	
1	#10 Tin shears	90	1.35	
5	Banjo torches,	75	4.70	
2	6' A Tooth Cross-cut saws	90	5.85	
3	10-gal. oil cans	60	.60	
2	1 " " "	50	.13	
3	Sets lug hooks,	80	6.00	
2	5/8" x 15' Cable choker slings (with derrick)			
4	Sq. Point D Handle shovels,	60	1.62	
2	Rd. " D " "	50	1.62 .75	
3	Scoops	80	1.92	
3	Peavies,	70	2.73	
8	Lining bars,	80	6.16	
8	Pick Handles,	New	.70	
4	Double wood blocks 3/4 size	80	2.02	
4	Single " " 3/4 "	80	8.00	
300'	3/4" Manilla Rope,	60	16.20	
250'	1 1/4" " "	60	8.02	
80'	2" " "	80	5.68	
1	Concrete tamping bar	80	1.20	
80	Eye Bolts for 24" forms,)			
20	" " " 36" ")	100	13.66	
200#	8" boat spikes	95	3.80	
175	3/4" x 24" Drift bolts,	100	4.00	
140	5/8" x 8" Bolts, Hex head and nut)			
60	5/8" x 6" " " " " ")	90	4.86	
1	Pr. Tongs for moving pipe	75	13.25	
1	Koppel car	90	66.60	
1	Pipe vise Reed Mfg. Co. #22	60	1.65	
1	Bench " G M Yost Mfg Co #104	90	5.18	
1	Green River Screw Plat Set #103	75	7.17	
1	Saunders Pipe Cutter, #2	90	1.34	
1	" " " #3	90	1.98	
3	Bamboo Brooms	50	.30	
1	Pipe Stock, Ashcroft #3,	90	8.94	
1	" " Wolworth #2	90	4.50	
1	" " " #1	90	3.38	
9	Pipe dies, 1/4", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", (price included with stocks)			
3	5/8" Ship augers,	75	2.74	
2	Swift Lubricators, 1/2 Pt.	75	3.98	

Forward:

296.46

-2-
P L A N T % New

Present Value
Material Freight

	Forward:	296.46	
2	Long Spout Oilers,	60	.20
1	Short " "	60	.07
2	Cold chisels,	50	.12
2	Concrete edging tools,	80	1.34
2	Flue cleaner rods,	90	.64
3	Raker rods for boiler,	90	1.00
13	MT wooden oil barrels (Return to S.Tacoma)		
1	Pc. #22 Galv. Iron 24x96	100	.70
2	#2 Dietz Lantern Globes,	100	.20
100	5/16"x2"Oval head Carriage Bolts,	100	.30
4	5/8"x10 1/2" Gauge Glasses,	100	.50
1	Office Broom,	90	.18
1	Hack Saw Frame 12"	90	.60
1	3/4" Hose nozzle,	50	.12
3	Metal oil spigots,	80	1.20
1	Spigot auger,	80	.24
1	Caboose stove,	80	10.50
1	Small coal Stove,	80	6.00
8	Lengths stove pipe,	60	.96
4	Pcs. 2 1/2"x3"x3/8"x9'0" T bar	90	7.13
1	Gross 2" wood screws,	90	.10
1	Set of 4 guy rods for 60' derrick boom (with derrick)		
1	Spreader for above rods (with derrick)		
1	Set extra gnahes for loco.boiler,	95	9.50
1	Marvel rod cutter #7	90	21.15
	Total Labor and Freight on Tools	80	13.22
1	Pr. tongs for moving pipe,	80	6.77
			53.14

Pipe and Fittings: All Black Mal. Iron.

1"	Pipe	20 Lin.Ft.	New	.50
1 1/4"	"	291 "	60	5.93
1"	"	23 "	New	.80
1 1/2"	"	232 "	75	12.70
2"	"	381 "	75	26.72
2 1/2"	"	540 "	70	56.32

Elbows, 90 degree.

3/4"	16 pcs.		
1"	1 "		
1 1/4"	1 "		
1 1/2"	7 "	60	5.73
2"	4 "		
2 1/2"	9 "		

Elbows, 45 degree.

1"	1 Pc.		
1 1/4"	5 "	60	.96
2 1/2"	2 "		

Tees:

1"	4 Pcs.		
1 1/4"	6 "		
1"	8 "		
1 1/2"	1 "	60	2.45
1 1/2"	12 "		
2"	5 "		
4"	1 "		

Flange Unions

2"	2 Pcs.	60	.21
----	--------	----	-----

Forward: 491.52 53.14

-3-
P L A N T
Forward: % New

Present Value
Material Freight
491.52 53.14

Pipe and Fittings, Cont.

Unions:

1/4"	2 Pcs.
1/2"	7 "
3/4"	5 "
1"	10 "
1 1/4"	1 "
1 1/2"	4 "
4"	1 "

60 1.35

Nipples 6" long:

3/4"	2 Pcs.
1"	2 "
1 1/4"	3 "
1 1/2"	4 "
2"	4 "

70 .53

Crosses:

2"	1 Pc.
----	-------

50 .13

Nipples 12" long:

4 1/2"	2 Pcs.
--------	--------

90 .35

Floor Flanges:

4 1/2"	2 Pcs.
--------	--------

90 2.00

Plugs:

1"	3 Pcs.
2"	2 "

60 .04

Bushings:

1/4"x1/2"	1 Pc.
1/4"x1/4"	2 "
1/4"x1"	5 "
1/4"x1 1/4"	3 "
1/4"x1 1/2"	9 "
1"x1 1/4"	3 "
1"x1 1/2"	2 "
1"x2"	5 "
1 1/4"x1 1/2"	3 "
1 1/2"x2"	8 "

60 .49

Reducers:

1/4"x1/2"	2 Pcs.
1/2"x1"	1 "
1"x1 1/4"	1 "
1 1/4"x1 1/2"	2 "
1 1/2"x2 1/2"	2 "
2"x2 1/2"	2 "
2"x3"	1 "
2"x4"	1 "

60 1.42

Valves--Globe:

1"	2 Pcs.)
1 1/2"	3 ")
2"	14 ")
1"	8 ")
1 1/2"	5 " (
2 "	5 " (
2 1/2"	3 " (

75 9.15

70 17.33

Valves--Check.

1 1/4"	1 Pc.
2 1/2"	2 "

70 .74

80 3.32

Forward:

528.37

53.14

-4-
P L A N T

Pipe and Fittings, Cont.		Forward:	% New	Present Value Material	Value Freight
<u>Valves---Angle:</u>				528.37	53.14
2"	1 Pc.		70	3.67	
<u>Faucets, Bib:</u>					
3/4"	1 Pc.		50	.35	
<u>Caps:</u>					
1/2"	2 Pcs.				
3/4"	2 "				
1"	5 "		60	.47	
1 1/2"	3 "				
2"	5 "				
<u>Couplings:</u>					
1/2"	3 Pcs.				
3/4"	15 "				
1"	9 "				
1 1/2"	30 "		70	5.70	
2 1/2"	32 "				
4"	3 "				

Total Freight on Pipe and Fittings, 60 37.27

Total: \$538.56 \$90.41

BUILDINGS & EQUIPMENT.

	Value New		Present Value.	
	L&M	Frt.	L&M	Frt.
<u>Gravel and Sand Bins:</u>				
Capacity: _____ Cu.Yds.Gravel; _____ Cu.Yds.Sand.				
Lined with #22 gauge galv. iron throughout inside				
Complete with cement platform, measuring bins, etc.				
Patterned after standard plans for water tank construction,				
partially bolted together. Depreciation by age only, 20%,				
	689.29	166.25	551.43	133.00
<u>Cement House 14'x30'</u>				
Capacity about 3000 sacks cement. Frame construction, not sealed inside; shingle roof, concrete and old stringer foundation. Depreciation 20% due to age only:				
	233.89	23.48	187.11	18.78
Trestle from gravel screens of pipe section to storage bins. Depreciation 20% from age:				
	398.03	68.42	318.42	54.73
Guy Derrick, 5 Ton Capacity, no bull wheel, 60 foot 12"x12" mast, 57 foot 12"x12" boom; eight 3/4" cable guys with turnbuckle tighteners; concrete foundation under mast, American Hoist & Derrick Co. fittings. Equipped with 2 heavy single steel diamond blocks 12" size, one plain, one with hook; 300 lin.ft. 3/4" crucible steel hoisting rope, six strands, nineteen wires per strand, hemp center; 350 lin.ft. 5/8" cable of same kind; Depreciation derrick and all fittings except cable, 30%:				
	839.72	50.72	587.80	35.50
Depreciation of cable 60%	37.50		15.00	
Forward:	2198.43	308.87	1659.76	242.01

BUILDINGS & EQUIPMENT:

	Value New		Present Value	
	L&M	Fr't	L&M	Fr't.
Forward:	2198.43	308.87	1659.76	242.01

Screens, Commercial:

Size 6'x12'. Working equipment requires one screen 6'x12" made of 3/8" reinforcing rods to leave 2 1/4" dia. opening; one screen 6'x12' of 3x3 smoke stack netting; one screen 6'x12' of No.22 mesh to the inch brass wire. All of these screens are at this time totally worn out. 2"x12"-48" sides or 16 Pcs. 2"x12"-12' now 50% good. Bottoms or 12 pcs. 2"x12"-12' now 50% good. 144 sq. ft. #22 galv. iron on these bottoms also worn out. 280 lin.ft. 2"x12" SLS lumber in chutes from screens to cars now 50% good. 35 sheets #10 gauge black iron 24"x96" 70% good, as chutes only, account bent into trough shape. 600 lin.ft. 4"x4" supports to chutes from screens to car about 75% good but buried in gravel full length up to bottom of chutes. Account mud sills under screens and above described equipment in place, we could claim credit for about 40% of the labor charge on installing these screens.

(Total cost paid by T.Z.Krumm)

Moulding Platforms:

Including original platform about 24'x40' for setting 24" and 36" pipe forms. Platform for molding piles and platforms or bases for 24" and 36" pipe forms inverted, or bell end down. Of the original platform about 24'x40' constructed of 3"x12" SLS matched fir laid on old stringers foundation and covered with #22 gauge galv. iron. The lumber of this platform is in place and about 70% good. The galv. iron cover is now worn out. Pile platforms: Concrete beams for setting up pile forms at least 95% perfect. Storage skids of old stringers 81% good. Trestle runway for transporting concrete to forms in wheelbarrows 70% good.

Pile Trestle: 85%	138.62	14.85	117.83	12.60
For Pipe 70%	546.40	83.08	382.48	58.16

Base blocks under 24" and 36" pipe forms made from old stringers 75% value.

Tool House and Office:

Size 12' x 36'. Frame construction. Office section 12'x10' sealed sides and top. Tool section unsealed. Shingle roof. Base or mudsills of 8"x8" and 8"x10" fir timber. 80% value at date:

169.69	15.50	135.75	12.40
--------	-------	--------	-------

Steel Shed:

Size 16'x30' dimensions; construction same as tool house; not sealed; old stringer foundation; 80% value:

182.87	20.35	146.30	16.28
--------	-------	--------	-------

Steel Racks:

Size 4'x30' affording 6 storage spaces 2'x2'-30'; inner construction of 4"x4" fir; lap sided 1"x12" rgh.fir; shingle roof; old stringer foundation; 80% value:

51.22	6.20	40.98	4.96
-------	------	-------	------

Well and Water Supply:

Well 35' deep; 12' circular curbing of 2"x10" SLS fir for 16' depth; 4'x6" curbing of 2"x4" balance of depth; 3 pcs. 2" iron pipe with 36" gravel drive points driven to depths from 20' to 40' below bottom of well. Water can be raised from all these pipes. This well now abandoned account getting supply from gravity water system.

Value 60%	657.62	17.50	394.57	10.50
One-half interest in 4" wire bound wood pipe line 1800' long connecting with Company main of 10" wood pipe along main line R/W. One-half cost:	260.01	6.25	260.01	6.25

Forward:	4204.96	472.60	3137.78	363.16
----------	---------	--------	---------	--------

BUILDINGS & EQUIPMENT:

	Value New		Present Value	
	L&M	Frt	L&M	Frt
Forward:	4204.96	472.60	3137.78	363.16
<u>Well and Water Supply, Cont.</u>				
One Worthington Duplex steam pump size 6x4x6. This pump received by plant second hand. Now worth 75% of value when received.	60.00	3.00	45.00	2.25
Water storage tank on top of bank of pit elevation 170' above yard grade. 2"x10" matched surfaced fir lumber, thoroughly bolted. No.12 wire between edges of all 2"x10", well leaded and oakum caulked. About 7000 gallons capacity. 430 lin.ft. 2½" pipe running from pump across yard, over trestle to screens, and up slope of pit to tank. 360 lin. ft. 2" pipe laid from tank down to commercial screens. Value of water tank now about 70% of new.	59.48		41.64	
Value of pipe (Included with pipe and fittings)				
<u>Tools (itemized individually above)</u>				
<u>Concrete Mixer:</u>				
Smith ¾ yard batch mixer, mounted on platform with steam upright engine; second hand when received. Complete at present and in good running order. Value 70% of when received:	957.09	80.65	765.67	64.52
<u>Cast Iron Pipe Forms 24" & 36":</u>				
Four 36" forms complete mounted on molding bases. Four 24" forms mounted on molding bases. 2 complete extra 24" forms; 4 outside 24" forms only. These forms all in perfect condition at present:	4292.43	687.90	4292.43	687.90
<u>Pile Forms:</u>				
Nine 16" wood stave pile forms 16" dia. made up. Material on hand for one form. Lined with No.30 black sheet iron. Complete with galv. points etc. Present value 80% of new,	457.57	27.30	366.05	22.24
<u>Pipe Mandrels, 24" and 36":</u>				
Present value 75%	267.89	35.00	200.92	26.25
<u>Privy:</u>				
Building 75%; foundation and vault no value; resulting about 50% original cost,	22.85	1.50	11.43	.75
<u>Loading Track:</u>				
Good repair. Practically all overhauled and replaced since plant started, 100%,	456.79	100.92	456.79	100.92
<u>Bulkheading:</u>				
Present value 50%	139.32	4.75	69.66	2.38
<u>Screens:</u>				
For pipe material. These screens are 3'x6' in size. The 1" diameter screen is constructed of ½" round plain bars on 2"x4" frame. This screen is now 50% good. The gravel then falls on a heavy galv. iron sheet screen punched with ½" round holes. This screen is 50% good. From this screen it passes out 3x3 smokestack netting screen. This netting is in two or three pcs. and is of little value. The 22 mesh to the inch screen (brass) wire screen is about 50% good. All material going to make up sides, bottoms, sills or braces of this screen would be of no value used for any other purpose. In place, however, it is still worth about 50% of the labor charge in construction of screens. 17 pcs. #10 gauge iron 24"x96" worth 90% as chutes only:	161.97	2.85	80.99	1.42
Forward:	11080.35	1416.97	9468.36	1271.79

	Value New		Present Value	
	L & M	Frt	L & M	Frt
Forward:	11080.35	1416.97	9468.36	1271.79
<u>Derrick Engine or Hoist Boiler:</u>				
8 1/2" x 10" Flory 2nd hand D.C.D.D. hoisting engine with upright boiler attached. All complete with injector, lubricator, oil cups and other sundries. Has depreciated 20% in our service:				
	970.00	25.20	776.00	20.16

Miscellaneous Charges:

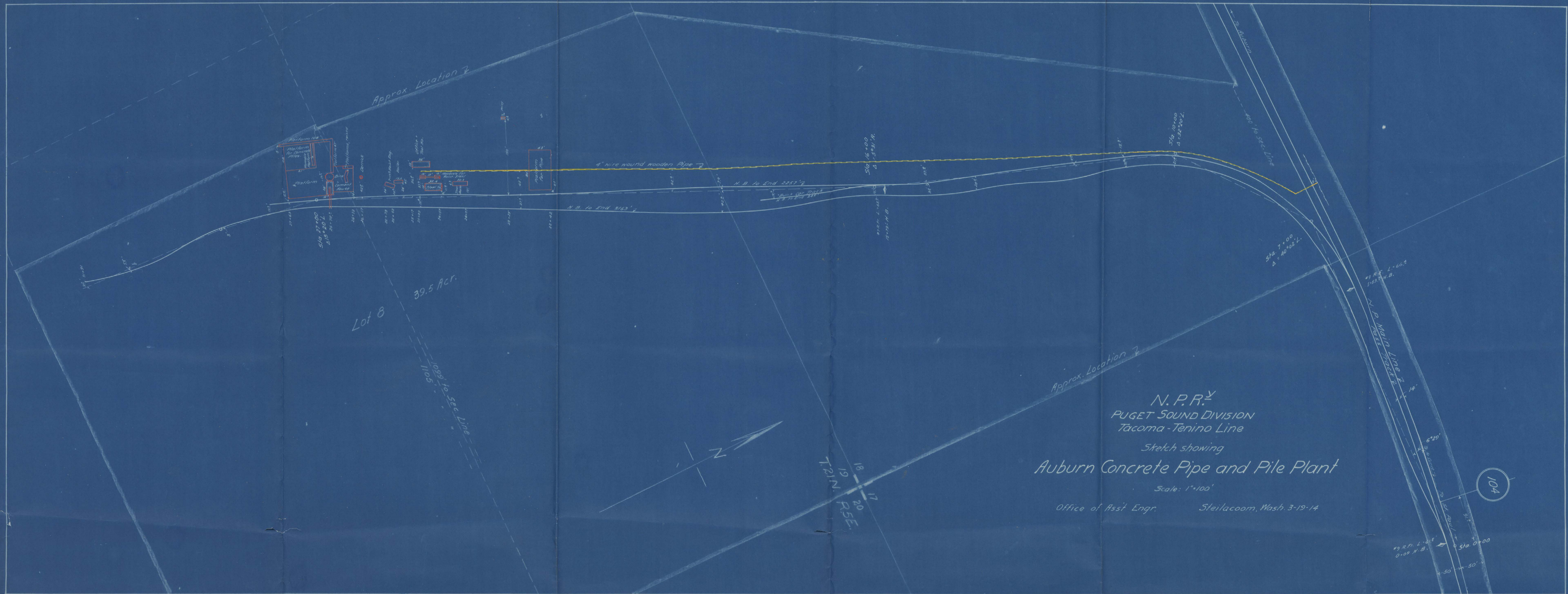
Rental of Equipment,	198.55
Injuries to Persons,	227.50
Engineering,	445.35
Passes,	11.65
Grading,	326.23

80%

1209.28	11.40	967.42	-80%-9.12
13259.63	1453.57	11211.78	1301.07

Tools and Fittings:
Buildings & Equipment:

696.02	119.67	538.56	90.41
13259.63	1453.57	11211.78	1301.07
13955.65	1573.24	11750.34	1391.48



N. P. R.
PUGET SOUND DIVISION
Tacoma-Tenino Line
Sketch showing
Auburn Concrete Pipe and Pile Plant

Scale: 1"=100'
Office of Asst. Engr. Steilacoom, Wash. 3-19-14

104

3677
CPS
St. Paul, Minn., March 4th, 1914.

Mr. J. C. Breedlove,

Assistant Engineer,

Tacoma, Washington.

Dear Sir:

I am in receipt of yours of the 27th ultimo in connection with present value of the Auburn Concrete Pipe and Pile Plant to be turned over to the Operating Department and covered by an A F E.

Your understanding of our conversation had last November is correct and I see no contradiction in Mr. Darling's letter of February 18th.

So far as the Operating Department and the proposed AFE is concerned you can, of course, only take into consideration the plant and the equipment, showing in detail the original cost and deducting therefrom the depreciation, thus arriving at the present value.

The value of the manufactured ^{raw} material to be turned over to the Operating Department, of course, should be on the basis of cost to the Construction Department as finally arrived at, but this latter item should not be included in the AFE but covered by a bill against the Operating Department and carried in Material and Supplies under "Auburn Concrete Pipe and Pile Plant" until disbursed by that department. There is, however, another consideration and that is your construction accounts for the Tacoma - Tenino Line. Full details are to be furnished showing

the cost of the plant and manufactured material, and any overage or shortage to be adjusted in the Construction Accounts.

Yours truly,

E

Auditor Disbursements.

Copy- Mr. W. L. Darling.

2677

File

St. Paul, Minn., March 4, 1914.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

#

Referring to your wire of the 3rd instant. Have arranged with Auditor of Agencies to make separate bill for all freight charges on shipments into Auburn for concrete Plant.

Yours truly,

REG-B

Chief Engineer.

Endorsed to Mr. Taylor 3/4.

3677

6-E-1

OFFICE OF
CHIEF ENGINEER
MAR
3
1914
NOR. PAC. RY
ST. PAUL, MINN.

Tacoma, February 27, 1914.

Mr. G. J. Mayer,
Auditor Disbursements,
St. Paul.

COPY

Dear Sir:

See Mr. Darling's letter to me under date of February 18th in reply to mine of the 9th about method of making up the A.F.E. and accounts in connection with the transfer of the Auburn Concrete Pipe & Pile Plant to the Operating Department:

I understood, from talk which I had with you when I was in St. Paul last November, that the procedure would be about as follows: We would make up a complete statement showing the cost of construction and installation of the plant and equipment, also a complete statement of cost of operation, applying a proper depreciation to plant and equipment to cover the time operated, and determine the unit cost price for the 24-inch and 36-inch pipe and also for piles and arrive at a corrected unit cost for each of these items and, if necessary, correct such bills as we have made, charging the work on the Tacoma-Tenino line at these revised rates.

In other words, the entire cost of the plant and its operation would show, also a credit to this new A.F.E. for the amount of pipe and piles furnished, which would leave a net sum covering the plant and equipment and material which we will have on hand and will turn over to the Operating Department, this net sum being the amount for which the new A.F.E. would really be passed.

I am having such a statement made, but will go ahead making up the A.F.E. on basis of Mr. Darling's letter of February 18th unless I have further advice from you.

Joint check has been completed with the Operating Department and depreciation percentages agreed upon and I am having this statement made up to show dollars and cents value of the plant and other equipment to be turned over to the Operating Department.

Yours truly,

JCB-A

(Signed) J. C. Broadlove

Copy to Mr. Darling.

Assistant Engineer

3677
St. Paul, Minn., Feb. 18, 1914.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Referring to your letter of the 9th instant concerning turning over the concrete plant at Auburn to the Operating Department. I have discussed the matter with Mr. Mayer and his idea is that an A. F. E. should be made to cover the present value of the plant to be turned over to the Operating Department, which should be agreed upon before A.F.E. is prepared. The estimate should show its cost from which depreciation should be deducted to give present value. When A.F.E. is made a bill should be put through for the value of the plant to be charged against the A. F. E. and credited Construction. In addition bills should be made against the Store Department for any surplus material turned over, not part of the plant. Please arrange accordingly.

Yours truly,

REG-B
Copy G. J. M.

COPY
Chief Engineer.

C. F. Massey Company

MANUFACTURERS OF

REINFORCED CONCRETE PRODUCTS

Railway Supplies

ILLUMINATED WARNING SIGNALS
MASSEY BATTERY WELLS
MASSEY BATTERY CHUTES
CULVERT PIPE
PORTABLE CONCRETE HOUSES
POLES, PILING AND POSTS

GENERAL OFFICES
PEOPLES GAS BUILDING, CHICAGO

EASTERN OFFICE
50 CHURCH STREET
NEW YORK

FACTORIES:
CHICAGO, ILL.
MINNEAPOLIS, MINN.
MEMPHIS, TENN.
DES MOINES, IOWA
NEWARK, N. J.
SPokane, WASH.

CHICAGO. Feb. 19th 1914

W. L. Darling, Ch. Eng.,
Minnesota & International Ry.,
St. Paul, Minn.

Dear Sir:-

Referring further to our previous correspondence, we take great pleasure in presenting to you the enclosed pamphlet on Reinforced Concrete Pile Trestles and Culvert Pipe. The trestles and bridges shown therein are the results of careful study and are not an experiment.

It occurs to us that you might have occasions where you could employ our permanent system in replacing existing temporary, and proposed new, structures. There are at present a number of these types of bridges in service throughout the country which have proven satisfactory in every respect. We are now manufacturing at our various plants a very high grade of bridge slabs and piles and are prepared to make any style or quantity of these articles, our own standard or any other design, that you may desire.

Our culvert pipe is now in such general use that you are, no doubt, familiar with its excellent qualities. We carry a large, well seasoned stock at all of our plants and are prepared to make prompt deliveries.

Trusting that this matter may have your favorable consideration and that we may have the pleasure of receiving your inquiries, we are,

Very truly yours,

C. F. MASSEY COMPANY.

W. A. Sultgren

Engineer.

DAH:F
encl.

Reinforced Concrete Pile Trestles and Culvert Pipe



C. F. MASSEY COMPANY

PEOPLES GAS BUILDING
CHICAGO

C. F. MASSEY COMPANY

Manufacturers of High Grade
Reinforced Concrete Products

Railway Supplies
Signal Accessories
Massey Battery Wells
Massey Battery Chutes
Telephone Booths
Watchman's Houses
Oil Houses
Power Houses
Station Houses
Culvert and Sewer Pipe
Telegraph Poles
Ornamental Lighting Posts
Railway Trestles

General Offices

PEOPLES GAS BUILDING
CHICAGO

Eastern Office

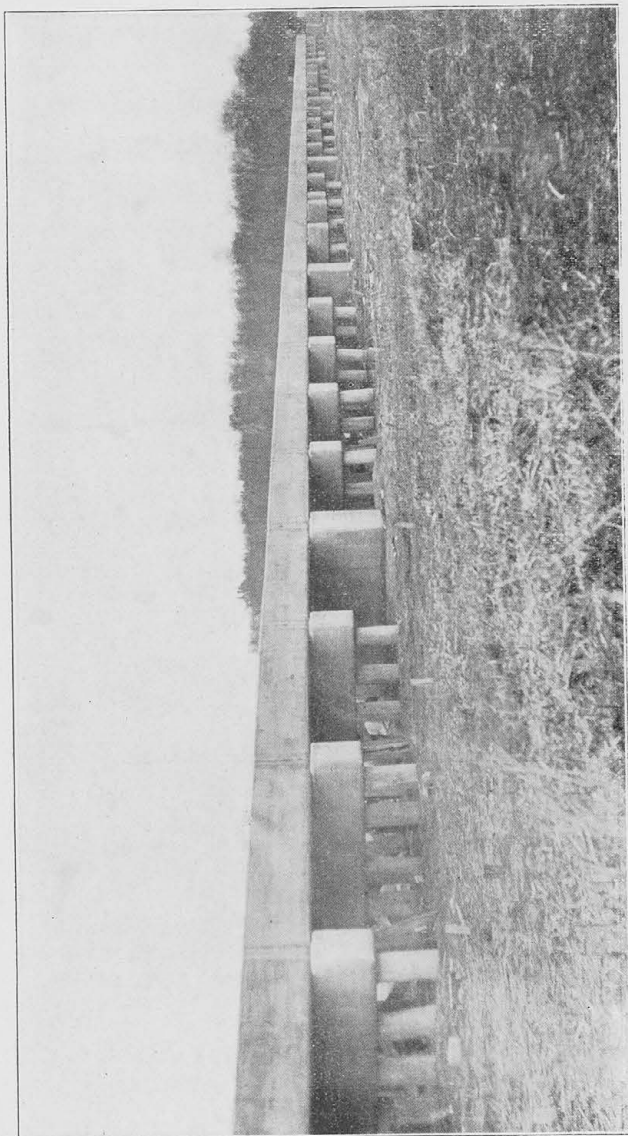
50 CHURCH STREET
NEW YORK, N. Y.

Western Office

03430 COOKE STREET
SPOKANE, WASH.

Plants Located at

NEWARK, N. J.	MINNEAPOLIS, MINN.	SPOKANE, WASH.
CHICAGO, ILL.	DES MOINES, IA.	
MEMPHIS, TENN.	ANNA, ILL.	



AN EXAMPLE OF "PERMANENT CONSTRUCTION"

Reinforced Concrete Trestles FOR RAILROADS

RAILROAD engineers are fast realizing the important part reinforced concrete is taking in modern railroad construction and maintenance. As a matter of fact, all of the principal railroads in the country are replacing deteriorating and disintegrating wooden and metal structures with reinforced concrete.

Engineers who have to do with railroad maintenance will appreciate the value of having **permanent structures** that require absolutely no maintenance along the right of way. It will, in fact, be obvious to anybody if they stop to consider the great expense involved in incessant repainting, repairing and renewing. The use of reinforced concrete in connection with building railroad trestles has attracted considerable attention in recent years and there are at the present time a number of roads who have adopted this method of construction as a standard.

In past years it has been the general practice to use timber pile trestles for bridging unimportant streams, drainage areas, swamps, etc., especially in the south along the Mississippi River Valley where there are a great number of waterways that cut through the right of way. This method of construction is invaluable in this territory owing to the fact that there is no necessity for long panels, i. e., the supports can be placed as close together as desired. These advantages combined with the fact that there is no ice to cause jams or other obstructive objects make conditions ideal.

Timber trestles are, strictly speaking, **temporary** structures. They not only require careful periodical inspections, but continual maintenance and repairing. Worn-out trestles have caused great losses both in lives and money. Fire particularly is a thing that is apt to occur any time. The continual wetting and drying of the trestles promotes decay which not only weakens the structure but makes it more susceptible to **conflagration**.

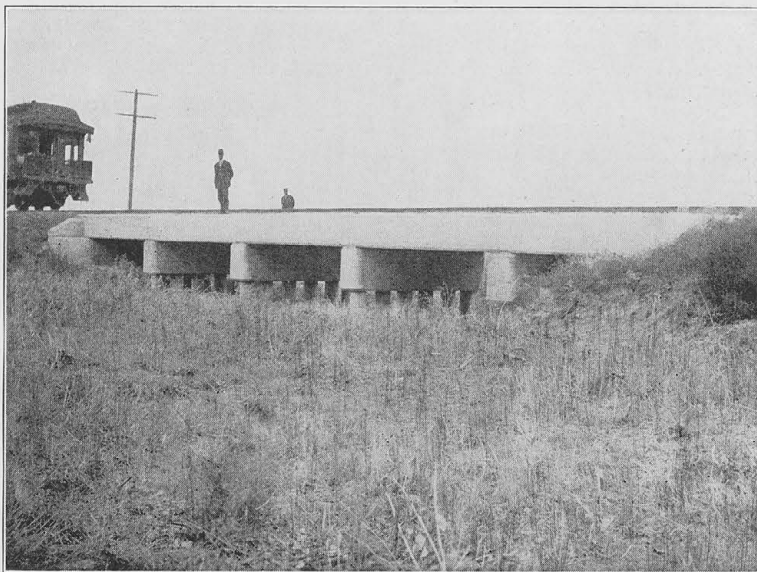
Extensive researching and experimenting have shown that reinforced concrete trestles can be made and erected at a cost that would be **economical** and with a **minimum disturbance to traffic**. The slabs and piling are manufactured and shipped to the site of the proposed trestle, where they are set into place by machinery, thereby obviating the necessity of storing large quantities of materials and equipment and as there is very little field work to be done the labor costs are also reduced to a minimum.

Reinforced concrete trestles have a great many advantages over any other type of trestles because they are absolutely **fire-proof, non-corrodible, require no maintenance and last forever**. This method of construction is not particularly limited to shallow openings, but it is generally the practice to limit the pile and cap type to 20 feet in height. Trestles having higher openings are usually constructed by building up thin piers as supports. The lateral stresses which occur in these trestles are taken care of in different ways, depending largely upon the various existing conditions. These stresses which occur in trestles of the former type are usually taken care of by building either a double pile cap or a solid pier every fifth span. Those that occur in trestles of the latter type are taken up by the

stability of the pier. It is even necessary in some cases where the openings are reasonably deep to build small girts between the piers.

The piles have to be driven to refusal owing to the great load they have to sustain, hence, it is necessary that the exact required depth be known. There have been cases where the pile has not been driven to refusal and settling has taken place. This has been corrected by jacking up the slabs to the grade line and casting a layer of concrete between the slabs and cap to fill up the discrepancy.

In some cases conditions have prevented piles from being driven to the anticipated depth. This has been taken care of by cutting off the top of the pile at the proper height. Then again, there have been instances where piles have been driven beyond the anticipated depth. In this case the pile cap has been made deeper. In driving

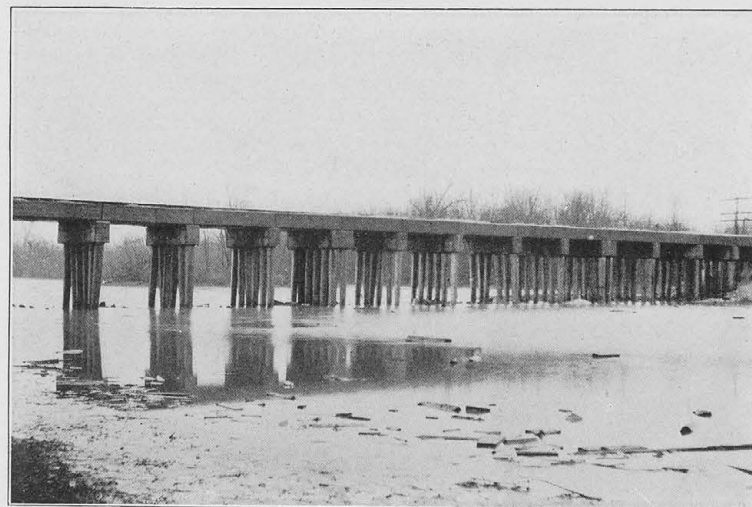
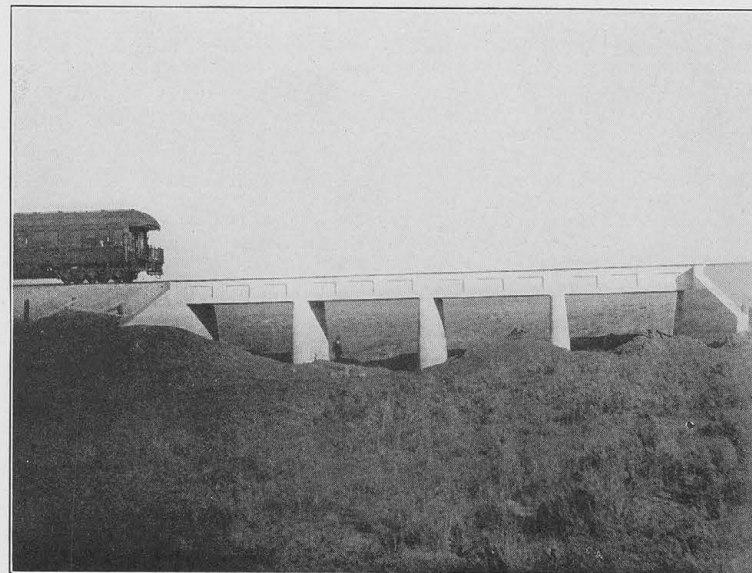


BRIDGING A SHALLOW OPENING.
(C. B. & Q. R. R.)

the piles for these trestles care should be taken in selecting the cap to be used. Layers of some elastic material, such as **rope** or **rubber**, should be placed between the head of the pile and the hammer in order to eliminate the possibility of injuring the top of the pile.

After the piles have been driven to the required depth the forms for the pile caps are set up around the top of them and the caps are cast. When this has been sufficiently seasoned the slabs are set into place by means of a locomotive crane, a layer of mortar being placed between the cap and slabs.

It has been the usual practice to make the slabs one-half inch shorter at each end than the distance between center to center of

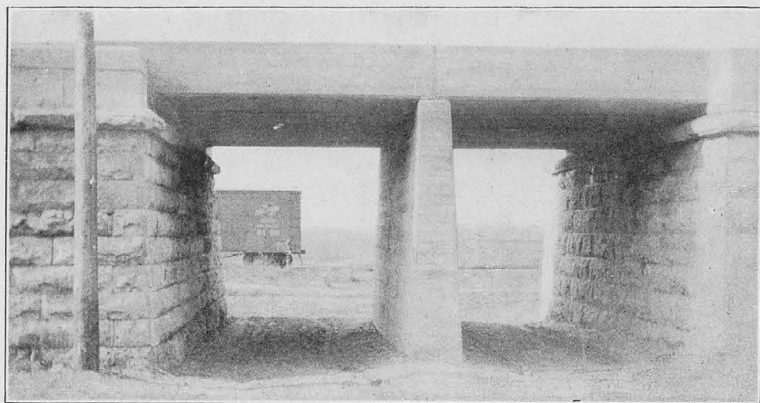


BRIDGING DEEP OPENINGS

supports, thereby making an open space of one inch between the slabs. This is done to allow for any expansion that might take place. This space is usually filled with a mixture of pitch and sand heated, melted and poured in.

There are a number of different ways of designing these structures and as every engineer has his own individual method of calculating, it would be rather difficult to strike a happy medium. It is, however, the general practice to use Cooper's E-60 Locomotive Loading as a standard basis for the live load.

The use of reinforced concrete trestles as a suitable bridging medium is not particularly limited to trestles, but can and is being used to great advantage in **decking plate girder structures**. In this connection the use of reinforced concrete slabs present approxi-

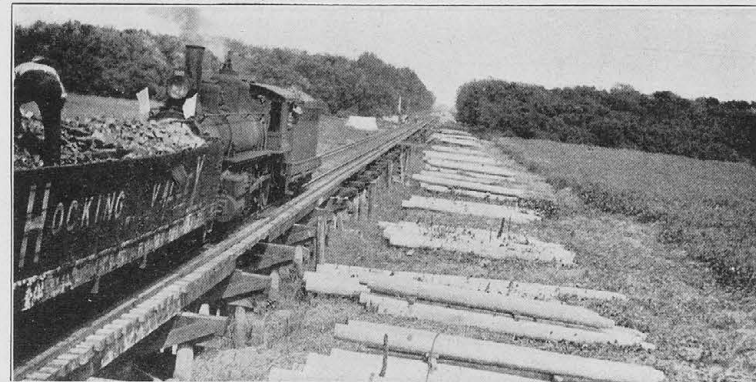
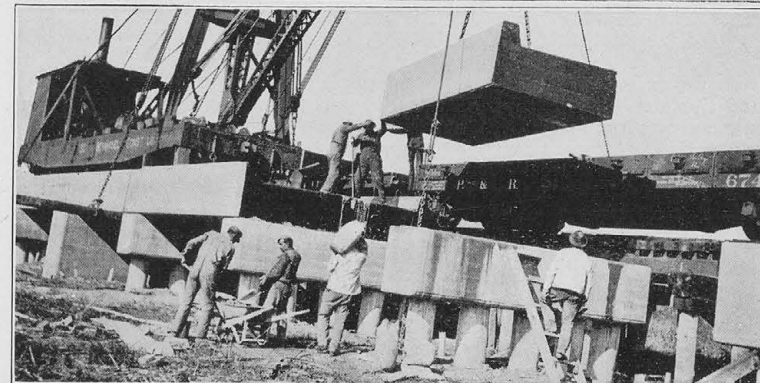
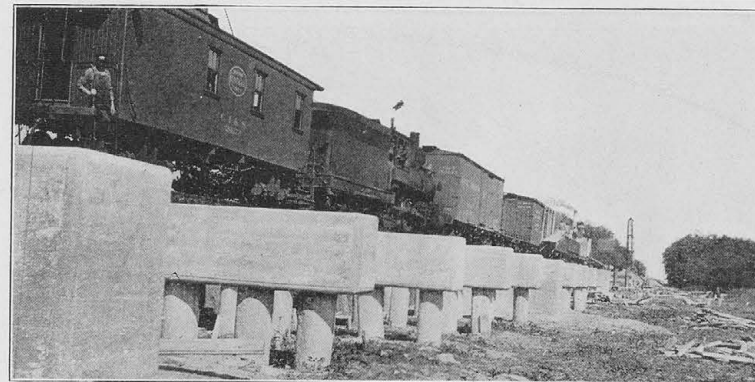


WHERE CHANGES IN GRADE ARE NECESSARY SOME ROADS ARE INSTALLING OUR SLABS, INSTEAD OF RESETTNG THE OLD STEEL BRIDGES, AT AN ECONOMICAL COST.

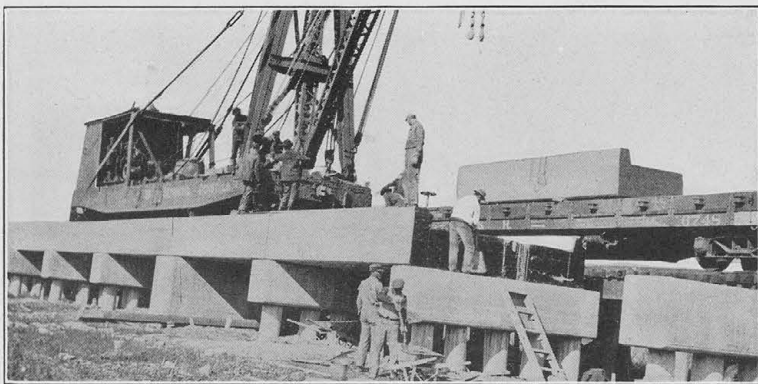
mately the same advantages as described in the foregoing treatise on trestle slabs. The fact that there are a number of these types of bridges in service that have proven to be satisfactory is, perhaps, the strongest argument that could be raised for the advisability of adopting this method of construction.

The C. F. Massey Company are now manufacturing a very high grade of reinforced concrete slabs and piles. The material and workmanship used in the manufacture of these products are of the high standard for which this company prides itself on being well known. The materials are from time to time tested so as to obviate the possibility of any inferior class of material being used. All the work is done by experienced workmen supervised by competent engineers.

The slabs are fitted with U-rods or stirrups placed at such an angle so that there will be a direct pull when the chains are engaged for lifting. This eliminates the necessity of using toggle beams and other equipment for lifting. They are also equipped with drainage channels that carry superfluous water to drain pipes which are cast



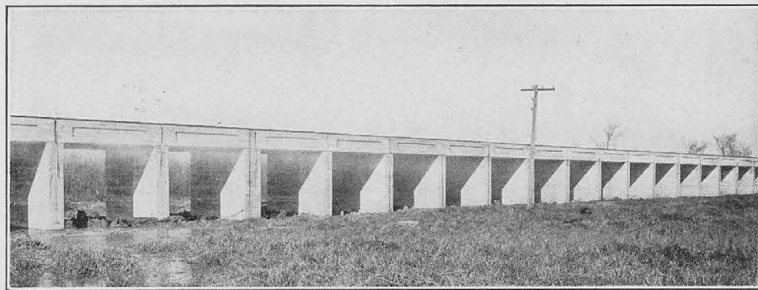
TYPICAL CONSTRUCTION VIEWS



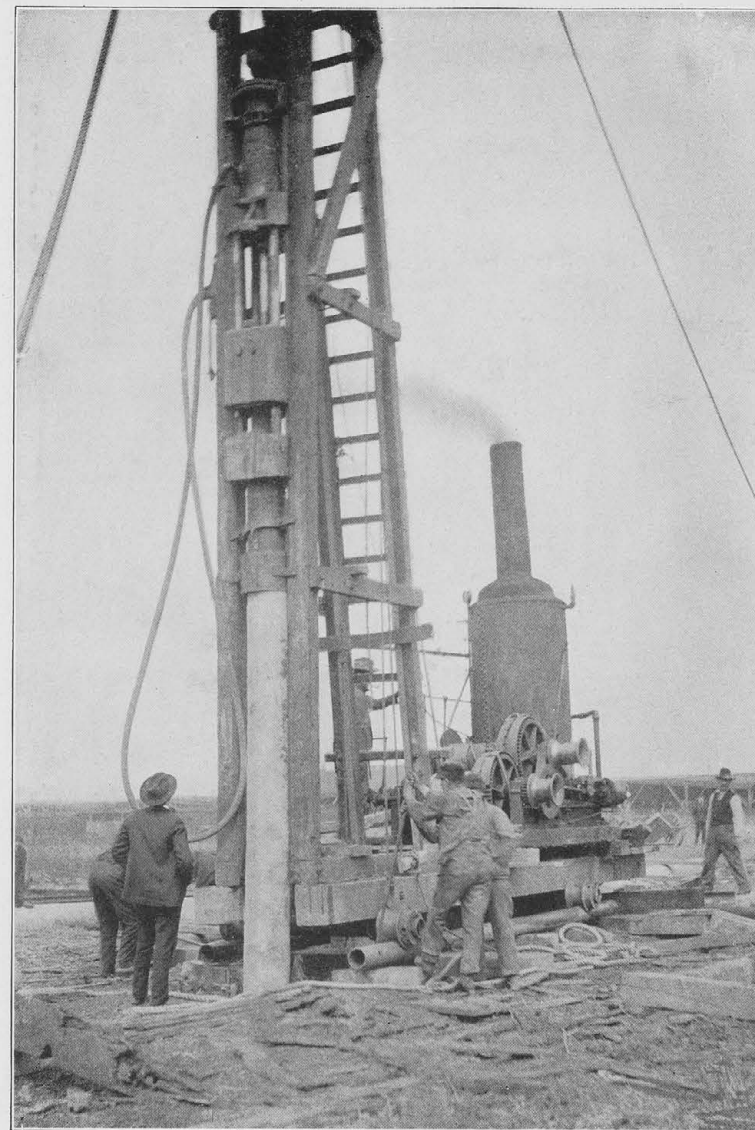
PREPARING TO PLACE ANOTHER SPAN

into the slabs. The tops of the slabs and the inside of the ballast rail are waterproofed with our special waterproofing process, which is not only more efficient, but is more economical than the use of waterproofing mastics. The end slabs of the trestles are provided with ballast stops. They are finished neatly and are of a uniform gray color. Each slab is made with two sunken panels on the exposed side which relieves the bulky appearance of the structure. The piles are reinforced sufficiently to take care of the required load, varying according to the length required and will withstand as much **punishment**, if not more, than any other type of concrete pile.

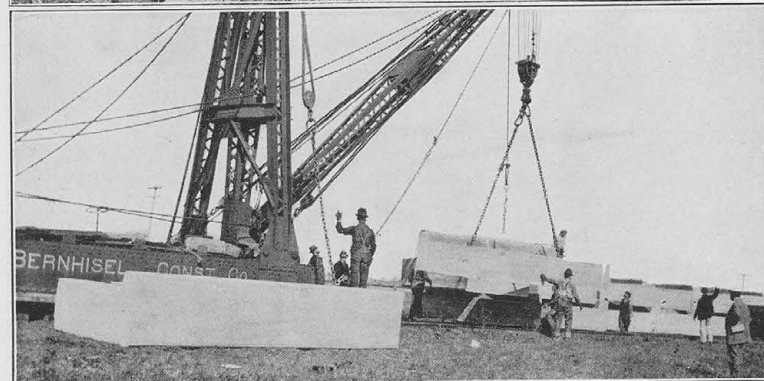
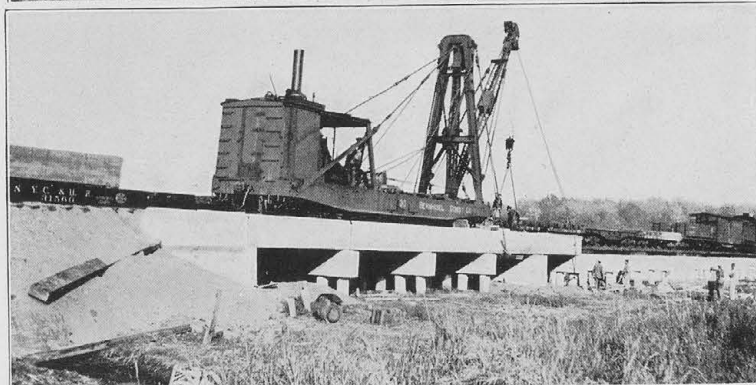
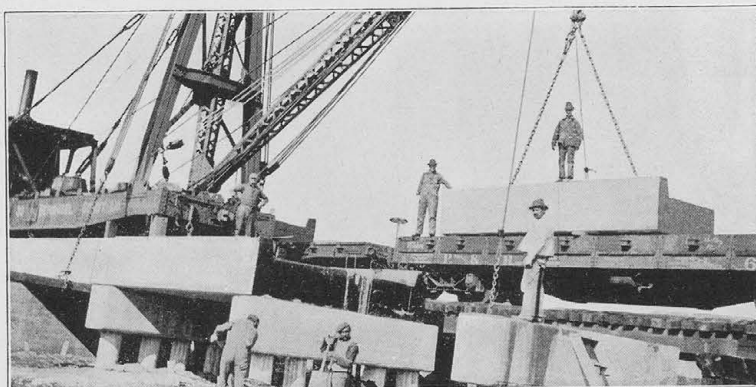
The C. F. Massey Company is now prepared to make up any style or quantity of these piles and slabs at their various plants, their own standard or any other standard and would be very glad to furnish interested parties with blue prints or any other information they may desire.



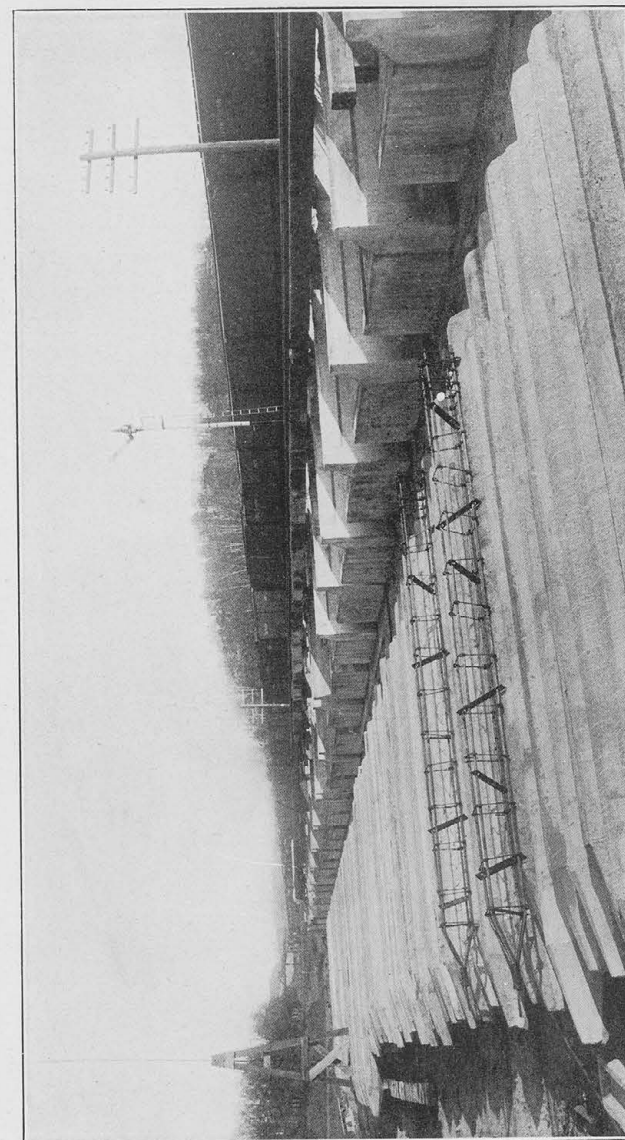
AN EXCELLENT EXAMPLE OF THE PIER TYPE TRESTLE
On the Illinois Central

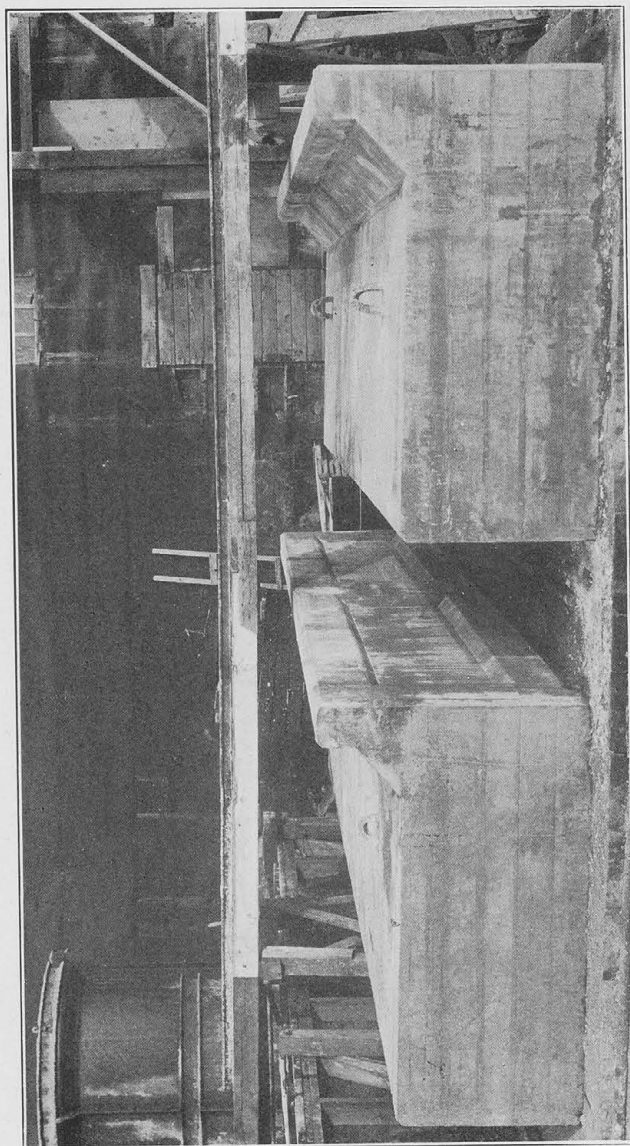


DRIVING PILES WITH STEAM HAMMER



VIEWS ILLUSTRATING SIMPLICITY OF HANDLING

VIEW SHOWING A SECTION OF OUR MINNEAPOLIS PLANT
(Note pile reinforcement in foreground)



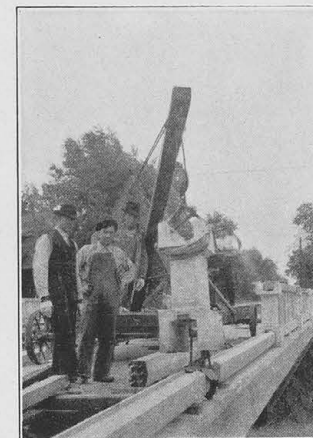
TRESTLE SLABS CAST AT OUR MINNEAPOLIS PLANT
(Note U Rods for handling and sunken panels)



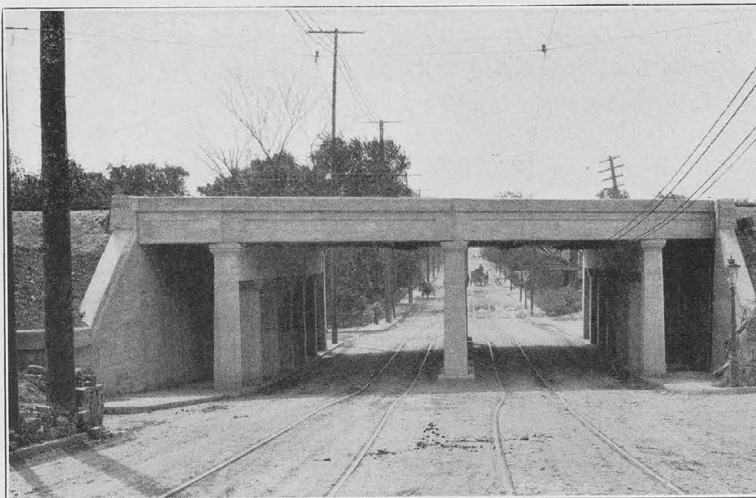
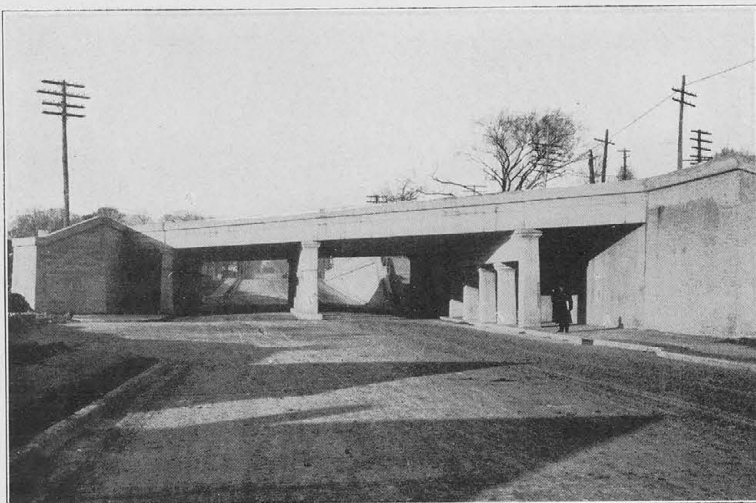
A BALUSTRADE LIKE THIS IS AN ASSET TO THE COMMUNITY

Through courtesy of Mr. C. H. Cartlidge, Br. Eng., C. B. & Q. R. R., Mr. M. Johnson, Br. Eng., I. C. R. R., Mr. G. E. Tebbetts, Br. Eng., K. C. T., we present these cuts illustrating the various work executed on the above mentioned roads.

Sectional
Concrete
Balustrades
Are Economical,
Durable and
Artistic

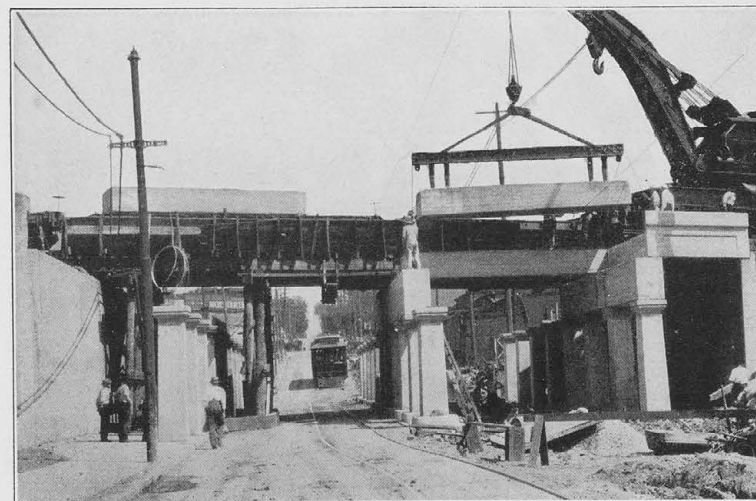


We Are
Prepared to
Make Up Any
Design or
Quantity
Desired



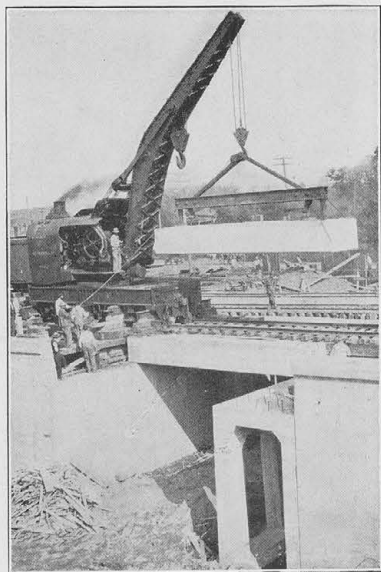
EXCELLENT EXAMPLES ON THE KANSAS CITY TERMINALS

(Note Artistic Effects Produced By Column Heads)

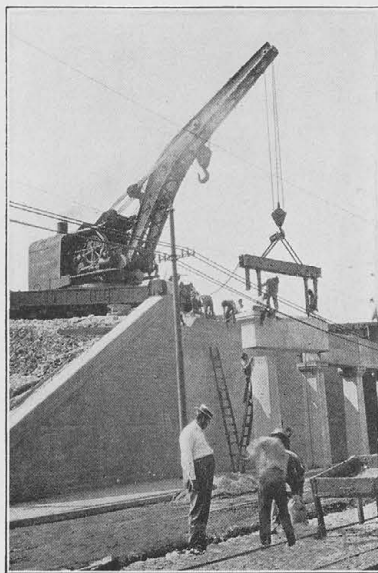


CONSTRUCTION VIEWS SHOWING SIMPLICITY OF HANDLING

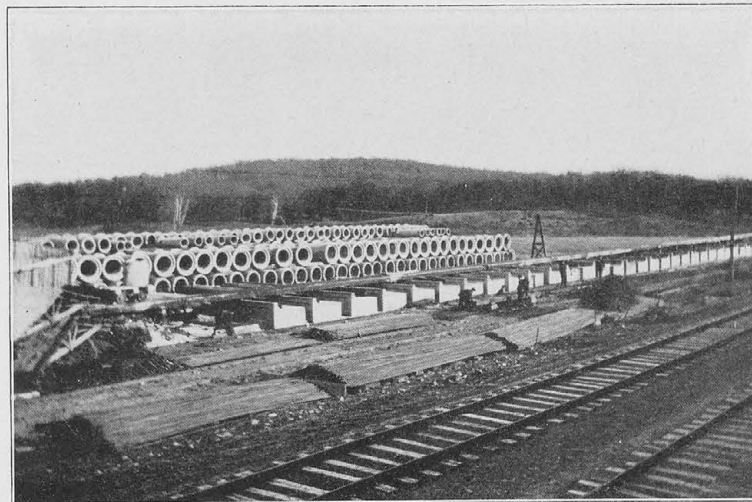
(Kansas City Terminal)



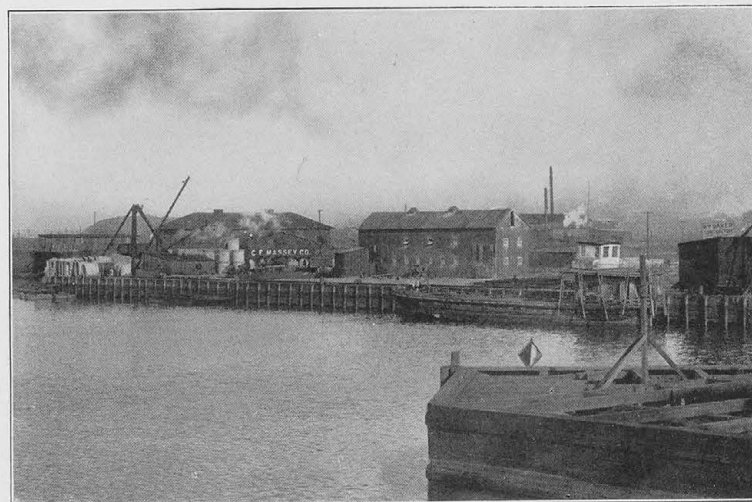
"It is unnecessary to close streets to traffic when installing bridges of this kind."



"Permanent, indestructable bridges that require absolutely no maintenance."



VIEW OF STORAGE YARD AT OUR CEDAR LAKE PLANT, MINNEAPOLIS, MINN.



VIEW OF OUR NEWARK, N. J., PLANT

REINFORCED CONCRETE CULVERT PIPE

REINFORCED CONCRETE CULVERT PIPE has now practically become a permanent standard with the majority of the principal railroads in the country for constructing culverts. The great development in railroad engineering has raised the standard of every railroad and increased the demand for **permanency**. It is a well known fact that culverts made up of the sections of pipe are far more economical to install and maintain, and that reinforced concrete pipes are preferable to any other kinds of pipes in this class of culverts. This is due principally to the fact that reinforced concrete pipes have many favorable advantages over other classes of pipe. They are absolutely **fire-proof, non-corrodible, are not affected by electrolysis, require no maintenance and last forever.**

The exact forces acting on a culvert are not known, owing to the various existing conditions at the location of installation. The forces that are considered in calculating the required amount of material to be used in a reinforced concrete pipe, are those that are exerted externally on the top and bottom, due to the weight of the earth and live load, also those that are exerted internally on the sides, due to the weight and pressure of the water.

Pipes having a double line of reinforcement, although excellent as a carrier for water under pressure, are not economical when used for culverts because of excessive steel, the difficulties encountered in getting the reinforcement placed properly, and casting. Those that are made with the reinforcement concentrically are also regarded as being not economical owing to their excessive thickness and weight.

It is a well known fact that the most **economical** form of reinforced concrete construction is that which uses **concrete in compression and steel in tension only.** Massey Reinforced Concrete Culvert Pipe follows out this principle precisely. Every engineer who has to do with railroad maintenance is no doubt familiar with its excellent qualities, as there are thousands of feet of this pipe in service on practically every principal railroad in the country.

The pipe manufactured by this company is made of the very best materials procurable. These materials are carefully tested periodically so as to obviate the possibility of any inferior class being used. All work is executed by skillful workmen supervised by competent and experienced engineers. Steel forms are used so that the finished products are true to plan. Utmost care is taken in placing the reinforcement so as to insure absolute accuracy. All pipe is thoroughly cured and carefully inspected before being shipped.

Massey pipe is designed so that the vertical diameter of the pipe is longer than the horizontal. This feature, which is apparently of no consequence, offers a great many advantages over the uniform diameter of round pipe. In the first place it can easily be seen that a reinforcing bar may be bent to a circular shape and held to such more readily than any other, therefore, it is found to **facilitate the placing of the steel** and also to **insure accuracy.** It also **increases the water area of the pipe** without contracting the flow when the flow line rises above one-half the shorter diameter of the pipe. In circular pipe any rise of the water line above the central line of the pipe contracts the volume and retards the flow. Another very desirable advantage of this feature is the fact that if one section is properly set all others must be set accordingly and one can tell at a glance whether the pipe has been placed so as to make the reinforcement effective. It is very essential that this pipe be properly placed, i. e., with the long diameter vertical. In order to insure this vital point against carelessness the word "Top" is indicated in depressed letters on both sides of the long diameter. It also furnishes a greater area for resisting the various forces that act on the culvert. The positive forces acting on the top of the pipe unite with the negative forces acting on the sides and cause a spreading tendency at and around the spring line. Hence, it is no doubt obvious why this additional area is beneficial.

The C. F. Massey Company will gladly furnish blue prints or any other information to interested parties and are prepared to make up any special designs desired.

Statistics of Massey Culvert Pipe

CHART No. 1 shows the bending moments under various loads up to fifty thousand pounds per linear foot of pipe. This chart is calculated from the following formula given in Mr. Arthur Talbot's report on "Tests of Cast Iron and Reinforced Concrete Culvert Pipe," published in Bulletin No. 22, by the University of Illinois.

$$M = 1-16 Wd - (1)$$

$$M = 0.86 Aft - (2)$$

Where M = Bending moment in inch pounds.

M_0 = Resisting moment in inch pounds.

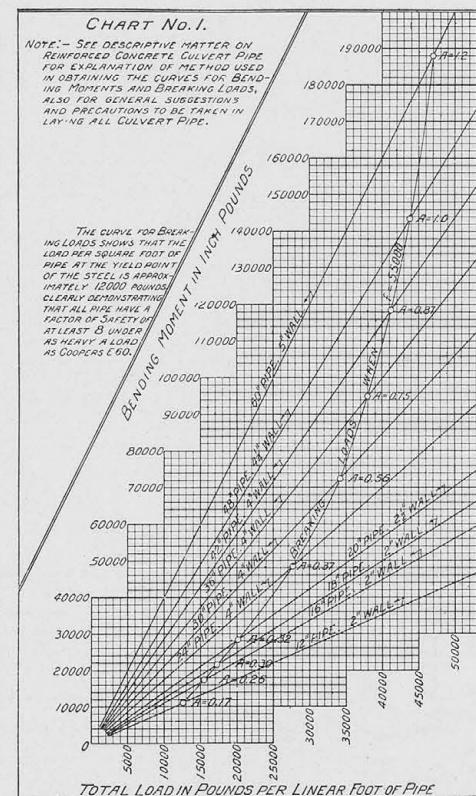
W = Total load in pounds per linear foot of pipe.

d = Mean horizontal diameter of pipe.

A = Area in square inches of steel reinforcement per foot of pipe, to give ultimate breaking load at yield point of steel.

f = Strength of the steel reinforcement at the yield point.

t = Distance from the center of the reinforcement to the compression face of the concrete.



Formula (1) was used for the curves giving the bending moments under various loads for all pipes, and formula (2), $f=55000$ pounds for the breaking load curve. An analysis of the breaking load curve shows that the load per square foot of pipe in each case is approximately 12000 pounds at the yield point of the steel. The maximum live load from Cooper's E-60 loading considering that the load is distributed over the length of an 8'-0" tie, is only 1500 pounds per square foot, thus giving a factor of safety of 8 for all pipes under this loading.

The fact that the yield point of the steel reinforcement is taken at 55000 pounds is very conservative, as in all probability the yield point will be higher, and also that if care is exercised in bedding and filling around and over the pipes, the bending moment will be materially reduced, thus giving an additional margin of safety.

Comparison of Physical Characteristics of Massey Reinforced Concrete Pipe and Cast Iron Culvert Pipe

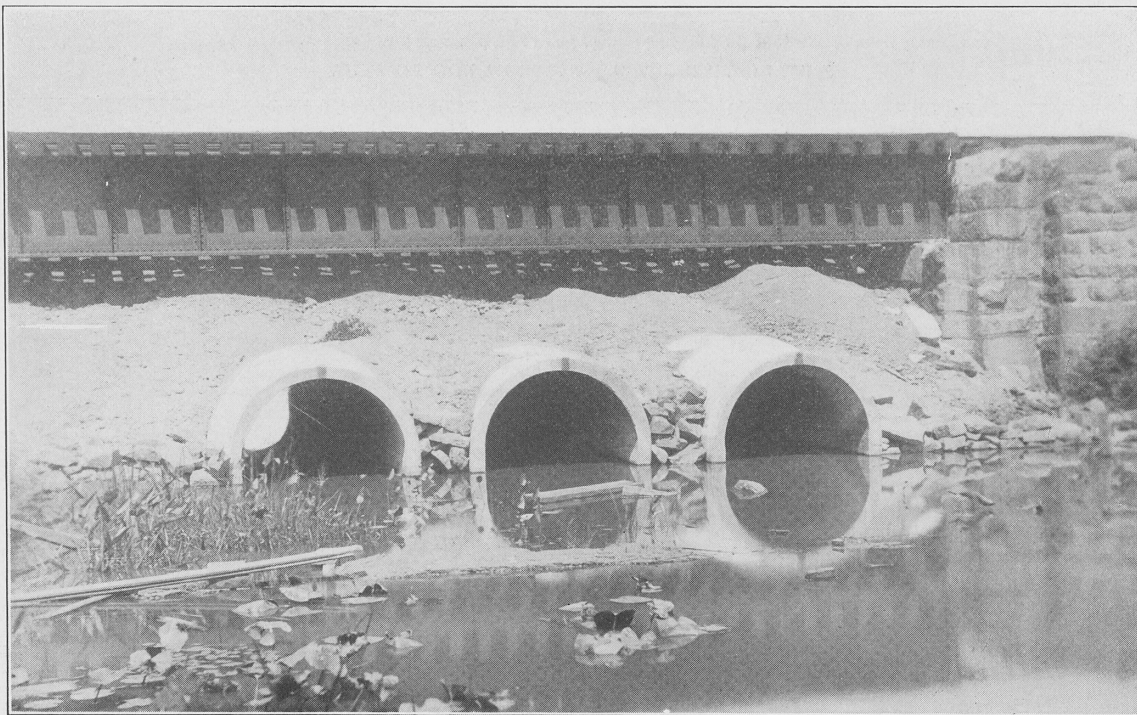
DIAM. OF PIPE			AREA OF OPENING SQUARE FEET			THICKNESS OF SHELL		WEIGHT PER LINEAR FOOT				WEIGHT PER LINEAR FOOT PER SQ. FOOT OF OPENING	
HORIZONTAL	VERTICAL		Cast Iron	Reinf. Conc.	Excess Massey Pipe over others	Cast Iron	Reinf. Conc.	POUNDS		NET TONS		Cast Iron	Reinf. Conc.
	Cast Iron	Reinf. Conc.						Cast Iron	Reinf. Conc.	Cast Iron	Rein. Conc.		
	2	3	4	5	6	7	8	9	10	11	12	13	14
12"		16"	.78	1.11	42%	5/8"	2 "	82	110	.041	.055	105	100
16"		20"	1.39	1.83	31%	1 1/16"	2 "	124	140	.062	.070	89	76
18"		22"	1.76	2.26	28%	3/4"	2 "	150	155	.075	.078	85	69
20"		24"	2.2	2.8	27%	1 3/8"	2 1/2"	174	219	.087	.110	79	78
24"		28"	3.1	3.8	22%	1 1/8"	4 "	232	405	.116	.202	75	106
30"		34"	4.9	5.7	16%	1 1/2"	4 "	334	490	.167	.245	68	88
36"		40"	7.1	8.1	14%	1 3/4"	4 "	454	584	.227	.292	64	72
42"		46"	9.6	10.8	12%	1 3/8"	4 "	592	702	.296	.351	61	65
48"		52"	12.6	14.0	11%	1 1/2"	4 1/4"	750	827	.375	.413	60	59
60"		64"	19.6	21.3	9%	1 1/2"	5 "	1104	1187	.552	.593	56	56
72"		76"	28.3	30.3	7%	1 5/8"	6 "	1546	1753	.773	.876	56	56

Attention is particularly directed to Column six in the above table showing that the Massey Reinforced Concrete Pipe gives a much larger waterway than any other pipe.

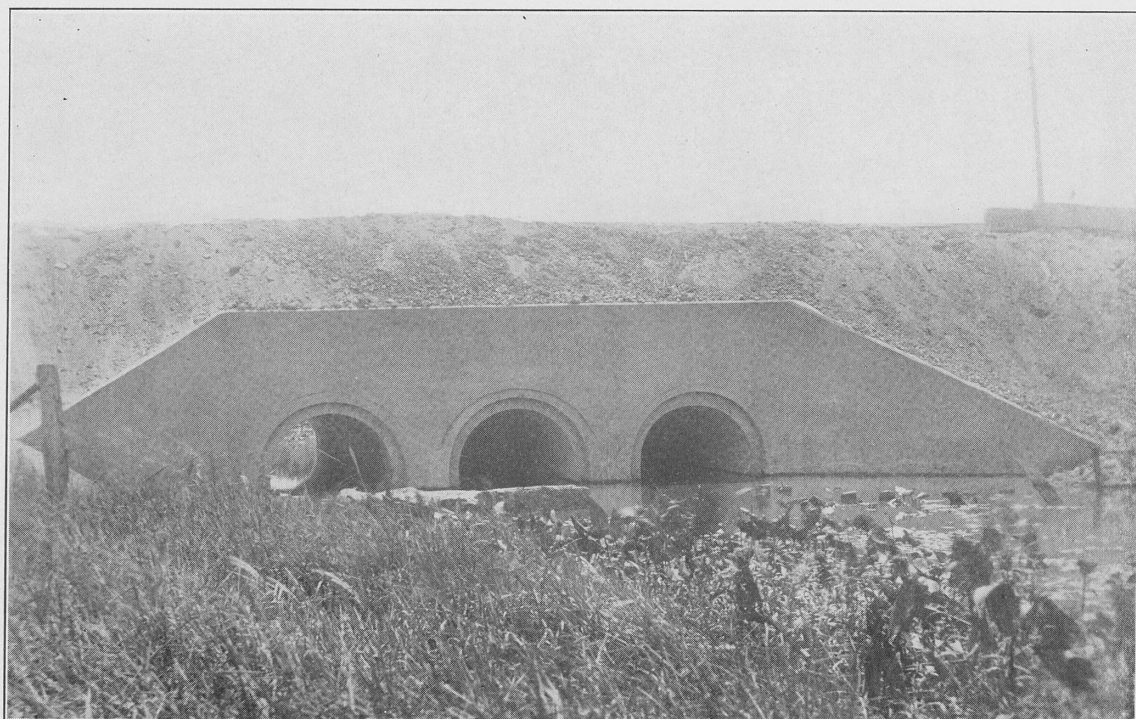


VIEW OF OUR MINNEAPOLIS (SHOREHAM) PLANT

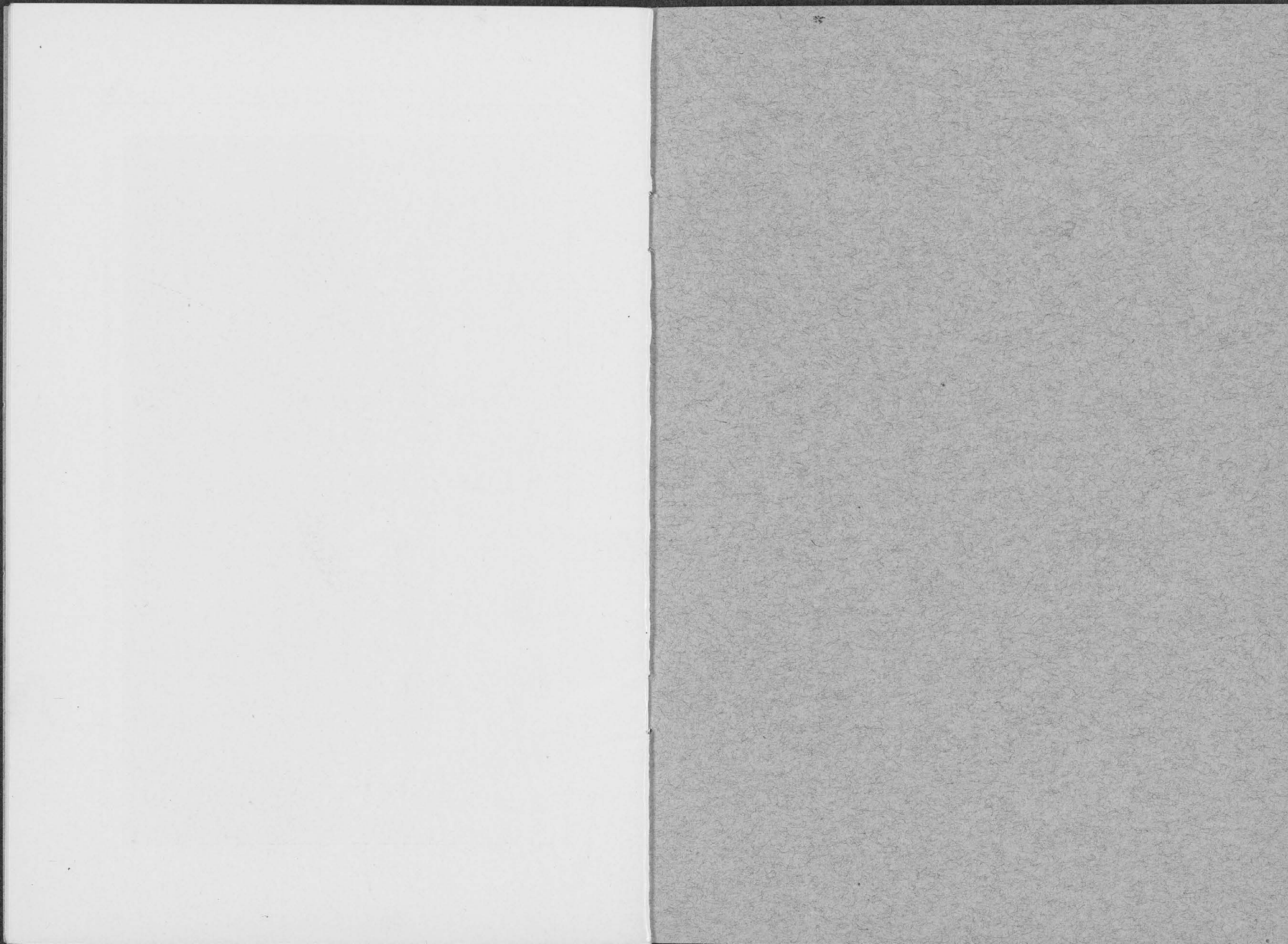
We carry a large stock of well-seasoned pipe at all of our plants and are prepared to make immediate shipments from standard stock.



REPLACING A PLATE GIRDER BRIDGE WITH MASSEY 72" CULVERT PIPE



COMPLETED BRIDGE: *No more rumbling noise; no more maintenance; fireproof; is not effected by elements and will last forever.*



C. F. MASSEY, PRESIDENT

ANDREW CHRIST, JR., SECRETARY

R. J. COLLINS, TREASURER

C. F. Massey Company

MANUFACTURERS OF

REINFORCED CONCRETE PRODUCTS

Railway Supplies

ILLUMINATED WARNING SIGNALS
MASSEY BATTERY WELLS
MASSEY BATTERY CHUTES
CULVERT PIPE
PORTABLE CONCRETE HOUSES
POLES, PILING AND POSTS

GENERAL OFFICES
PEOPLES GAS BUILDING, CHICAGO

EASTERN OFFICE
50 CHURCH STREET
NEW YORK

FACTORIES:
CHICAGO, ILL.
MINNEAPOLIS, MINN.
MEMPHIS, TENN.
DES MOINES, IOWA
NEWARK, N. J.
SPOKANE, WASH.

CHICAGO. Febr. 16th, 1914.

Mr. W. L. Darling, Chf. Engr.,
Northern Pacific Ry. Co.,
St. Paul, Minn.

Dear Sir:-



I have your favor of Febr. 10th,
covering prints of cast iron pipe forms, for which
please accept my thanks.

Yours very truly,

C. F. Massey
President.

CFM:R

COPY.

February 10th., 1914.

G. F. Massey Company,
Peoples Gas Building,
Chicago, Illinois.

Gentlemen:-

Replying to your favor of the 24th. ult:
I beg to hand you herewith blue print
relative to cast iron forms for concrete.

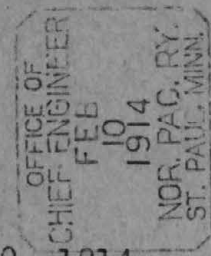
Mr. Bell, the inventor, I understand has
already applied for papers for patent to cover.

Yours truly,

Chief Engineer.

WLD-b

Encl.



St. Paul, Minn. February 10, 1914.


HES-0

Mr. W. L. Darling:

Your memo on the attached about cast iron forms
for concrete pipe.

I see no objection to furnishing these prints to
the Massey Company, but suggest that you call their attention
to the fact that Mr. Bell made application sometime ago for
a patent covering this form of construction.

H. E. Stevens. ✓



OFFICE OF
CHIEF ENGINEER
FEB 9
1914
NOR. PAC. CO.
ST. PAUL, MINN.

Saint Paul, February 6, 1914.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

I am enclosing Mr. Perkins' letter of the 2nd to which is attached letter from the C. F. Massey Company requesting prints of shrinkable cast iron cores and forms as used at Auburn.

Yours truly,

A. M. Burke

Chief Eng'r of M. of W.

Encl.

*PHS
To you are
Bye later 2/9*

FROM OFFICE OF
ENGINEER OF MAINTENANCE OF WAY
TACOMA, WASH.

Tacoma, Washington, February 2, 1914.

Mr. A. M. Burt,

Chief Engineer of Maintenance of Way,

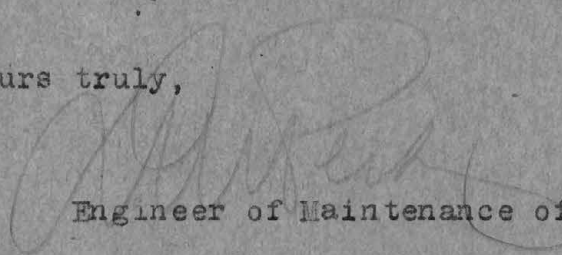
Saint Paul, Minnesota.

Dear Sir:-

I am handing you herewith a letter from the C. F. Massey Company asking for prints covering the cast iron cores and forms used at the Auburn concrete plant; also a print showing these forms.

If you care to furnish this information to this company, will you kindly forward to them?

Yours truly,


Engineer of Maintenance of Way.

LMP-w
encl.

OFFICE OF
CHIEF ENGR. M. M. M. W.

FEB

5

14

NOT REC'D BY

ST

MINN

C. F. Massey Company

MANUFACTURERS OF

REINFORCED CONCRETE PRODUCTS

Railway Supplies

ILLUMINATED WARNING SIGNALS
MASSEY BATTERY WELLS
MASSEY BATTERY CHUTES
CULVERT PIPE
PORTABLE CONCRETE HOUSES
POLES, PILING AND POSTS

GENERAL OFFICES
PEOPLES GAS BUILDING, CHICAGO

FACTORIES:
CHICAGO, ILL.
MINNEAPOLIS, MINN.
MEMPHIS, TENN.
DES MOINES, IOWA
NEWARK, N. J.
SPOKANE, WASH.

NOTED BY
CHICAGO, ILL.
JAN 24 1914
MAINTENANCE
TACOMA, WASH.

CHICAGO. Jan. 24th, 1914.

L.N.Perkins, Engr.M.of W.,
Northern Pacific Railway,
Tacoma, Washington.

Dear Sir:-

Sometime ago our Mr.Christ, when in Auburn, Washington, had the pleasure of visiting your concrete plant and became very interested in your methods of making concrete pipe with a shrinkable cast-iron core.

I have been requested to investigate the possibilities of using cast-iron forms in connection with the manufacture of concrete pipe and would appreciate very much if you could furnish us with blue prints or any other information regarding cast-iron pipe cores or forms.

Thanking you in advance for any information you may furnish us on this subject, we are,

Very truly yours,

C. F. MASSEY COMPANY,

D.A. Hultgren
Engineer.

DAH/A.

3677

On Line, Tacoma, Feb. 10, 1914.

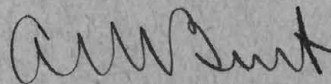
Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

Referring to your letter of January 14th, in
regard to Auburn concrete plant:

Arrangements have been made for the Engineer
of Maintenance of Way to take over the operation of
this plant in order to get out the material required
for this season's work covered by Form 134.

Yours truly,



Chief Eng'r of M. of W.

Tacoma, February 9, 1914.
OFFICE OF
CHIEF ENGINEER
FEB
13
1914
NOR. PAC. CO.
ST. PAUL, MINN.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

About turning the Auburn Concrete Plant over to
the Operating Department:

When I was in St. Paul last fall, I had a talk with
Mr. Mayer about the method of handling at such time as trans-
fer was made, and it is my understanding that it will be
necessary, to properly clear the accounts, to have an A.F.E.
made to cover the installation of the plant and the operation
during the time it was handled by the Construction Department,
charging to this A.F.E. the entire cost of construction and
operation and crediting the A.F.E. with the value of the
output of pipe, piles and sand and gravel & charging them to
the various accounts benefitted.

Will you not please take up with Mr. Mayer and
ascertain just what method is to be used, so that I can get
this in shape now that it has been decided to turn the plant
over to the Operating Department? See your letter of
February 5th to Mr. Balnchard.

Yours truly,

JCB-A

John M. Dineen
Assistant Engineer.

X 3677
St. Paul, Minn., February 9th., 1914.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Wash.

Dear Sir:-

Replying to your letter of the 4th. inst:

I see no objection to turning Auburn concrete plant over to Mr. Perkins if Mr. Blanchard is willing.

Yours truly,

Chief Engineer.

WLD-b

3677
St. Paul, Minn., February 5th., 1914.

Mr. H. C. Blanchard,
General Manager,
Tacoma, Washington.

Dear Sir:-

Referring to your letter of the 2nd. inst:

I agree with you it would be better to turn
the operation of the Auburn plant over to Mr. Perkins
in view of the fact that all construction pipe has been
furnished.

Mr. Breedlove will arrange with Mr. Perkins to
make the necessary check whenever you desire.

Yours truly,

Chief Engineer.

WLD-b

Cy. Mr. Geo. T. Slade
Mr. A. M. Burt,
Mr. L. M. Perkins,
Mr. J. C. Breedlove.

Tacoma, February 4, 1914.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

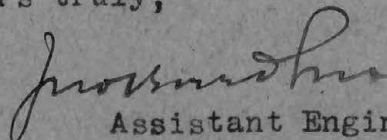
Dear Sir:

See Mr. Blanchard's letter of February 2nd about turning the Auburn Concrete Plant over to the Operating Department:

Will you please advise if it is all right to check up and make transfer to Mr. Perkins? I have an inventory all in shape ready for Mr. Perkins' check as soon as I receive your advice.

Yours truly,

JCB-A



Assistant Engineer.

OFFICE OF
CHIEF ENGINEER
FILED
1914
NOV. 24 C. R.
ST. PAUL, MINN.

Tacoma, February 2, 1914.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

I have had some correspondence with the Vice President, Mr. Slade, relative to the operation of the Auburn concrete plant, calling his attention to the fact that there should be made about 1500 lineal feet of 24 inch reinforced concrete pipe, 1500 lineal feet of 36 inch pipe and 4125 lineal feet of concrete piles, which will be required for maintenance work during the year 1914.

I believe you decided and instructed Mr. Breedlove to close down the plant, which was the cause of my letter to Mr. Slade of January 16th, in which I suggested that the plant should continue operation so that we could get out the material for necessary repairs and renewals, or especially until we could start our steam shovel again, perhaps about March 1st, at which time we will take a cut through that part of the pit where the concrete plant is located, to afford better operation of the plant.

Mr. Darling - 2

Mr. Breedlove has been anxious to transfer the operation of this plant to the Operating Department, and I have suggested that he continue its operation at least until next fall.


Mr. Slade wrote me under date of January 28th, that in view of the fact that the plant has now been closed down, we had better let the matter rest in abeyance until we have taken out the steam shovel cut and made the pit suitable for further use by the concrete plant force, when the work may be again undertaken.

I see no objection to turning the plant over to the Operating Department, but do not believe the division Superintendent or his staff have the time or are competent to give it the necessary supervision, and if agreeable to you, I would suggest that the plant be turned over to the Operating Department under the supervision of Mr. Perkins and his office, and if this arrangement is made, it will be necessary to make a check of the equipment between Messrs. Breedlove and Perkins, so that the matter can be formally turned over.

Will you please advise?

Yours truly,

Cy. Mr. Slade.
Mr. Burt.
Mr. Perkins. JCB


General Manager.

24677
6-E-2

Tacoma, January 21, 1914.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

See Mr. Stevens' letter of the 8th in reply to mine of the 3rd sending in plan showing method of constructing the round reinforced concrete piles. I attach hereto blueprint revised as indicated in Mr. Stevens' letter, the revisions showing the manner in which the piles are actually constructed at Auburn.

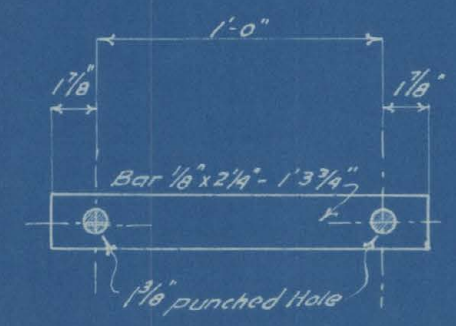
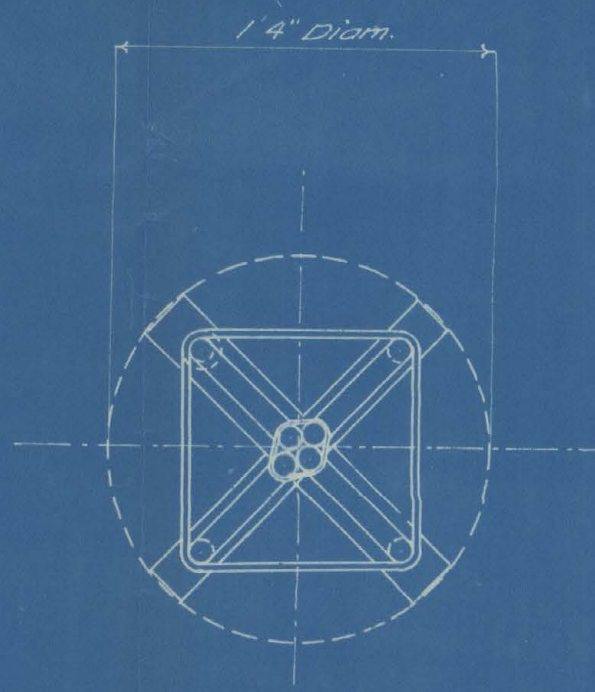
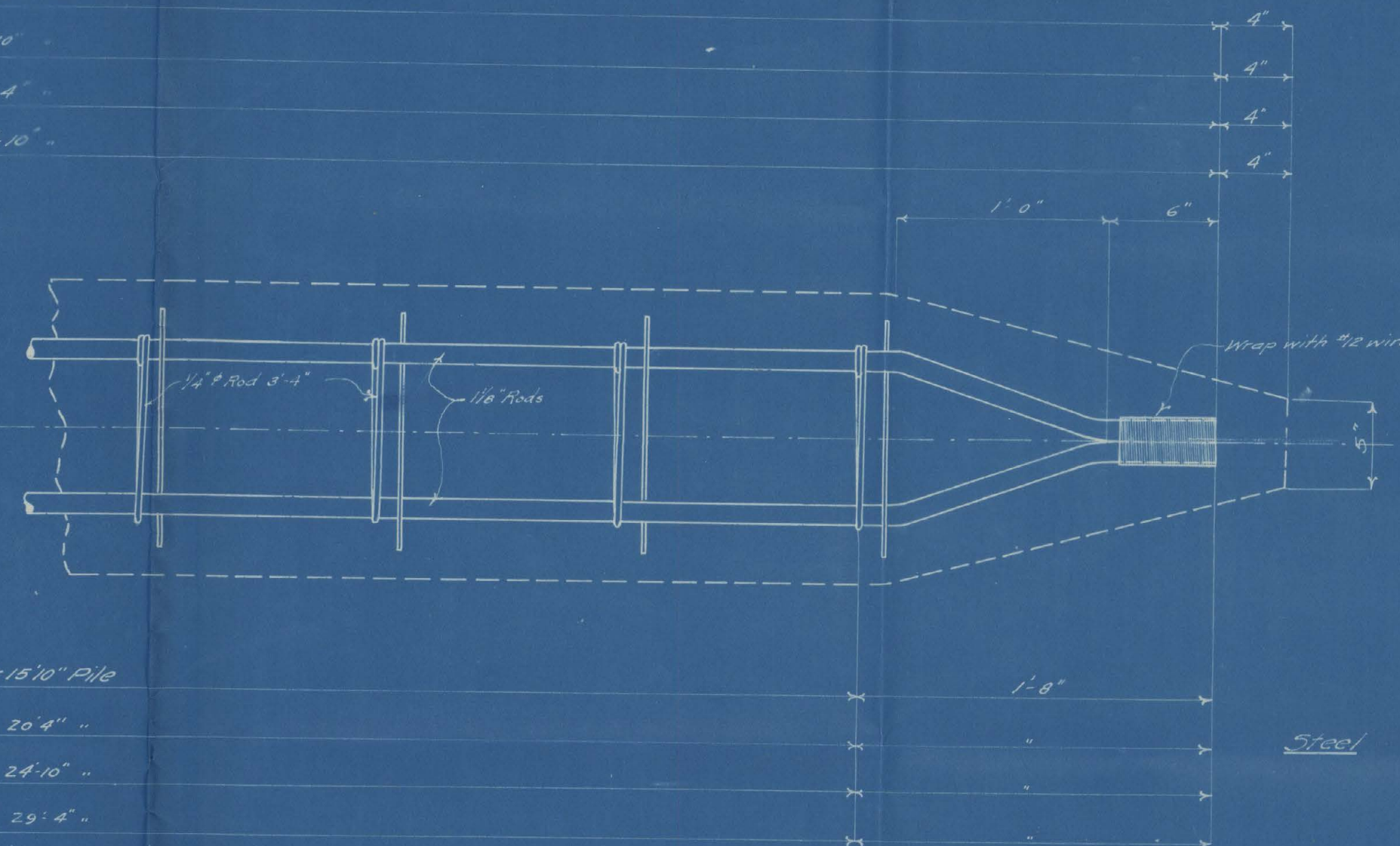
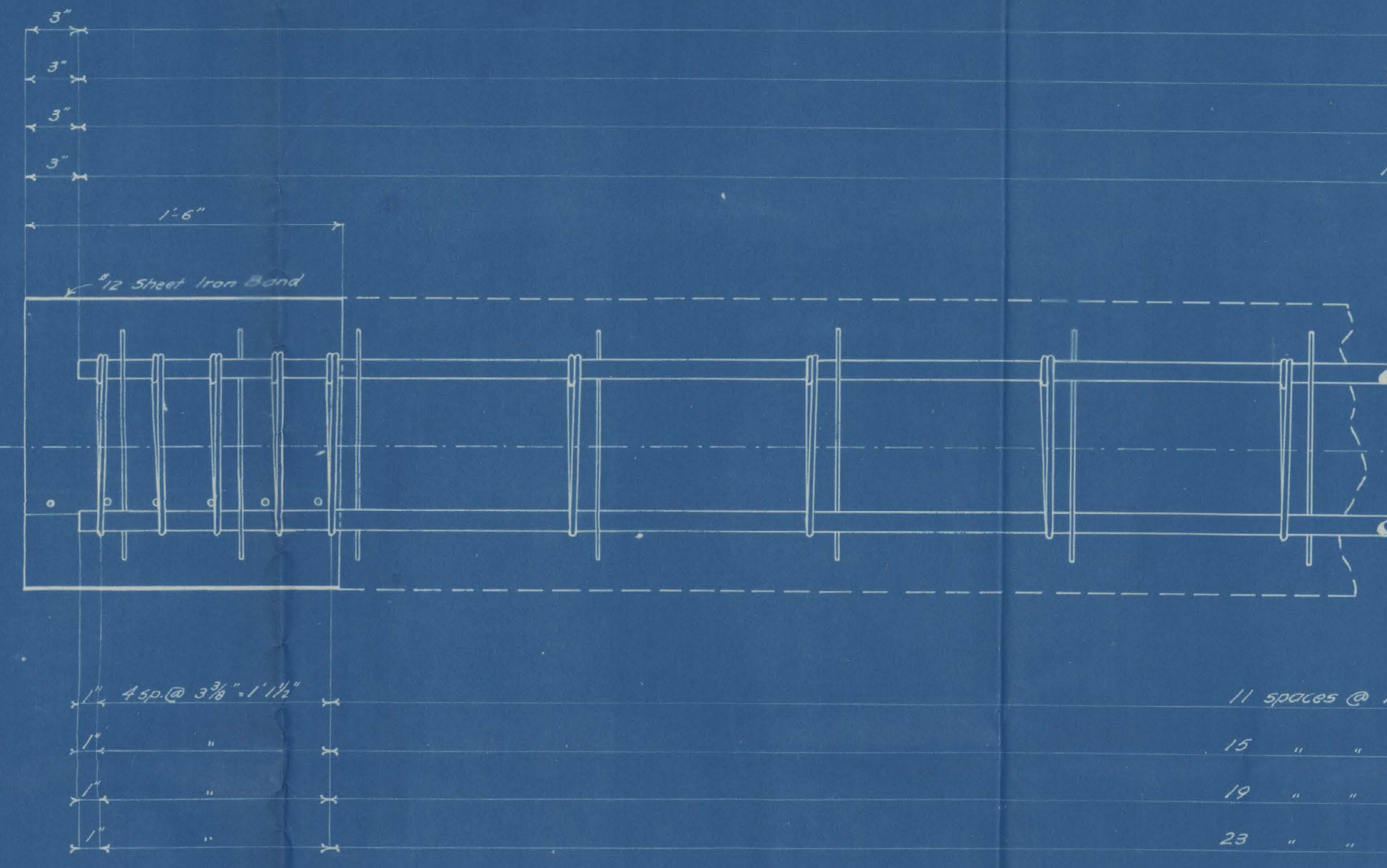
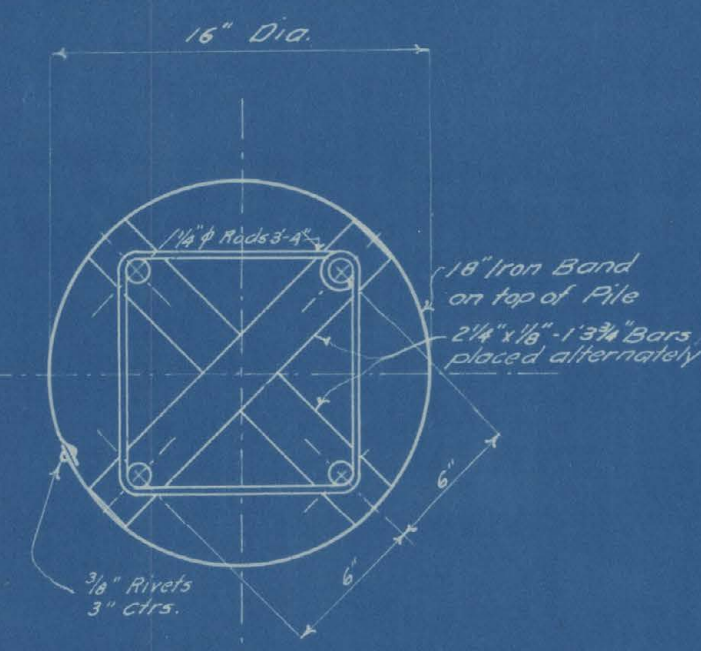
Yours truly,

JCB-A

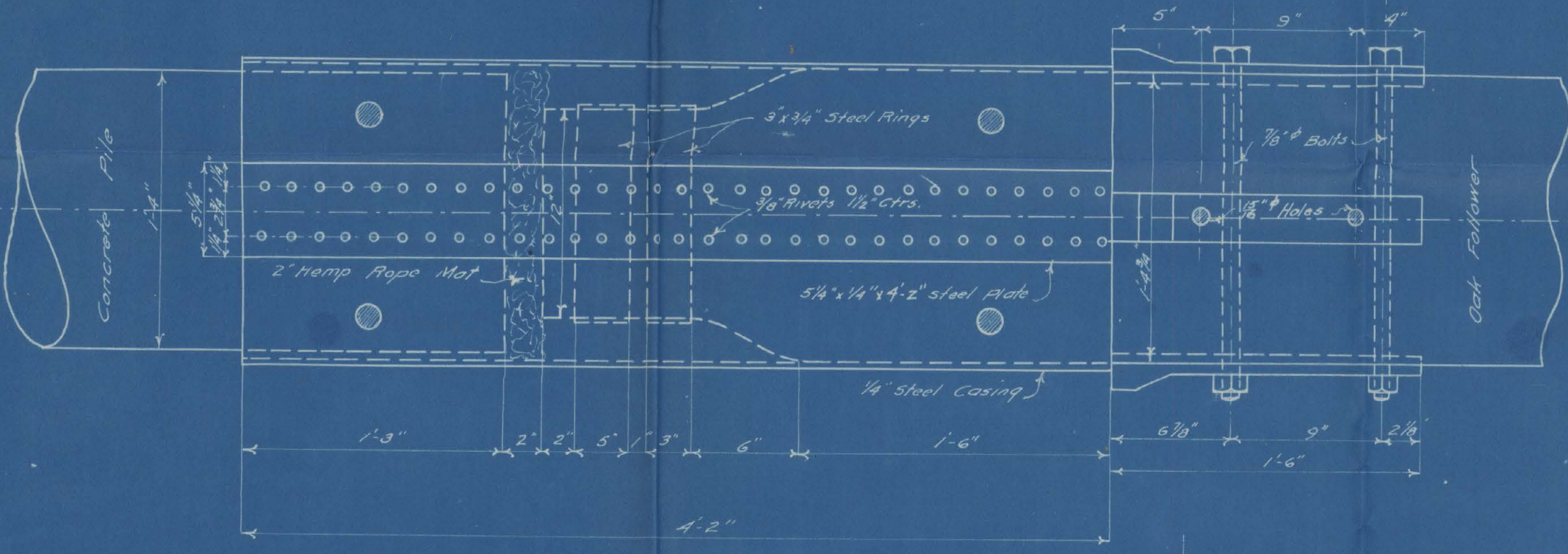
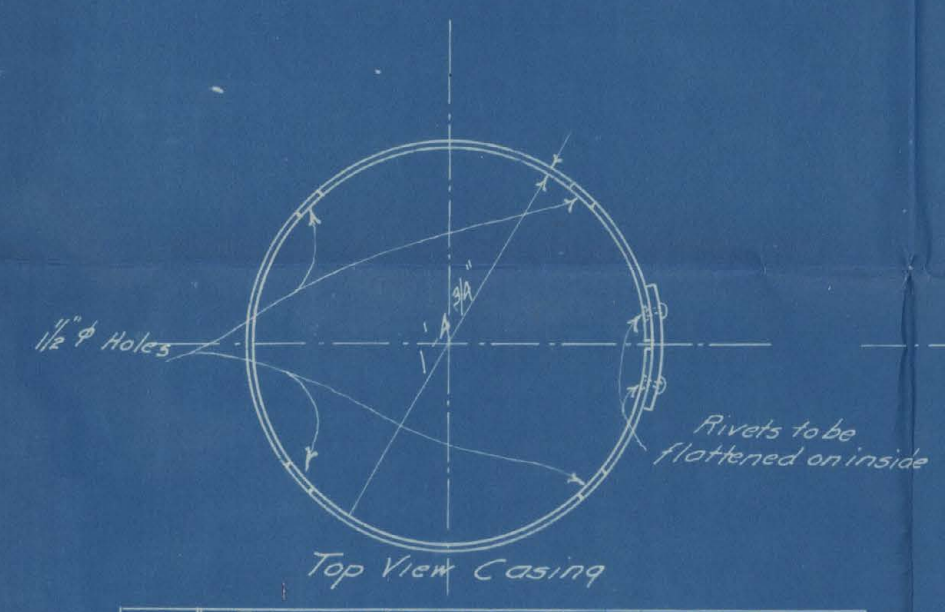
Copy to Mr. Stevens with B/P

James B. ...
Assistant Engineer.

*Noted
OK for strength
H. J. ...
1/26*



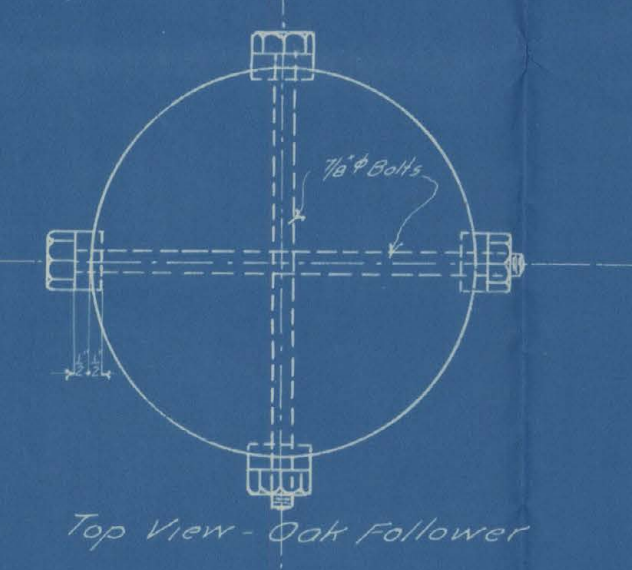
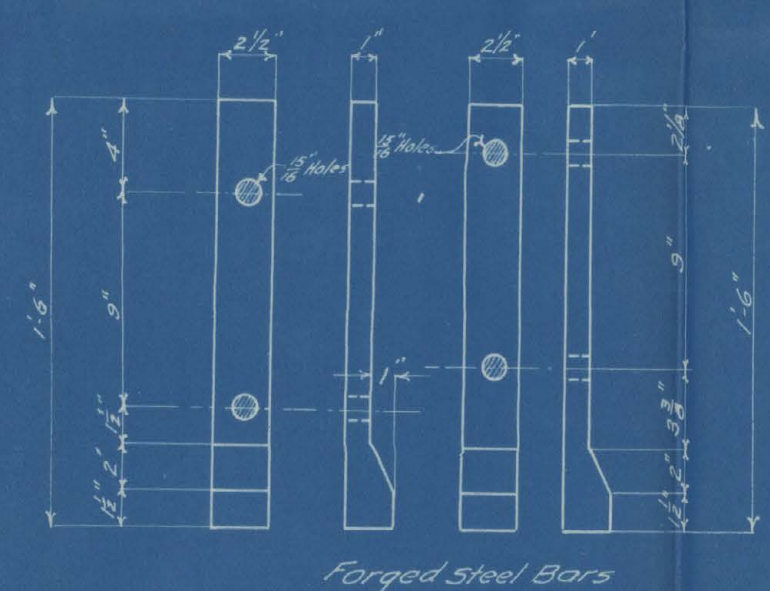
DRIVING CAP



No.	Bill of Material for Driving Cap
4	Steel Bars 2 1/4" x 2" x 1'-6"
1	" Sheet 52" x 1/2" x 1'-2" bent to 1'-4 1/2" diam.
4	Bolts 1/2" x 1'-7" 1 nut each.
1	Steel sheet 3/4" x 1/2" x 1'-2"
2	" Rings 3" x 3/4" x 1'-0" diam.

Material Required for One Pile				
No. Pcs	Size	Length	Remarks	
29'-4" Pile				
4	1/8" φ	28'-10"	Bent as shown	
20	1/4" φ	3'-4"	" " "	
26	2 1/4" x 1/8"	1'-3 3/4"	Two Holes for 1/8" Rods	
1	16" Dia.	1'-6"	Band for top of Pile made of #12 sheet iron	
1#	No.12		Annealed steel wire	
24'-10" Pile				
4	1/8" φ	24'-4"	Bent as shown	
24	1/4" φ	3'-4"	" " "	
22	2 1/4" x 1/8"	1'-3 3/4"	Two Holes for 1/8" Rods	
1	16" Dia.	1'-6"	Band for top of Pile made of #12 sheet iron	
1#	No.12		Annealed Steel Wire	
20'-4" Pile				
4	1/8" φ	19'-10"	Bent as shown	
20	1/4" φ	3'-4"	" " "	
18	1/8" x 2 1/4"	1'-3 3/4"	Two Holes for 1/8" Rods	
1	16" Dia.	1'-6"	Band for top of Pile made of #12 sheet iron	
1#	No.12		Annealed Steel Wire	
15'-10" Pile				
4	1/8" φ	15'-4"	Bent as shown	
16	1/4" φ	3'-4"	" " "	
14	1/8" x 2 1/4"	1'-3 3/4"	Two Holes for 1/8" Rods	
1	16" Dia.	1'-6"	Band for top of Pile made of #12 sheet iron	
1#	No.12		Annealed Steel Wire	

Cu. Yds. Concrete in 29'-4" Pile = 1.44
 " " " 24'-10" " = 1.21
 " " " 20'-4" " = 0.98
 " " " 15'-10" " = 0.75
 Weight of 29'-4" Pile = 6270 Lbs.
 " " 24'-10" " = 5280
 " " 20'-4" " = 4290
 " " 15'-10" " = 3300



General Notes
 Vertical Reinforcement to be round deformed bars conforming to specifications for reinforcing steel.
 Pile and tie bars to be medium steel.
 Driving cap to be medium steel.

Steel
 Gravel or broken stone to be clean and screened from all flat chips or dust.
 Stone shall not be larger than one inch in any direction.
 Sand shall be clean, coarse and sharp and entirely free from clay or dirt.
 Cement shall be of an approved brand and no cement shall be used until samples of same have passed specification requirements.

Concrete Materials
 Aggregates shall be carefully washed to secure proper proportions for maximum density of concrete.
 These proportions shall be as near one-two-four as possible.
 Mixture must be poured dry and shall be spaded in the molds with a straight blade shovel until perfectly worked with reinforcement and smooth surfaces are obtained.
 Side forms shall be removed as soon as concrete has taken a good set, but in no case less than twenty-four hours from time of pouring.
 In removing forms, care must be taken not to disturb the pile, and pile shall be left lying on its base and most thoroughly sprinkled for at least ten days from date of pouring.
 At the end of ten days it may be carefully rolled to one side and placed on a level sand or gravel bed, giving it even support for entire length.
 In no case shall piles be blocked on skids or piled on top of one another until a period of at least thirty days has elapsed from date of pouring.
 During this period of curing, piles shall be well sprinkled at frequent intervals and shall be carefully inspected from time to time.

Mixture
 Care must be taken to get pile started in true position and alignment.
 Pile must not be struck by hammer direct or by hammer on wooden follower, but in all cases driving cap must be used.
 Drivers must be filled with jet and a combination of jelling and driving used, if possible.
 Account of their great weight it will often be found possible to give piles a good start by churning up and down in the leads.
 Piles must not be driven in less than ninety days from date of pouring.

Driving

N. P. R. K.
 Tacoma Division - Tacoma Tenino Line
DETAILS OF REINFORCED CONCRETE PILES
 Scale: 1/2" = 1'
 Office of Assistant Engineer, Stillacoom Wash. January 17th 1914

3677

6-E-1

Tacoma, January 19, 1914.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

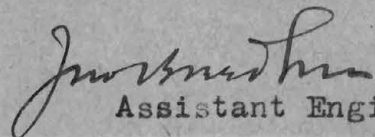
Dear Sir:

Your letter of the 14th with copy of your letter to Mr. Burt under the same date about the Operating Department taking over the Auburn concrete plant:

I took this matter up with Mr. Blanchard on January 14th, suggesting that, as the plant has now been closed down, it is an opportune time to turn it over to the Operating Department.

Yours truly,

JCB-A


Assistant Engineer.

RECEIVED

OFFICE OF
CHIEF ENGINEER
JAN 22
1974
NOR. PAC. RY.
ST. PAUL, MINN.

3677

6-E-1

Tacoma, January 16, 1914.

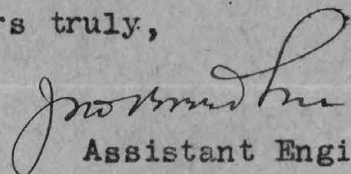
Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Your letter of January 9th advising to close down the Auburn concrete plant was received on the 13th and I arranged on that date to stop making pipe and keep the force at work on the 14th and 15th loading out 50 pieces of 36-inch reinforced concrete pipe for which I had received orders from the Store Department to be shipped to Smeltz, Oregon, on J. L. Deforce's requisitions, also dismantling boilers, screens etc., and fixing up for storage.

Yours truly,

JCB-A


Assistant Engineer.

V

CHIEF OF
ENGINEER
1914
NOR. PAC. RY.
ST. PAUL, MINN.

Saint Paul, Minn. January 14, 1914. WLD-0

Mr. A. M. Burt,

Chief Engineer Maintenance of Way.

Dear Sir:-

Please note the attached copy of message from Mr. Breedlove relative to keeping a watchman at Auburn to take care of the material and supplies for the concrete plant, which is to be closed down.

These plants are generally handled by the Engineers of Maintenance of Way, but Mr. Breedlove on account of having so much work on the Point Defiance Line and construction work under way north of Seattle has handled the plant until this time. I suggest you discuss this with the General Manager with a view of determining whether the Operating Department should take over this plant and operate it. Mr. Breedlove's work will be so nearly through when spring opens up again that the plant should, of course, be operated by the Engineer Maintenance of Way.

Mr. Breedlove will, of course, keep this watchman on his roll until such time as the Operating Department decide whether they care to take it over.

Yours truly,

Chief Engineer.

3677
Saint Paul, Minn. January 14, 1914. WLD-0

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

Replying to your message of the 13th instant relative to the Auburn concrete plant watchman.

I think a watchman should be maintained there until such time as he can be relieved of the work. In this connection please note the attached copy of letter I have just written Mr. Burt concerning it.

Yours truly,

Chief Engineer.

Enc.

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

299. BY C. SI.

Seattle Wn Jan 13th 1914.

RxXxMx W.L.Darling.

St. Paul Minn.

Your letter 9th. about closing down work at Auburn concrete plant think we had better arrange to keep watchman on hand wish you would advise if I am authorized to do this paying watchman \$2.00 per day.

J.C.Breedlove.

ST. PAUL, MINN.
NOR. P.C. 17
1914
13
AN
OFFICE OF
CHIEF ENGINEER

X

367

Saint Paul, Minn. January 9, 1914.

WLD-0

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

On receipt of this I wish you would arrange to
close down all work at the Auburn concrete plant.

Please advise when done.

Yours truly,

Chief Engineer.

OFFICE OF
CHIEF ENGINEER
AA
1914
NOR. PAC. RY.
ST. PAUL, MINN.

Mr. W. L. Darling:

In view of the extra expense which will be involved if we continue to operate the Auburn concrete plant under the present unsatisfactory conditions with respect to the face of the pit, would it not be better to close down the work there as soon as the material which is absolutely necessary to fill requisitions already made has been completed?



Ans. per a. 19

72

3677
Saint Paul, Minn. January 8, 1914. HES-0

Mr. J. C. Breedlove,

Assistant Engineer, Tacoma, Wash.

Dear Sir:-

Your favor of the 3rd showing a plan for round concrete pile.

Mr. Bell advises me that the piles built at Auburn were not constructed as shown on this plan. The flat spacing bars were staggered, being placed alternately on vertical and horizontal bars; the bars were then revolved 45 degrees so that a clear opening is left at the top of the form for pouring concrete. This opening being only four inches in width in the round form makes it quite essential that the bars be so placed in order to get room for pouring the concrete.

The hooping was not wrapped around each bar, but was wrapped around one bar and then carried around the outside of the remaining three, the end being finished with a wrap about the starting bar.

For the round form this system of putting reinforcing is better than the one shown, and is no doubt the system that is still being followed at Auburn. Will you therefore kindly revise the plan to show the work as actually being done. One of your prints with these changes indicated, is returned you herewith.

Yours truly,

Cy WLD

Bridge Engineer.

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

372. BY *[Signature]*

Tacoma WA Jan 6th 1914.

W.L. Darling

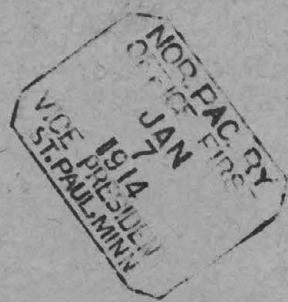
St. Paul Minn.

Browsing about taking out gravel past concrete plant at Auburn. Plant will not have to be shut down but we will have to continue running waste into cars and as we do this a considerable portion unavoidably runs onto the track and for each car we get out we have to clean track. On our screening sand and gravel for concrete work elsewhere the cost is still further increased on account of frequent movements of cars that have to be made requiring more work on the track. The cost of pipe making is increased from ten to fifteen percent.

J.C. Breedlove.

754PM.

Mr. Slade Please note as to necessity of expenditure
for cleaning Auburn pit - *[Signature]* 47





TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, place of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgement would have served the Company's interest as well if sent by train mail, or which are unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

NUMBER	REC'D FROM	SENDER	RECEIVER	TIME REC'D	DATE REC'D	TIME FILED	NUMBER	SENT TO	TIME SENT	SENDER	RECEIVED

FROM St. Paul, January 6, 1914. WLD-0

TO J. C. Breedlove

DATED

AT

Tacoma, Wash.

COPY

My wire to you 5th not properly answered. Question is as to the necessity of taking out ten thousand yards material now. If this work is not done will your plant have to shut down, or will it materially increase the cost of getting out material for work authorized. Ans. qk.

W. L. Darling 918 a.m.

NORPAC OFFICE
 1011A
 VICE PRESIDENT
 55 PAULININ

DETAD

TA

MOHT

OT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

THE FOLLOWING IS A LIST OF THE NAMES OF THE MEMBERS OF THE BOARD OF DIRECTORS OF THE COMPANY FOR THE YEAR 1961. THE NAMES ARE LISTED IN ALPHABETICAL ORDER. THE NAMES OF THE MEMBERS WHOSE TERMS EXPIRE IN 1961 ARE LISTED IN ITALICS. THE NAMES OF THE MEMBERS WHOSE TERMS EXPIRE IN 1962 ARE LISTED IN BOLD. THE NAMES OF THE MEMBERS WHOSE TERMS EXPIRE IN 1963 ARE LISTED IN REGULAR TYPE.





Form 1386

3677

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessary long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

538 BY Q CN

Tacoma, Jan. 5, 1914

W. L. Darling,

St. Paul.

Your wire date about Mr. Blanchard's message to Mr. Slade moving 10,000 yards of gravel at Auburn concrete plant at cost of \$6500. When operating department cut steam shovel in at Auburn about two and one half months ago to get gravel for work North of Seattle, I asked them to make run through at the plant so as to take the waste material that has been piled up alongside and is now encroaching on the loading track. Mr. Richards thought output would be too slow if this was done although it later developed they could have gotten

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

out just as much here as they did where shovel was cut in. It is my understanding that the material is still needed for operating Dept work and it will cost no more to get it one place than it will other so may just as well clean up past the plant. Did not ask them to take this material out if it was not needed for their work. 10,000 yards material will about represent as narrow a cutting as the shovel could make although nowhere near that amount of material is necessary to be moved so far as plant is concerned.

J. C. Breedlove 1045pm



TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

Saint Paul, January 5, 1914. WLD-0

J. C. Breedlove
Tacoma, Wash.

COPY
Mr. Slade has message from Blanchard saying you want shovel to do ten thousand cu. yds. of work at cost of sixty five hundred dollars, for the pipe work. This is first information I have on matter Wire me quick what is situation and whether the expenditure is actually necessary

W. L. Darling 1110a.m.

3677
6-E-9
OFFICE OF
CHIEF ENGINEER
1914
NOR. PAC. RY.
ST. PAUL, MINN.

Tacoma, January 3, 1914.

W. L. Darling

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I do not find that plans have ever been made showing the circular reinforced concrete piles which we are making at Auburn, the general plans of these piles having been the octagonal shape as per plans dated Office of Bridge Engineer, April 28th, 1909. That plan has been used in making up the attached plan, the only change in which is the shape, quantities of concrete and weight. Will you please have this checked over and see if it is all right?

Yours truly,

JCB-A
Enc
Copy to Mr. Stevens with B/P

W. L. Darling
Assistant Engineer.

3677
6-E-1
Tacoma, December 29, 1913.

Mr. A. R. Cook,
Prin. Asst. Engineer,
Tacoma.

COPY

Dear Sir:

Answering your inquiry of December 20th about cost of washing, screening and loading sand and gravel at Auburn:

I have to advise as follows: For the 9425 yards we have washed, screened and loaded to date the cost has been as follows:

For Plant,	4.5	cents	per	yard,
For Supplies,	9.6	"	"	"
For Labor,	33.3	"	"	"
Total,	47.4	"	"	"

Of the above, however, the plant charge of 4.5 cents will have to be distributed over the entire amount of sand and gravel which we may get out from this plant, and I think for your present purpose should be disregarded. On the item of supplies, 2.6 cents is freight, or a theoretical charge, so that the actual money cost was 40.3 cents per yards. This cost was increased quite a bit by the almost daily changes requested on delivery by Mr. Krumm and with anything like regular delivery the cost should be reduced.

The above is the cost F.O.B. cars at the plant.

Yours truly,

JCB-A

(Signed) J. C. Breedlove

Copy to Mr. Darling. ✓

Assistant Engineer.

3677

Saint Paul, Dec. 19, 1913. WLD-D

Mr. A. R. Cook,
Principal Assistant Engineer,
Tacoma, Wash.

Dear Sir:

Confirming my wire of today which reads as follows:

"Contract for the substructures of 21st and 15th Street viaducts awarded on the basis of the railway company furnishing sand and gravel from Auburn, and cement to be purchased. Make requisitions quickly for early delivery."

I have just written to Mr. Breedlove about delivery of this material, as per copy attached.

It is very important to get these requisitions in early as the contractors are to start about the first of the year and material should be on hand so that there will be no delays. Will you please see that the necessary requisitions are promptly forwarded and arrange with Mr. Breedlove and the Assistant Purchasing Agent so as to get proper delivery of material.

Yours truly,

Enc

Chief Engineer

3677

Saint Paul, Dec. 19, 1913. WLD-D

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to your letter of the 14th instant with requisition for 175 pieces of reinforcing steel, for the 175 reinforced concrete piles:

I think I covered this question pretty thoroughly in my letter to you of the 12th instant, showing authority Mr. Slade has given for work that can be done at the Auburn plant.

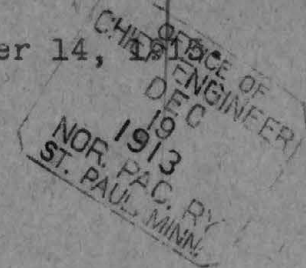
In this connection, there has been recently awarded to the Widell Company contract for 15th and 21st Street viaducts, Tacoma, the railway company to furnish cement, sand and gravel, the sand and gravel from Auburn on requisition from Mr. Cook. You should have your organization in shape, therefore, so that you can furnish the necessary sand and gravel to Mr. Cook as rapidly as needed. I wish you would take up with him and agree on about when and at what rate this material should be delivered. It should be delivered to The Widell Company on board cars at the site of the work, and be properly graded for the different mixtures to be used.

Yours truly,

Cy ARC

Chief Engineer

Tacoma, December 14, 1913



Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I hand you herewith my requisition No. 351 covering reinforcing steel and bars necessary to make the 175 pieces of reinforced concrete piles indicated in your letter of November 27th.

If the work has been authorized, will you not please hurry this material all possible, as we can make piles much more economically if we can do it in connection with the manufacture of concrete pipe?

I had planned to make, in addition to orders for pipe, 100 pieces of 24-inch pipe and 100 pieces of 36-inch pipe for stock purposes, but so far have been unable to get anything like this amount ahead for the reason that I am continually receiving orders from the Store Department to make and ship out pipe for the Operating Department.

I have on my desk now orders from Mr. Wakefield dated December 9th for 184 feet of 36-inch pipe and 32 feet of 24-inch pipe.

I have been filling these orders, although I do not believe I have ever taken up with you to see if it is all right to do so.

Dit
JCB-A

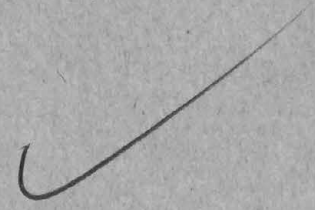
Yours truly,

Assistant Engineer

3677

St. Paul, December 12, 1913. WLD-D

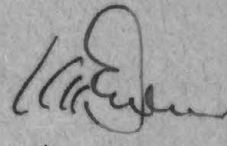
Mr. George T. Slade,
First Vice President.

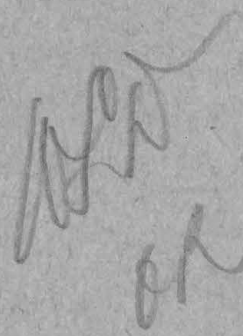
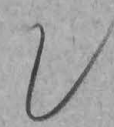


Referring to your memorandum 11th instant.

I have arranged with Mr. Breedlove to continue operation of the concrete plant at Auburn. But I think perhaps you misunderstood my letter of the 9th instant: the \$2500 cash expenditure applied merely to the 4125 feet of piles, but not to the work needed on Form 134 for the coming season.

Unless advised to the contrary we will go ahead on the basis of your letter, and manufacture the needed material.


Chief Engineer


ggd 12/13 

X

3677

St. Paul, December 12, 1913. WLD-D

Mr. George T. Slade,
First Vice President.

Referring to your memorandum 11th instant.

I have arranged with Mr. Breedlove to continue operation of the concrete plant at Auburn. But I think perhaps you misunderstood my letter of the 9th instant: the \$2500 cash expenditure applied merely to the 4125 feet of piles, but not to the work needed on Form 134 for the coming season.

Unless advised to the contrary we will go ahead on the basis of your letter, and manufacture the needed material.

Chief Engineer

Saint Paul, December 12, 1913. WLD-D

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to your letter of the 3rd instant relative to material for stock at Auburn.

You can continue the operation of the plant with the idea of filling out stock enough to complete Form 134 work for the coming year, which is approximately 1500 feet of 24" and 1500 feet of 36" pipe. Also arrange to make the 175 piles, aggregating 4125 feet if it does not exceed \$2500 cash expenditure.

Yours truly,

Chief Engineer


OFFICE OF
CHIEF ENGINEER
DEC
1913
NOR. PAC. RY.
ST. PAUL, MINN.

St. Paul, December 11, 1913.

✓
Mr. W. L. Darling:

Replying to your letter of December 9th with reference to the Auburn concrete plant.

I think that in view of the fact that we now have an organization at Auburn, it would be a good idea to continue the plant in operation until we have provided enough pipe and piling to take care of the probable requirements in connection with the Form 134 work to be done on the West End in 1914, and upon the understanding that you will not exceed an expenditure of \$2,500 for this purpose, I am willing that the operation of the plant should be continued until either that amount has been expended or the needed material has been manufactured.



Saint Paul, Dec. 9, 1913. WLD-D

Mr. George T. Slade:

The Auburn concrete plant is now carried on Mr. Breedlove's roll and amounts to approximately \$1000 per month. All construction requisitions have been filled. There is on hand 35 lineal feet of 24" pipe and 238 feet of 36" pipe available for requisitions next year. There are also in stock 560 feet of 24" and 511 feet of 36" being held for the Kruse-Edgecomb work.

There will be needed on Form 134 approximately 1500 feet of 24" and 1500 feet of 36" pipe. It would be advisable, also, to make 175 piles, aggregating 4125 lineal feet, at an approximate cash expenditure of \$2500.

Will you please advise whether operation of the plant should be continued or closed down.

W. L. Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

40 BY Y R 103 A 12-9

Tacoma, 12-7-13.

W. L. D.,

St. Paul.

See my letter Dec. 3rd, about making 175 pieces of re-inforced concrete piles. Is it alright to go ahead on these? Can work plant to good deal better advantage if we make these piles in connection with remaining pipe to be made.

Breedlove.

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

41 BY Y R 105 A 12-9

Tacoma, 12-7-13.

W. L. Darling,

St. Paul.

Browsing, about pipe needed by Perkins for form 134, work coming season. Talked this over with him and he advises needs 1500 feet of 36 inch and 1500 feet of 24 inch pipe. This is roughly 300 pieces of each size. If you want to go ahead and make this pipe up now while we have plant running please wire me so I can get in reqn's. necessary to get re-inforcing material to make.

Breedlove.

COPY

wld-d

6

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St Paul

J.C.Breedlove

Dec 8 1913

Tacoma

Solomon 6th. Wish you would consult with Perkins and see about how much pipe will be needed on Form 134. work coming season and wire me results.

W.L.Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessary long, operators are required to attach a copy to Form 233, and forward same to Superintendent of Telegraph.

17 HN C J

Tacoma Dec 6 th 1913.

W.L.Darling

St. Paul.

Browsing five pieces 24 inch and 34 Pieces 36 inch pipe in Stock at Auburn in addition to this have eighty pieces 24 in. and 73 pieces 36 in which are being held for Mr. Cook's work Edgcomb to Kruse Spur until Such time as he can handle it on the Ground This could be used in emergency Elsewhere and additional pipe made to replace as understand Mr. Cook Cannot take delivery until Next Spring. To get effective length of pipe multiply number pieces by seven and seven tenths feet.....J. C. B. 255 AM 7 th



COPY.

Form 1386

wld-d

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St Paul

J C Breedlove

Dec 6 1913

Tacoma

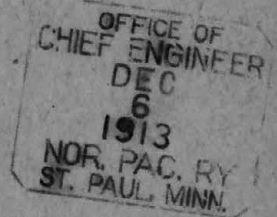
How much concrete pipe have you in stock at Auburn
and what is it.

W.L.Darling

3677

6-E-2

Tacoma, December 3, 1913.



Mr. W. D. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Yours of the 27th in reply to mine of the 15th about reinforced concrete piles to be made at Auburn for stock:

I note Mr. Stevens recommends making 175 piles aggregating 4125 lineal feet. These piles cost about \$1.00 per foot and the cost to the company would represent about as many dollars.

Counting material which we have on hand, the actual money expenditure yet required would probably be not to exceed \$2500.

As soon as you can, I will be obliged if you will advise me if I am authorized to go ahead and make the piles.

Yours truly,

JCB-A

James M. Smith
Assistant Engineer

COPY

3677

On Yellowstone Division, Nov. 27, 1913.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Wash.

12/10

Dear Sir:

Replying to your letter of the 15th instant:

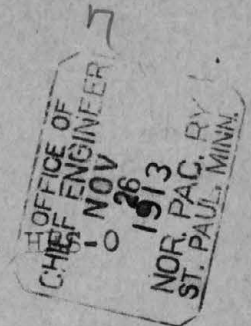
Please note attached copy of letter from Mr. Stevens to me of the 26th instant, in which he recommends the manufacturing of 175 concrete piles. Will you please advise about how long it will take and what it will cost so that I can get it approved.

Yours truly,

Enc

Chief Engineer

26
Saint Paul, November 26, 1913.



Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Your memo on the attached letter from Mr. Breedlove suggesting that we make up a stock of reinforced concrete piles at Auburn.

I think this would be an excellent idea. We are sure to need them sooner or later, and the older they get the better they are. One of the greatest objections to using concrete piles in ~~the~~ design, is the fact that we have heretofore experienced more or less delay in getting them turned out. I would suggest that we make up the following list:

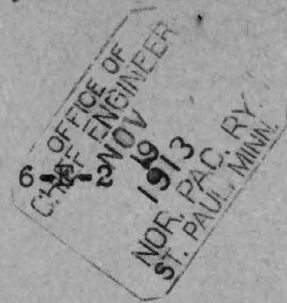
25 piles	15' long
50 "	20' "
50 "	25' "
50 "	30' "

It may be that we can use some concrete piles to advantage in the construction of the 15th and 21st St. Viaducts. This can be determined after the excavations have been opened up and we find out the comparative costs of excavating to ground ^{water} level and using wooden piles as compared with the cost of shallow excavation and using concrete piles.

Yours truly,

A handwritten signature in dark ink, appearing to be 'N. E. Smith'.

Bridge Engineer.



Tacoma, November 15, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Before we close down the Auburn concrete pipe plant this winter, I would suggest that we make, say, 100 or 150 reinforced concrete piles of such lengths as the Bridge Engineer thinks would be most likely to be used during the coming year, so as to insure having piles well seasoned before they are needed.

Yours truly,

JCB-A

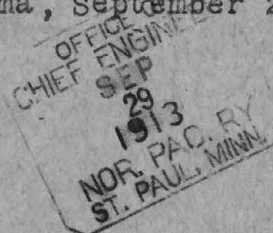
J. C. B.
Assistant Engineer.

H.E.S. What do you think as to the recommended length - I believe we should have a few say 40' x 24"

2677

6-E-1

Tacoma, September 25, 1913



Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

At the Auburn concrete plant there are four extra cast iron outside forms for 24-inch pipe. The inside forms for these pieces have never been made. suggest that you keep these in mind in case you require additional forms at Glendive as they could doubtless be used there to good advantage, getting the inside forms to go with them.

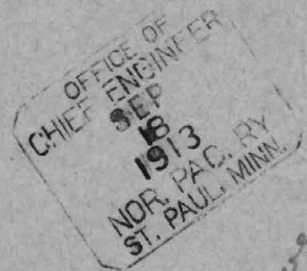
Yours truly,

JCB-A

Assistant Engineer

W. S. Rodger

*Noted
for
9/30*



Tacoma, September 13, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Answering yours of August 29th concerning my letter of the 25th with statement of cost of concrete plant at Auburn, which statement gives \$15083.83, and my report of July 3rd, 1912, in which this figure is shown as \$10725.47.

The discrepancy is noted as follows: \$375.06 due to Engineering was due to our assuming that amount for the length of time that the plant would run. In the forms themselves there is a difference of \$1145.70. Our statement of July 3rd included the cost of the forms per bills rendered up to June 1st, 1912, from the best information we could get from South Tacoma store, and of the above amount additional \$373.91 is a Store Expense item and \$771.79 is actual outlay according to the bills rendered by South Tacoma Store. There is an additional charge of \$999.81 for transportation of men and material, part of which is accounted for by the new rule to charge freight on material from the store department from the point of original shipment to the Store and from the Store out again.

This addition also includes charges on forms sent from South Tacoma to Auburn. Rental of Equipment was overlooked in my statement of July 3rd and amounts to \$198.55. Miscellaneous items on bills received since the statement of July 3rd was made up include \$427.10, covering cost of a dump car, cement in foundations, some additional tools and difference between estimated and actual cost of pipe fittings and other supplies received from South Tacoma. Our estimated cost was made up at that time for the reason that we did not have bills from the Store. The last statement also included cost of extension for making piles, amount \$1212.14. The items noted above total \$4358.36, which, added to the \$10725.47, makes a total of \$15083.83, as shown on statement sent you August 29th.

Yours truly,

Dictated
JCB-A

ge Budden
Assistant Engineer.

2677

StPaul August 29th 1913.

Mr. J. C. Breedlove,

Asst. Engineer Tacoma Wash.

Dear Sir-

Referring to your letter of the 25th with statement of cost of the concrete plant Auburn as \$15,083.83. These figures do not agree with the figures of \$10725.47 furnished in your letter of July 3rd 1912, please explain discrepancy.

Yours truly,

Chief Engineer.

Tacoma, August 25, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

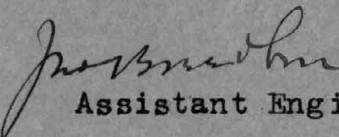
Your message of August 9th about detail statement
original construction Auburn concrete plant:

I attach hereto such a statement on which is shown ^{also}
the cost of reinforced pile forms, trestle and other items
in connection with the making of reinforced concrete piles;
total amount \$15,083.83.

Yours truly,

JCB-A

Enc


Assistant Engineer

N O R T H E R N P A C I F I C R A I L W A Y C O M P A N Y
TACOMA-TENINO LINE

Statement of Cost of Auburn Concrete Pipe Plant.

	<u>Freight</u>	<u>Labor</u>	<u>Material</u>	<u>Total</u>
Engineering	11.40	842.24		853.64
Transportation Men a/c 6-E	11.65			11.65
Grading		326.23		326.23
Gravel & Sand Bin	129.90	429.85	232.55	792.30
Cement House	21.48	115.62	108.27	245.37
Trestle	6842	224.98	153.05	446.45
Guy Derrick	64.57	330.09	1428.64	1823.30
Screens	2.85	79.40	72.57	154.82
Moulding Platforms	53.08	307.95	208.45	569.48
Tool House	15.50	79.76	79.93	175.19
Steel Shed	20.35	77.12	95.75	193.22
Steel Racks	5.20	33.94	17.28	56.42
Well and Water Supply	50.75	617.62	345.25	1013.62
Tools	44.77	16.53	432.21	493.51
Concrete Mixer	79.65	40.77	866.32	986.74
24" Pipe Forms } 36" " " }	687.90	138.68	4151.75	4978.33
Pile Forms	14.45	153.60	283.97	452.02
24" Pipe Mandrels		111.62	4.13	115.75
36" Pipe Mandrels		131.49	10.65	142.14
Privy	1.50	15.03	7.82	24.35
Loading Track	88.92	287.80	138.99	515.71
Rental of Equipment				198.55
Bulkheading	4.75	67.80	61.52	134.07
Concrete Pile Trestle	14.85	130.08	8.54	153.47
Injuries to Persons				227.50
	1391.94	4558.20	8707.64	15083.83

N O R T H E R N P A C I F I C R A I L W A Y C O M P A N Y
TACOMA-TENINO LINE

Statement of Cost of Auburn Concrete Pipe Plant.

	<u>Freight</u>	<u>Labor</u>	<u>Material</u>	<u>Total</u>
Engineering	11.40	842.24		853.64
Transportation Men a/c 6-E	11.65			11.65
Grading		326.23		326.23
Gravel & Sand Bin	129.90	429.85	232.55	792.30
Cement House	21.48	115.62	108.27	245.37
Trestle	6842	224.98	153.05	446.45
Guy Derrick	64.57	330.09	1428.64	1823.30
Screens	2.85	79.40	72.57	154.82
Moulding Platforms	53.08	307.95	208.45	569.48
Tool House	15.50	79.76	79.93	175.19
Steel Shed	20.35	77.12	95.75	193.22
Steel Racks	5.20	33.94	17.28	56.42
Well and Water Supply	50.75	617.62	345.25	1013.62
Tools	44.77	16.53	432.21	493.51
Concrete Mixer	79.65	40.77	866.32	986.74
24" Pipe Forms } 36" " " }	687.90	138.68	4151.75	4978.33
Pile Forms	14.45	153.60	283.97	452.02
24" Pipe Mandrels		111.62	4.13	115.75
36" Pipe Mandrels		131.49	10.65	142.14
Privy	1.50	15.03	7.82	24.35
Loading Track	88.92	287.80	138.99	515.71
Rental of Equipment				198.55
Bulkheading	4.75	67.80	61.52	134.07
Concrete Pile Trestle	14.85	130.08	8.54	153.47
Injuries to Persons				227.50
	1391.94	4558.20	8707.64	15083.83



TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending, and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams, which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

COPY.

St Paul

J C Breedlove,

Aug 9 1913

Tacoma

Please send in detail statement ~~showing~~ original construction cost of Aburn Concrete plant showing cost various buildings machinery tools ~~xxx~~ etc

W L Darling.

REG R

2

BA-8960

St. Paul, Minn.,

8/23/13

Mr. J. C. Breedlove,

Auburn, Wash.

3677
*Full
Auburn pipe plant*

Dear Sir:

Please ship the Northern Pacific Railway Company.
care of G. Simensen, Eltopia, Wn.

QUANTITY	DESCRIPTION OF ARTICLES	FOR WHAT PURPOSE
----------	-------------------------	------------------

48 Ft.	24" Concrete Culvert Pipe	
--------	---------------------------	--

For placing
pipe in bridge 234-
1st Dist, Imp. 798

JLD-423

~~###~~
W L D

Yours truly,

Supply Agent.

BA-8975

St. Paul, Minn.,

August 23, 1913

Mr. J.C. Breedlove,

Asst. Engr. Auburn, Wash.

Dear Sir:

Please ship the Northern Pacific Railway Company.
care of A. Merider, Supv. Woodinville, Wash.

QUANTITY	DESCRIPTION OF ARTICLES	FOR WHAT PURPOSE
64ft.	24" Dia. Concrete Culvert Pipe CULVERT 15-G	Comp. 2009-13 Replace wooden culvert 15G with pipe
48ft.	24" Dia. Concrete Culvert Pipe CULVERT 15-F	
64ft.	24" Dia. Concrete Culvert Pipe CULVERT 15-H	

WLD ✓
JEC #443

Yours truly,

Supply Agent.

BA-8976

St. Paul, Minn.,

August 23, 1913

J.C. Breedlove,

ASST Engr. Auburn. Wash.

Dear Sir:

Please ship the Northern Pacific Railway Company.

care of A. Herider, Supv.

Kirkland. Wash.

QUANTITY

DESCRIPTION OF ARTICLES

FOR WHAT PURPOSE

96ft.

30" Concrete Culvert Pipe

Acct. Eliminating
bridge #14 near
Kirkland by filling
over 30" concrete
culvert pipe Comp.
2073-13

WLD
JEC # 442

Yours truly,

Supply Agent.

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St. Paul,

August 20th, 1913..

J. C. Breedlove,

Tacoma.

COPY

Your letter 15th to Mr. Blanchard in regard to connection with gravity supply pipe Auburn gravel pit came thru to St. Paul by mistake. Possibly intended copy for me. Will retain.

W. L. Darling.

RNG R

Tacoma, August 15, 1913.

Mr. E. C. Blanchard,
General Manager,
Tacoma.

Dear Sir:

confirming conversation with your office this afternoon, it seems necessary that we make a connection with the 10-inch gravity supply pipe which follows the main line to Auburn, connection to be made at the Auburn gravel pit, laying a four-inch pipe line to our reinforced concrete pipe plant.

When we installed the plant we figured that it was only for making pipe for the Point Defiance line and I did not care to go to the expense of laying a pipe line to connect with this water supply so dug a well and installed a pump. We have been working the plant continuously, however, for a much longer period than was anticipated in the beginning and have had trouble all along in getting sufficient supply of water, so that the gravity supply would afford a much more economical operation and at the same time a stable supply.

It is my understanding, from investigation which I have made, that you have an ample supply of water and the amount which we will use, say from 10,000 to 20,000 gallons per day, will not in any way embarrass you; also that you have no objections to the connection being made.

I am today sending requisition in for the necessary amount

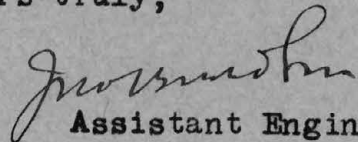
6-E-1

-2-

of pipe and as soon as recived will ask your water service man
to make the connection so as to ^{be} sure there is no interference
with your water supply.

Yours truly,

JCB-A


Assistant Engineer.

3679
6-E-1
1913

Tacoma, August 15, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I hand you herewith my requisition No. 242 for 1800 feet of 4-inch wire wound pipe good for 200 foot head, this pipe to be used at Auburn concrete plant in connection with 10-inch gravity water supply line which follows the main line past the Auburn gravel pit down to the Auburn Terminal.

We have been using a well which we dug at the time the plant for making reinforced concrete pipe was started, but have always had more or less trouble with it and lately, since we have been getting out sand and gravel for Mr. Krumm, we have had to work it to full capacity and are now unable to get the water needed. The pipe line will all be laid on Company right of way and will give us a good supply of water at all times and be, I am quite sure, more economical than trying to keep the pump going.

I wish you would arrange to have Mr. Crassweller purchase the pipe locally so we can get delivery made promptly. South Tacoma store has none of this pipe in stock.

Yours truly,

JCB-A

W. L. Darling
Assistant Engineer.

3677
St. Paul, August 11th, 1913..

Mr. A. H. Hogeland,

Herewith statements of the cost of the Concrete Plants
at Glendive, Montana, and Auburn, Washington, also copy of letter
of December 24th, 1912, giving data covering the cost of making
pipe at Glendive.

W. L. Darling.

REG R

Encl.

NORTHERN PACIFIC RAILWAY COMPANY.
Tacoma-Tenino Line

Statement showing cost of concrete pipe plant at Auburn
to May 31, 1912.

Cost of plant:

Engineering,	\$ 467.18	
Labor,	2631.84	
Material,	3926.45	
Transportation men,	11.65	
Transportation material,	316.12	
Injuries to persons,	227 .50	
Cast Iron Forms, material,	1829.09	
labor,	1096.36	
shop expenses,	<u>219.28</u>	\$10725.47

2677
6-E-1
1913

Tacoma, June 2, 1913.

Mr. W. L. Darling,
Chief Engineer,
Tacoma.

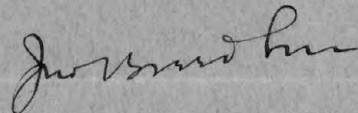
Dear Sir:

I hand you herewith my requisition No. 154 covering one old locomotive boiler to be sent from South Tacoma to Auburn to be used in connection with the concrete pipe plant at that point. Last year we got a boiler from South Tacoma which now needs extensive repairs---more than can be made economically at the plant, and I have arranged with Mr. Crosby to send out another old boiler to replace.

Yours truly,

JCB-A

Enc



Assistant Engineer

COPY. 3677

Saint Paul, May 17, 1913. WLD-D

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Wash.

Dear Sir:

In accordance with your letter of April 24th
I hand you herewith blueprint of sketch made by Mr.
Stevens to take the place of that accompanying your
letter; also copy of Mr. Stevens' letter of the 16th.

I think you will find the changes Mr. Stevens
has made will work out well.

Yours truly,

Enc

Chief Engineer

5
ST. PAUL, MINN. MAY 16 1913
St. Paul, Minnesota. May 16, 1913. HES

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

I am returning you herewith Mr. Breedlove's letter of the 24th ult. with sketch plan of proposed driving cap for concrete piles, and I am attaching five prints of a sketch I have had made up of a pile driving cap based on the experience we have had in driving piles heretofore.

Mr. Breedlove's sketch is in line with the sketch shown on our plans for concrete piles, and caps of this type have been used on the Yellowstone Division. Mr. Clements, however, advises me that there is no necessity for providing the hoisting straps or the lead guides. These straps and guides are very much in the way in getting the cap through the falsework decks, and the guides are of no use whatever as the pile is out of the leads very soon after the driving of pile is started.

The angles on the inside of the cap do not work very well, as the oak follower drives through and breaks them off. These have therefore been omitted and straps provided on the outside of the oak follower, which can be easily replaced when the bolts become worn and shear off.

W.L.D.

-2-

We have had some difficulty with piles spalling off at the edges, and in the new sketch I have tried to avoid this by reducing the size of the end ^{of} follower and putting a couple of heavy steel pile rings on the reduced end. This will deliver the blow inside the reinforcing rods of the pile, and will probably avoid the trouble from spalling.

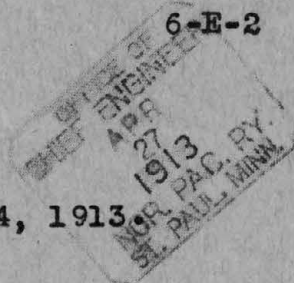
The follower shown is very cheaply and easily made, and in view of our experience will I think answer the purpose better than the more expensive ones heretofore used.

Yours truly,

A handwritten signature in dark ink, appearing to be 'W. L. D.', with a long, sweeping horizontal line extending to the right.

Bridge Engineer.

Tacoma, April 24, 1913

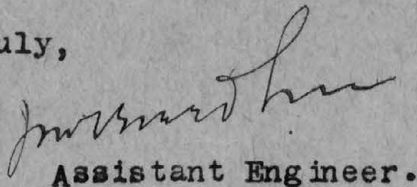


Mr. W. L. Darling,
Chief Engineer,
St. Paul.

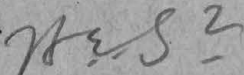
Dear Sir:

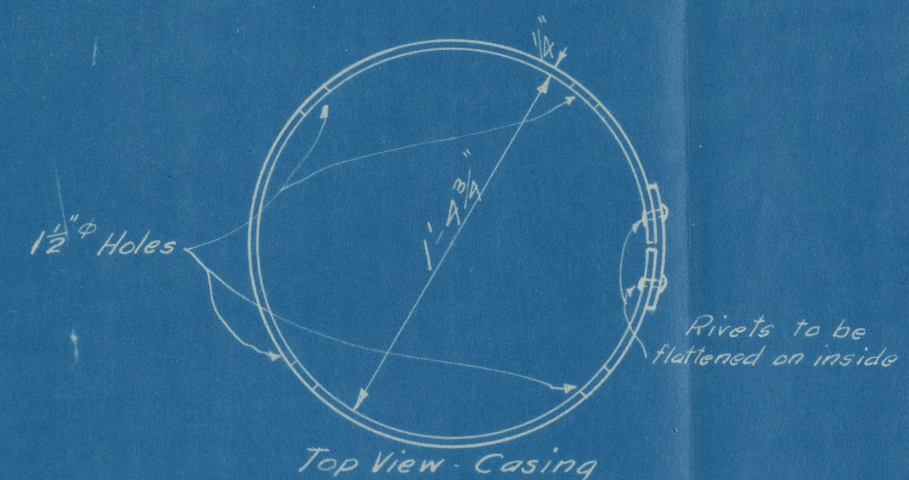
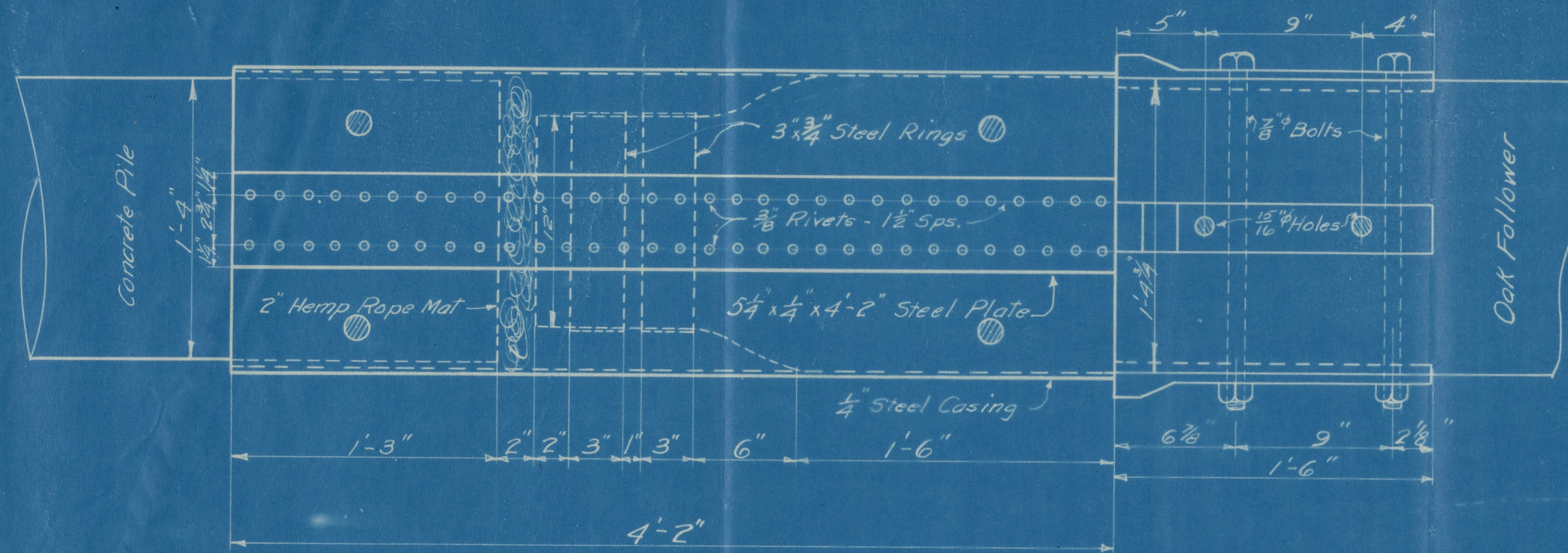
I hand you herewith two blueprints each of two different plans for driving cap for circular reinforced concrete piles which we made at Auburn to be used at the Nisqually river bridge and the Des Chutes river bridge. The plan dated April 19, 1913, is a plan suggested by Mr. Bell. I doubt if this plan would give as good satisfaction as the one dated April 21st, which is made more in accordance with the plan for driving cap for the octagonal piles. Will you not please advise which one you desire used, or suggest any changes and advise me so that I can make requisition and get driving caps made in time for using piles at bridge ends as noted above?

Yours truly,

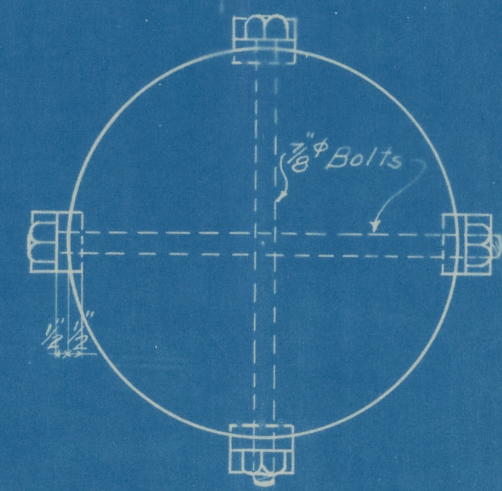
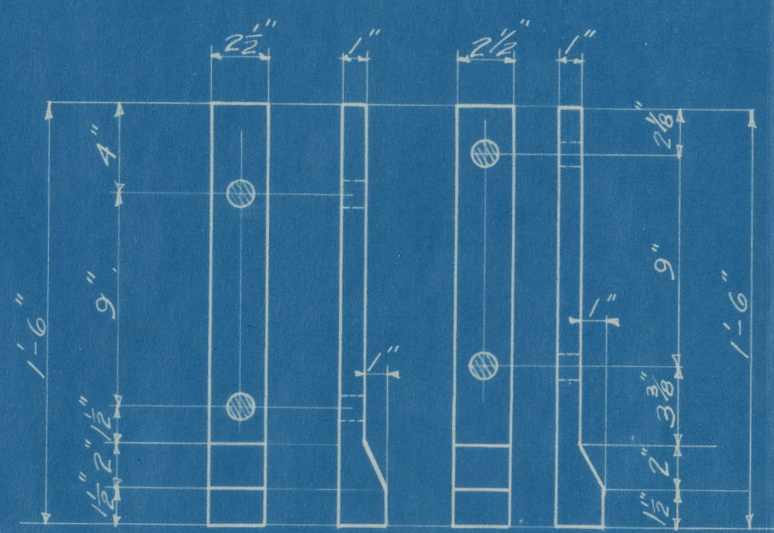

Assistant Engineer.

JCB-A



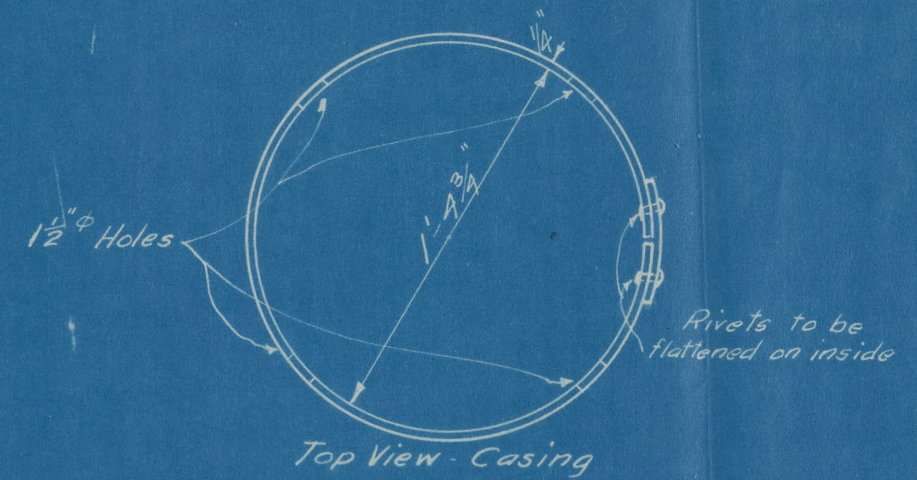
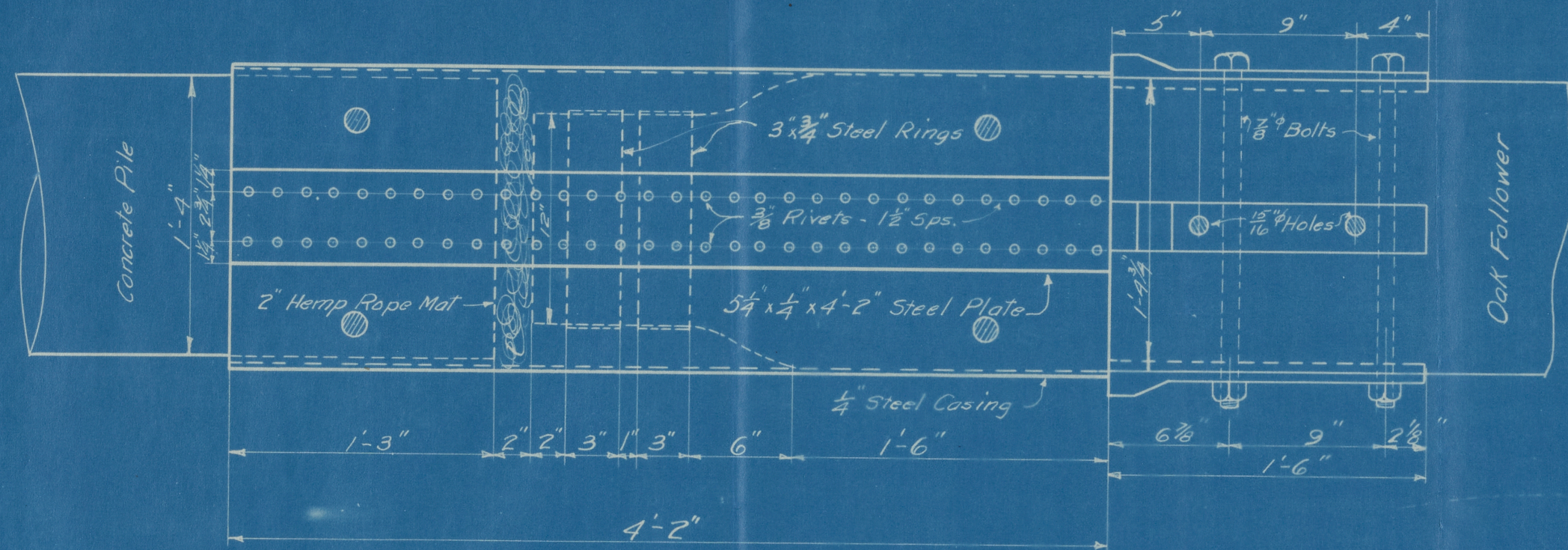


No.	BILL OF MATERIAL
4	Steel Bars 2 1/2 x 2 x 1-6"
1	" Sheet 5 1/4 x 1/4 x 4-2" bent to 1-4 3/4" Diam
4	Bolts 7/8" x 1-7" 1 nut each
1	Steel Sheet 5 1/4 x 1/4 x 4-2"
2	" Rings 3" x 3/4" x 1-0" Diam

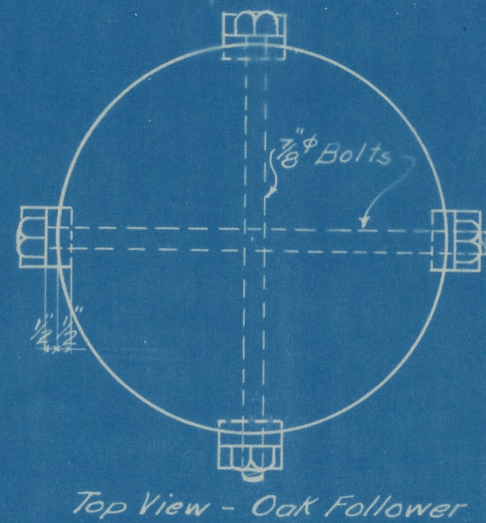
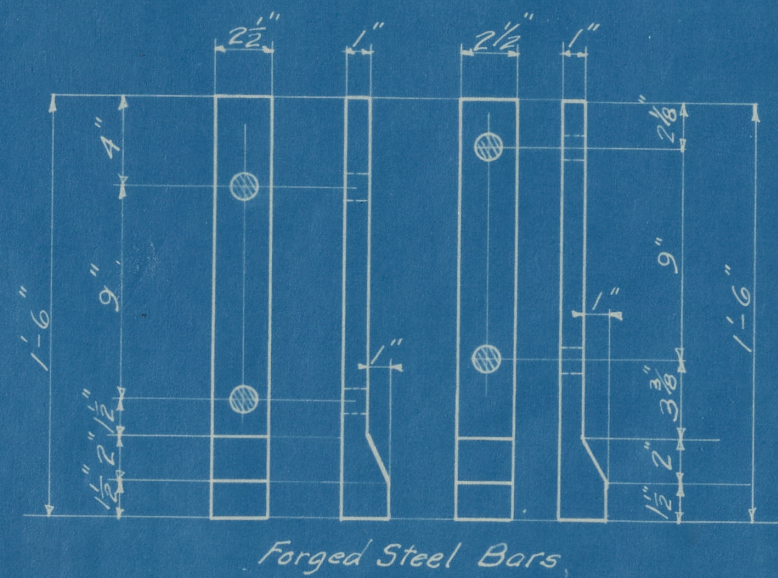


N.P.R.Y.
 SKETCH OF DRIVING CAP
 for
 16" DIAM. ROUND CONCRETE PILE

Scale - 1 1/2" = 1'-0"
 OFFICE OF BRIDGE ENGINEER ST. PAUL MINN. MAY 14 1913



No	BILL OF MATERIAL
4	Steel Bars 2 1/2 x 2 x 1'-6"
1	" Sheet 52 x 1/4 x 4'-2" bent to 1'-9 3/4" Diam
4	Bolts 7/8" ϕ x 1'-7" 1 nut each
1	Steel Sheet 5 1/4 x 1/4 x 4'-2"
2	" Rings 3" x 3/4" x 1'-0" Diam



N.P.R.Y.
SKETCH OF DRIVING CAP
for
16" DIAM. ROUND CONCRETE PILE

Scale - 1 1/2" = 1'-0"

OFFICE OF BRIDGE ENGINEER ST. PAUL MINN. MAY 14 1913

3677

Tacoma, Wash., May 6, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul, Minn.

Dear sir:

I hand you herewith statement showing in detail cost of manufacturing 36 inch and 24 inch reinforced concrete pipe at Auburn, as compared with the cost shown on statement sent me with your letter of April 21st.

You will note that the cost of the 36 inch pipe, exclusive of transportation charges and cost of loading pipe on cars at the plant for shipment, and also deducting .0307 per lineal foot of pipe which is included in the depreciation charge, is \$1.8024, as compared with a cost of \$1.8301 at Glendive, or about 2 cents per lineal foot cheaper. The cost of the 24 inch pipe, exclusive of transportation charges and labor of loading is \$1.2619, as compared with \$1.5549 at Glendive, or .293 cheaper.

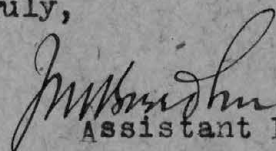
At Auburn we made during the period covered by this statement, 3576 lineal feet of 36 inch pipe and 11048 lineal feet of 24 inch pipe. Some slight additional cost has been caused to the reinforcing, by reason of the fact that we used 3/8 inch reinforcing rods which we had on hand at Sopanah and Centralia, in accordance with instructions in your letter of Jan. 23, 1912. Also, we have had to purchase locally from time to time triangular mesh that was really longer than the pipe required, this in order to keep

Mr. W.L.Darling. -2-

5-6-13.

the plant going for rush orders; so that, if we could have,
at all times, used economical material, our cost would have
been slightly less at Auburn than it ^{here shows} ~~was at Glendive.~~

Yours truly,


Assistant Engineer.

JCB-S
enc.

N O R T H E R N P A C I F I C R A I L W A Y C O

Cost of Pipe manufactured at Glendive & Auburn.

36" Concrete Pipe <i>3576 lin ft.</i>				
	Lin. Ft. Glendive	Lin. Ft. Auburn	AUBURN Over	Under
Pipe Proper	\$.4577)			
Labor pipe forms	.0198)	.7051	.1450	
Gravel	.0826)			
Cement	.1810	.2682	.0872	
Reinforcing	.3340	.2857		.0483
Misc. (for Auburn Plant Includes coal) <i>also for Glendive</i>	.0906	.1131	.0225	
Royalty	.0500	.0500		
Yard and equipment (for Auburn Plant, supplies included, -labor maintenance charged to pipe proper) also Mat'l Rep. Plant)	.0675	.0531		.0144
Forms other than labor	.0099			.0099
Salaries & Wages	.1214)			
Sub. Men & Animals	.0318)	.0988		.0589
Stationery & Printing	.0015)			
Depreciation, Cost material & Labor plant & forms,	.3823	.2284		.1232
Freight		.0307		
	<u>1.8301</u>	<u>1.8331</u>	<u>.2547</u>	<u>.2517</u>
Passes, Freight on Material & Supplies,		.0014		
Loading out pipe, Labor		.4299		
Rental of Equipment,		.0413		
	<u>1.8301</u>	<u>2.3072</u>		

24" Concrete Pipe <i>11048 lin ft.</i>				
Labor pipe proper	.3829)			
" " Forms	.0244)	.4651		.0022
Gravel,	.0600)			
Cement	.1335	.1786	.0451	
Reinforcing,	.1984	.2420	.0436	
Misc. (Inc. coal for Auburn Plant,) <i>also for Glendive</i>	.0909	.0752		.0157
Yard & Equipment, for Auburn Plant includes Supplies, labor and Mat'l. maintenance Plant <i>chgd. Pipe proper</i>	.0678	.0335		.0343
Forms other than Labor	.0098			.0098
Sal & Wages,	.1213)			
Sub Men & Animals,	.0316)	.0658		.0886
Staty. & Printing,	.0015)			
Royalty	.0500	.0500		
Depreciation	.3828			
Labor & Material Const. Plant, & Forms,		.1517		.2106
Freight		.0205		
	<u>1.5549</u>	<u>1.2824</u>	<u>.0887</u>	<u>.3612</u>

N O R T H E R N P A C I F I C R A I L W A Y C O.

(2)

	<u>24" concrete Pipe, Non.</u>		<u>Auburn</u>	
	<u>Lin. Ft.</u> <u>Glendive</u>	<u>Lin. Ft</u> <u>Auburn</u>	<u>Over</u>	<u>Under</u>
Bro't forward,	1.5549	1.2824	.0887	.3612
Labor loading out				
pipe,		.0323		
Passes		.0010		
Freight on material				
and Supplies,		.2864		
Rental of Equipment,		.0002		
Total cost Lin Ft.	<u>1.5549</u>	<u>1.6023</u>		



wld-d

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St. Paul

J. C. Breedlove

May 2 1913

Tacoma

Solomon 30th. Freight charges not included in Chapman's figures for cost of reinforced pipe at Glendive.

W. L. Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

275 by v 1

Tacoma April 30-13

W.L. Darling

St Paul.

See your letter 21st. sending detail statement cost Reinforced concrete pipe at Glendive. Are freight charges included in any of items.

J.C. Breedlove. 421 pm

Mr. Stevens says no freight charges are included in Mr. Chapman's figures

Saint Paul, April 21, 1913. WLD-D

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Replying to your letter of the 14th instant
relative to the cost of concrete pipe:

I hand you herewith a statement made by Mr.
Chapman, in his report of December 19, 1912, which I
believe will give you all the information you require.

Yours truly,

Enc

Chief Engineer

3677

6-E-1

1913

Tacoma, April 14, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Yours of the 7th giving statement of cost of reinforced concrete pipe for the years 1910, 1911 and 1912 at Glendive:

Will you please furnish detail cost so that I can compare with similar detail which I am having prepared here? You will note on statement sent in that there are only three items, viz.; manufacture of pipe, plant charge and royalty. I should like to have a detail statement, particularly of the items which enter into the cost of manufacture; that is, the unit per foot of length for labor, material, freight, etc.

Yours truly,

J. M. Smith
Assistant Engineer.

JCB-A

*Pls. be sure get this from car
or W.C.S. files of 4/17*

*In Darling - will it answer to send him
copy Chapman report Dec 24, 1912 attached
Mf*

3677
Saint Paul, April 7, 1913. WLD-D

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to your letter of the 1st instant
relative to cost of concrete pipe made at Auburn:

Please note the attached statement showing
cost of pipe at Glendive.

I understood that we were getting much better
results at Auburn. Can it be that you have got your
whole plant distributed to the work done this year, or
what is the cause of the additional cost?

Yours truly,

Enc

Chief Engineer

Tacoma, April 1, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Yours of March 8th about cost of reinforced concrete pipe which we have furnished Mr. Cook and Mr. Perkins from the Auburn concrete plant:

For the purpose of arriving at unit cost we closed our accounts temporarily as of March 1st and figuring to that date, the cost is as follows: \$1.60 per lineal foot of 24-inch pipe and \$2.30 per lineal foot of 36-inch pipe and bills have been made on that basis.

Yours truly,

James B. Smith
Assistant Engineer.

JCB-A

*Mr. Darling -
Glendine billings are as follows
Season 1909-1910*

	<i>Manufacture</i>	<i>Plant charge</i>	<i>Royalty</i>	<i>Total</i>
24"	1.05	0.41	.05	1.51
36"	1.44	0.57	.05	2.06
<i>Season 1911</i>				
24"	.94	.57	.05	1.56
36"	1.31	.79	.05	2.15
<i>Season 1912</i>				
24"	1.12	.38	.05	1.55
36"	1.40	.38	.05	1.83

Auburn
- \$ 1.60
- 2.30

COPY.

3677

9

Saint Paul, March 8, 1913. reg-d

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:

Mr. Cook is inquiring in regard to bills for
concrete pipe furnished him from Auburn. Will you please
advise when these bills may be expected.

Yours truly,

Chief Engineer

St. Paul, December 24th, 1912..

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

The following is a report on finished concrete product manufactured at Glendive Concrete Plant during the season ending November 20th, 1912, together with a comparison with cost of manufacture for previous years.

REINFORCED CONCRETE PRODUCT MADE IN 1912.

No.Pcs.	Kind	No. of cubic yards concrete	Total Unit cost (Incl. depreciat- ion & 5¢ per l.f. royalty on pipe)	Total Cost.
30	Complete S T Slab spans	525 ✓	\$175.88 ✓	\$5276.57 ✓
106	16' - 1696 l. f.			
39	20'6" piles 799.5 l.f.			
38	29'6" " 1121.0 "			
	3616.5 l.f.	189	0.9969 ✓	3605.24 ✓
48" Pipe	160 l.f.	30½	2.6968 ✓	431.49
36" "	1760 l.f. ✓	269 ✓	1.8302 ✓	3221.14 ✓
24" "	2272 l.f.	252½	1.5548	3532.49
	4192 l.f.	1266 ✓		\$16066.98 ✓

The distribution of costs in detail for the various kinds of manufactured product are as follows:

Reinforced concrete slabs mfg. 1912 cost.

30 complete spans single track slabs 525 - cu. yds.

		Per Span
Labor, slabs proper,	\$831.57 ✓	\$27.719 ✓
Labor, slabs forms,	32.90 ✓	1.097 ✓
Slab forms, other than labor,	6.48 ✓	.216 ✓

Gravel,	283.71	9.457
Cement,	695.78	23.193
Reinforcing,	1164.67	38.822
Moving slabs & misc.	399.29	13.309
Stationery & Printing,	4.62	.154
Yards & Equipment,	207.86	6.929
Salaries & Wages,	373.69	12.456
Subsistence men and animals,	97.21	3.240
Depreciation,	1178.79	39.293
	<u>\$5276.57</u>	<u>\$175.875</u>

Reinforced concrete piles, Mfg. 1912 cost.

106 pcs. 16'0"	1695	
39 pcs. 20'6"	799.5	189 cu. yds.
38 " 29'6"	1121	
	<u>3616.5</u>	lin. ft.

		Per Lin. ft.
Labor Pipe proper,	679.00	.1875
Labor Pipe forms,	53.20	.0147
Gravel,	102.12	.0283
Cement,	260.32	.0719
Reinforcing,	1069.46	.2951
Pile forms other than labor,	7.96	.0022
Moving piles & miscellaneous,	160.90	.0445
Stationery & Printing,	3.19	.0009
Yard & Equipment,	141.95	.0393
Salaries & Wages,	255.34	.0707
Subsistence men & animals,	66.42	.0184
Depreciation,	805.43	.2227
	<u>3605.29</u>	<u>0.9969</u>

Reinforced concrete Pipe Mfg. 1912. cost.
48" Pipe 160 lin. ft. 30½ cu. yds.

		Per Lin. ft.
Labor pipe proper,	180.07	1.1254
Labor Pipe forms,	8.43	.0527
Pipe forms other than labor,	1.56	.0098
Gravel,	16.48	.1030
Cement,	30.98	.1936
Reinforcing,	74.71	.4669
Misc. incl. Royalty 5¢ ft.	22.48	.1405
Stationery & Printing,	.24	.0015
Yard & Equipment,	10.80	.0675
Salaries & Wages,	19.41	.1213
Subsistence men and animals,	5.07	.0317
Depreciation,	61.26	.3829
	<u>431.49</u>	<u>2.6968</u>

3.

Reinforced concrete pipe Mfg. 1912. cost.
36" Pipe 1760 lin. ft. 269 cu. yds.

		Per Lin. Ft.
Labor pipe pr per,	805.33	.4577
Labor pipe forms,	34.86	.0198
Pipe forms other than labor,	17.41	.0099
Gravel,	145.36	.0826
Cement,	318.52	.1810
Reinforcing,	587.67	.3340
Miscellaneous, Inc. Royalty 5¢ l.f.	247.31	.1406
Stationery & Printing,	2.68	.0015
Yard & Equipment,	118.80	.0675
Salaries & Wages,	213.65	.1214
Subsistence men and animals,	55.82	.0318
Depreciation,	673.92	.3823
	<u>3221.14</u>	<u>1.8302</u>

Reinforced Concrete Pipe. Mfg. 1912. Cost.
24" Pipe 2272 lin. ft. 252 $\frac{1}{2}$ cu. yds.

		Per Lin. Ft.
Labor Pipe Proper,	870.11	.3829
Labor Pipe Forms,	55.46	.0244
Pipe forms other than labor,	22.49	.0098
Gravel,	136.44	.0600
Cement,	303.55	.1335
Reinforcing,	450.83	.1984
Miscellaneous inc. 5¢ l. f. Royalty	319.27	.1409
Stationery & Printing,	3.45	.0015
Yard & Equipment,	153.31	.0678
Salaries & Wages,	275.80	.1213
Subsistence Men and animas,	71.81	.0316
Depreciation,	869.97	.3828
	<u>3532.49</u>	<u>1.5548</u>

For purposes of comparison with cost of previous years a depreciation cost of 0.878 per cubic yard, same as was used for the years 1909-10, and the following table has been made on this basis.

	COMPARATIVE			COST.		
	Unit Prices.			Total Costs,		
	1909-10	1911	1912.	1909-10	1911	1912
30 spans slabs, per slab span,	157.00 ✓	156.18 ✓	151.96 ✓	4710.00 ✓	4685.40 ✓	4558.73 ✓
2272 l. f. 24" Pipe, per l. f.	1.51 ✓	1.3486 ✓	1.2694 ✓	3430.72 ✓	3064.02 ✓	2884.21 ✓
1760 l. f. 36" pipe, per l. f.	2.06 ✓	1.7435 ✓	1.5815 ✓	3625.60 ✓	3068.56 ✓	2783.40 ✓
160 l. f. 48" pipe, per l. f.	2.74 ✓	2.3605 ✓	2.481 ✓	438.40 ✓	377.68 ✓	397.01 ✓
3616.5" Piles per l. f.	.69 ✓	.8396 ✓	.82 ✓	2495.38 ✓	3036.41 ✓	2965.80 ✓
				14700.10 ✓	14232.07 ✓	13589.15 ✓
				1110.95 ✓	642.92 ✓	

Difference in cost,

Yours truly,

L. H. Chapman,

Assistant Engineer

26-17
P-9

Tacoma, March 4, 1913.

Mr. W. L. Darling:

Referring to my letter of December 14th last in regard to bills covering concrete pipe furnished from Auburn for use on the Tacoma-Tenino Line: Will you please advise when these bills may be expected?

A. R. COOK

RECEIVED
NOV 1913
OFFICE OF
ENGINEER

London, March 4, 1913.

Mr. J. H. ...

Reference to my letter of December 1912
first in regard to bills covering concrete pipe
from ... in the ...
of ... may be expected?

Yours ...

3677
8-93

Tacoma, Washington, March 15, 1913.

Mr. J. C. Breedlove,
Assistant Engineer.

Dear Sir:

In addition to the reinforced concrete pipe requested in my letters of February 17th and March 5th for work north of Seattle, we will require 128 feet of 24" and 136 feet of 36" pipe. Kindly add these to amount already ordered.

Yours truly,

W-P

Principal Assistant Engineer.

WLD

PRINTED BY
H. L. ENGINEER
MAY 13
1913
ST. PAUL, MINN.

3677

S-93

Tacoma, Washington, March 5, 1913.

Mr. J. C. Breedlove,

Assistant Engineer.

Dear Sir:

Supplementing my letter of February 17th regarding culvert pipe required north of Seattle:

In addition to pipe noted in my letter the following amount will be required for use from Edgecomb to Kruse's spur on the Great Northern Line:

272 lineal feet 24" reinforced concrete pipe

144 lineal feet 36" reinforced concrete pipe

Yours truly,

W-P
WLD

Principal Assistant Engineer.

NOV 1913
10
MAY
KCHH 1913

3677

6-E-3

OFFICE OF
CHIEF ENGINEER
U.S. NAVY
1913
NO. PAC. DIV.
ST. PAUL, MINN.

Tacoma, February 25, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

This will acknowledge yours of the 20th about
getting out culvert pipe required for Mr. Cook. I have
arranged to carry out as outlined in your letter.

Yours truly,

James B. Low
Assistant Engineer.

JCB-A

4 3677
Saint Paul, February 20, 1913. WLD-B

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to Mr. Cook's letter to me of the 17th instant with statement of amount of culvert pipe needed for the line north of Seattle:

I wish you would get this out at Auburn with the force now employed. I talked the matter over with Mr. Blanchard, and he would prefer to have you go ahead with the operation of the plant until such time as construction material is provided for.

Yours truly,

Chief Engineer

Copy to:
Mr. Blanchard.

Tacoma, Washington, February 17, 1913.

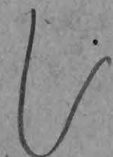
Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

The following culvert pipe will be required Black
River to Wickersham:

36" reinforced concrete pipe:

Belt Line,	84'
McMurray to Montborne,	248'
Sedro Woolley to Wickersham,	1608'



24" reinforced concrete pipe:

Belt Line,	228'
McMurray to Montborne,	752'
Sedro Woolley to Wickersham,	1452'

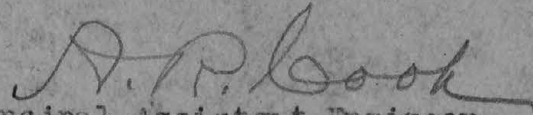
24" vitrified pipe to lengthen out existing culverts:

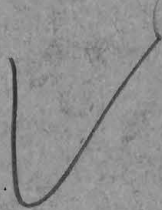
Belt Line,	20'
------------	-----

Yours truly,

ARC-P

JCB


Principal Assistant Engineer.



ST. PAUL, MINN.
NOV. 20, 1913
FEB.
CHIEF OF
ENGINEERING

3697
St. Paul, Feb. 17th, 1913..

Mr. O. C. Wakefield,
Supply Agent.

Dear Sir:-

Referring to ED 136 7500 lineal feet AS&W Co. No. 23
triangular mesh. This is required for making concrete pipe at the
Auburn concrete plant and I will be glad if you will arrange to
have it shipped as promptly as possible as it is needed to keep the
plant running.

Yours truly,

Chief Engineer.

REG R

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

239 by c a n

Tacoma Feb. 13, 1912

Handwritten initials: "E 1 3/4"

W. L. Darling,

ST. PAUL.

Am sending you my reqn. 44 to-day for seventy-five hundred lineal feet A.S. & W. Co., No.23 triangular most plain concrete re informement width 46 inch. This for making concrete pipe at Auburn concrete plant. Do not think can get this on coast and wish you would have sent out promptly as possible.

J. C. Breedlove

4:12PM

Tacoma, February 5, 1913.

Mr. L. Crassweller,
Assistant Purchasing Agent,
Tacoma.

COPY

Dear Sir:

I hand you herewith my requisition No. 40 covering three rolls, 450 lineal feet, of No. 23 A.S. & W. Co. 58-inch plain concrete reinforcement triangular mesh, which I wish you would arrange to have purchased as promptly as possible and have sent to Auburn. This additional purchase made necessary account of using up what little cement we would have left over and to complete requirements ~~for~~ for reinforced concrete pipe.

Yours truly,

(Signed) J. C. Breedlove

JCB-A

Assistant Engineer.

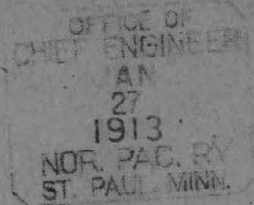
Copy to Mr. Darling ✓

Mr. Darling:

This will complete all the pipe needed on work for Mr. Krumm and Mr. Cook. Expect to be able to finish up Monday or Tuesday of the coming week and turn the plant over to the Operating Department.

J C Breedlove.

2677
6-E-1



Tacoma, January 23, 1913.

Mr. L. Crassweller,
Assistant Purchasing Agent,
Tacoma.

COPY

Dear Sir:

I hand you herewith my requisition No. 33, which covers two rolls, about 300 lineal feet, of No. 23 A.S. & W. Co. 58-inch plain concrete reinforcement triangular mesh. Need this at Auburn to complete making some additional pipe for which we have recently received orders and wish you would purchase and have delivery made as promptly as possible.

Yours truly,

(Signed) J. C. Breedlove

JCB-A

Assistant Engineer.

Copy to Mr. Darling. ✓

C

====

JCB

33.

Tacoma, Wash., Jan. 23, 1913.

Mr. L. Crassweller:

NPRy c/o J.C. Breedlove, Ass't Engineer,

Auburn, Wash.

COPY

- 2 Rolls (or about 300 lin. ft.) No. 23
A.S. & W. Co. 58" plain concrete reinforcement triangular mesh.

Tacoma-Tenino Line
For making concrete
pipe at Auburn Plant

(Can be furnished by U.S. Steel Products
Co., Seattle)

CONSTRUCTION

Local Purchase.
Delivery soon as possible.

copy to Mr. Darling.
" " Mr. McGilvrey

(Signed) J. C. Breedlove

3677
6-E-1
OFFICE OF
CHIEF ENGINEER
JAN
1913
NOR. PAC. RY.
ST. PAUL, MINN.

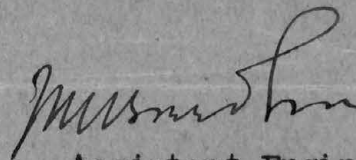
Tacoma, January 14, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I hand you herewith copy of my requisition 19, covering 200 pcs. 4" x 4" - ~~12~~ 16' and three kegs of 60d wire nails, for the Auburn concrete plant. I am sending this requisition to Mr. Crassweller for immediate purchase for the reason that I want to ship to Mr. Krumm at Lester the pipe made for him before closing down the plant, and it is necessary that we have this material for staking the cars.

Yours truly,



Assistant Engineer.

JCB-A

Enc

Copy to Mr. Crassweller

3677

6-E-2
OFFICE OF
CHIEF ENGINEER
JAN
13
1913
NOR. PAC. RY.
ST. PAUL, MINN.

Tacoma, January 7, 1913.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

copy only need

I hand you herewith my requisition No. 7, covering two rolls of 58-inch AS&W Co No. 23 plain concrete reinforcement triangular mesh, to be used in making reinforced concrete pipe at Auburn. I wired you, asking if this could be furnished promptly from Glendive and your advice was that it could not be, so I have asked Mr. Crassweller to purchase it at Seattle for immediate delivery. This was made necessary by the additional orders for pipe which Mr. Krumm has been sending me over and above his first order, for which we had a sufficient amount of mesh on hand.

Yours truly,

James H. ...
Assistant Engineer.

JCB-A Enc
Copy to Mr. Crassweller

19

7/6/13
Saint Paul, January 6, 1913.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Wash.

Dear Sir:

Replying to your letter of the 2d instant
relative to royalty for reinforced concrete pipe:

Vouchers are generally made up by the
Engineer in charge of the work. I enclose herewith a
sample of voucher made up at Glendive. Will you please
have similar voucher made up for your work.

Yours truly,

WLD-D

Chief Engineer

Enc.

OFFICE OF
CHIEF ENGINEER
JAN
6
1913
NOR. P. C. RY.
ST. PAUL, MINN.

Tacoma, January 2, 1913.

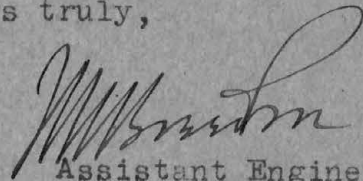
Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Will you please advise how the bills for royalty on the reinforced concrete pipe are handled? Do you make the bills in your office or are they made somewhere else? Cannot yet tell you just exactly how many lineal feet of pipe we will have made but as soon as we close down the plant will give you this information.

Would like to get the bills for royalty made as soon as possible after we have closed the plant so we can get all our charges against the pipe in.

Yours truly,


Assistant Engineer.

JCB-A

In Darling -
on the output from Glenview we have
made a voucher each year ourselves - copy last
one attached - Presume Mr. Brecklow should handle same
way - *reg*

CONSTRUCTION.

NORTHERN PACIFIC RAILWAY COMPANY.

E. D. No.

To

American Concrete Company,
c/o C. H. Cartlidge,
Bridge Engineer,
Address Chicago, Illinois.

Dr.

November 30th: For royalty on patented system of reinforcing
used in construction of concrete culvert pipe
manufactured during year ending December 31st, 1912
under terms of license dated April 1, 1908, and
agreement between Walter C. Pamley and G. H.
Schribner, Jr., dated September 24, 1907, made
part of said license.

2272 lineal feet 24" culvert pipe,	
1760 lineal feet 36" culvert pipe,	
160 lineal feet 48" culvert pipe.	
4192 lineal feet at 5¢ per lineal foot	\$209.60

AMOUNT OF THIS VOUCHER,	\$209.60
-------------------------	----------

CHARGE:

Material & Supplies,
Glendive Concrete Plant,
Pipe Proper.

Correct: _____

Approved: _____

Chief Engineer.

Correct: _____

Approved: _____

For the President.

I certify that this account is duly approved by the proper officers; that the same has been examined, found
correct, and is hereby audited for payment.


\$ _____

Auditor Disbursements.

Received _____ 191____, of the NORTHERN PACIFIC RAILWAY COMPANY.

in full of the above account.

Witness: _____

 READ THIS.—The above receipt must be dated and signed by the party in whose favor this Voucher is made out,
or, when signed by another party, the authority for so doing must in all cases accompany it and the receipt must
NOT be cut off from the body of the Voucher.

This Voucher, when dated and signed in ink as above, becomes a SIGHT DRAFT on the Northern Pacific Railway Company, St. Paul, Minn.
and may be used through bank in the same manner as a check. VOID IF ALTERED OR ERASED.

NORTHERN PACIFIC RAILWAY CO.

VOUCHER.

Audit No. _____

Month of _____ 191

\$ _____



Form 1286

wld-d

3677

0

TELEGRAM.

COPY

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 288, and forward same to Superintendent of Telegraph.

St. Paul

J.C. Breedlove

Dec 31, 1912

Tacoma

Your wire 28th. Cannot furnish triangular mesh from Glendive plant.

W.L. Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

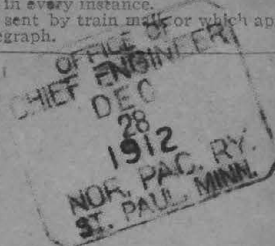
After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

123 hy-c-hn.

Tacoma, Dec 28th

W.L. Darling,

STPaul



We need two rolls or about 260 lineal feet of A.S.&W.CO., no 23 plain concrete reinforcement triangular mesh 46 inches wide for making pipe at Auburn can you ship this at once to me from Glendive.

JCBreedlove..1236pm.

*Mr Stevens
no wire mesh
at Glendive.
Hoc
12/30*

W.B. Sawyer Dec 28
*Mr Darling
Done on hand at Glendive. We require 239 rolls
for Glendive Dec 27th for Standard Southern Lumber Co
for Glendive Dec 27th for Standard Southern Lumber Co
12/30*

3677

OFFICE OF
CHIEF ENGINEER
DEC
27
1912
ST. PAUL, MINN.

Saint Paul, December 18, 1912

Held

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Will you please arrange to have bills rendered as soon as possible for the concrete pipe furnished Mr. Cook from Auburn.

Yours truly,

W. L. D. [Signature]
Chief Engineer

reg-d

WLD
Bill told up acct matter
to get actual cost of pipe
until plant turned over to city.
Dept and ascertain just what
depreciation on plant will be
JLB 012724

Saint Paul, December 18, 1912.

Hold
Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Will you please arrange to have bills rendered as soon as possible for the concrete pipe furnished Mr. Cook from Auburn.

Yours truly,

reg-d

Chief Engineer

Tacoma, Washington, December 14, 1912.

Mr. W. L. Darling.

Chief Engineer.

Dear Sir:

Bills have not been rendered as yet for the concrete pipe furnished from Auburn for use on the Tacoma-Tenino Line:

Will you please arrange to have these bills furnished as soon as possible?

Yours truly,

A. R. Cook

Principal Assistant Engineer.

W-P

OFFICE OF
CHIEF ENGINEER
DEC
17
1912
NOR. PAC. RY.
ST. PAUL, MINN.



Form 1386

reg-d

37677

TELEGRAM.

COPIES

All Railway messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except ranchmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of leaving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St. Paul

S.H. Robson

Dec 18, 1912

So. Tacoma

Dont understand your wire 14th WLD 13520 as shipment made and receipt acknowledged by Burt December 9th.

W.L. Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

1017 BY E CN

Tacoma, Dec. 17, 1912

W. L. Darling,

St. Paul.

Browsing pipe W.L.D.13520 eight pieces 64 feet 36 inch pipe shipped to Burt at Plains, and he acknowledged receipt of same December 9th.

J. C. Breedlove

1134pm



Form 1386

5 3677

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance. After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

COPY.

St. Paul,

Dec. 16th, 1912..

J. C. Breedlove,

Tacoma.

Rush concrete pipe WLD 13520 awhile.

S. L. Darling.

REG R

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered in proper spaces in every instance.

After transmitting telegrams which in their judgment would have served the Company's interests as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

63 BY O R 137 A

So. Tacoma, 12-14-12.

W. L. Darling,

St. Paul.

Rush concrete pipe W. L. D.-13520 awhile.

S. H. R.

12-15-12.

JCB
12/16/12

3677
6-E-1
OFFICE OF
ENGINEER
CHIEF
DEC
1912
NOR. PAC. RY.
ST. PAUL, MINN.

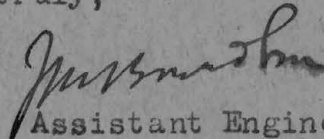
Tacoma, December 5, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Yours of the 30th in reply to mine of the 25th about turning over the Auburn concrete plant: I have had matter up with Mr. Blanchard and as soon as I have completed making pipe for Mr. Krumm will turn over the plant to Mr. Blanchard.

Yours truly,


Assistant Engineer.

JCB-A

U

Saint Paul, November 30, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Replying to your letter of the 25th instant:

I think the concrete plant at Auburn should be turned over to the Operating Department as soon as possible. I presume Mr. Blanchard would not care to take it over until the work is completed for Mr. Krumm, but there will be so little of that that I do not think it will take more than a month to complete it.

I suggest you talk with Mr. Blanchard and arrange with him to turn it over whenever he wants to take it.

Yours truly,

WLD-D

Chief Engineer

3677

6-E
OFFICE OF
CHIEF ENGINEER
NOV 28 1912
NOR. PAC. R.
ST. PAUL, MINN.

Tacoma, November 25, 1912.

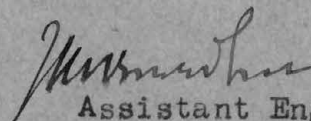
Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Please be referred to your letter of November 4th, in reply to mine of October 31st, about turning the Auburn concrete pipe and pile plant over to the Operating Department:

As requested in your letter of the 4th inst. I took this matter up with Mr. Blanchard and attach hereto copy of his reply of November 23rd to my letter of November 19th, from which you will note that Mr. Blanchard desires to have the plant turned over to the Operating Department as soon as our work is completed. I take it that you desire that we keep control of the plant during the time we are making pipe required for the double track work on the mountain and unless otherwise advised will arrange to turn the plant over to the Operating Department on completion of making of pipe required for that work.

Yours truly,



Assistant Engineer.

JCB-A

Tacoma, November 23, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

COPY

Dear Sir:

Replying to your favor of the nineteenth
relative to the concrete plant at Auburn gravel pit.

I believe it would be desirable that when
you have completed all the work you have in sight
the plant be turned over to the Operating Department
for future use in the making of culvert pipe, concrete
piles and slabs as fast as the same may be necessary.

Yours truly,

(Sgd) E. C. Blanchard

General Manager.

Copy to Mr. I. B. Richards
Mr. L. M. Perkins.

7 3677
Saint Paul, November 4, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

12/3
Dear Sir:

Replying to your letter of the 31st ultimo, relative to the Operating Department taking over the Auburn concrete plant:

I wish you would discuss this with Mr. Blanchard and see if he wants to take the plant over for the purpose of making material next year, or whether we should dismantle it and get such salvage as is practicable out of it. I believe, however, it would be a good scheme to maintain the plant there, and think that was the intention when it was erected, that the Operating Department would take it over and continue its operation as necessity demanded.

Yours truly,

WLD-D

Chief Engineer

Tacoma, October 31, 1912.

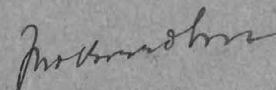
Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

In two or three weeks we will have completed the building of all the reinforced concrete piles which will be needed on the Point Defiance line. At that time will close down the plant at Auburn and, inasmuch as we will then have completed all of the work---both on pipe and piles---necessary for the construction of the Point Defiance line, suggest that the plant be turned over to the Operating Department and in doing this, that they designate someone to go to Auburn with one of my men and make a joint inventory of plant, tools, equipment and supplies on hand. This in order to prevent any discussion as to the above items on bills made to cover the transfer.

Will you please take up at your convenience and advise me as to the procedure to be followed out in making the transfer?

Yours truly,



Assistant Engineer.

JCB-A

CHIEF OF ENGINEER
NOV 1912
NOR. PAC. RY.
ST. PAUL, MINN.

✓
Saint Paul, November 29, 1912. 3677

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:

Replying to your letter of the 25th instant:

I find on my return to Saint Paul that the only requisition for operating department pipe that has been placed thus far or is in sight, is 64 feet of 36-inch pipe, order for which I think you already have.

Yours truly,

WLD-D

Chief Engineer

Saint Paul, November 29, 1912.

Mr. A. H. Hogeland,

Tacoma, November 25, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I have just written Mr. ~~Krumm~~ to advise me the amount of 24-inch and 36-inch pipe he will need on the double track work over the mountain. I understood you to say when you were here that the Operating Department also wants some pipe made and I wish you would advise me as promptly as possible. I asked Mr. Blanchard about it recently and he said he did not know of any pipe that was needed.

Yours truly,

Wm. L. Darling
Assistant Engineer.

JCB-A

*Re ED. Did you not have a Rg for some
further Dept. Rpt. 11/28 - in order, yes 64' & 36"
See order attached
Reg*

Tacoma, November 25, 1912.

Mr. T. Z. ~~Grumm~~,
Assistant Engineer,
Lester.

COPY

Dear Sir:

Mr. Darling has told me that he wants me to make the reinforced concrete pipe which you will need on the double track work on the mountain, but does not know how much you will need. I have just about finished making reinforced concrete piles that will be needed on this line and by the end of this week will start the outfit making reinforced concrete pipe. As we turn this out very rapidly, wish you would advise me promptly what amount of 24-inch and what amount of 36-inch pipe you will need.

In figuring the number of pieces of pipe you should figure on each length as 7.7 feet.

Yours truly,

(Signed) J. C. Breedlove

Assistant Engineer.

JCB-A

Copy to Mr. Darling. ✓

✓

3677 6-E-3

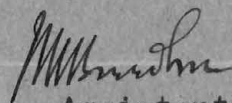
Tacoma, November 19, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I have yours of the 15th asking that I ship
64 lineal feet of 36-inch reinforced concrete pipe to
the Northern Pacific Railway Company, care of A. M. Burt,
Superintendent, Plains, Montana, this applying on
Comptroller's No. 2219 for Bridge 262-1. Will have
this loaded and shipped out as quickly as possible.

Yours truly,



Assistant Engineer.

JCB-A

Copies to Mr. Wakefield,
Mr. Burt.

CONFIDENTIAL - SECURITY

CONFIDENTIAL - SECURITY

SECRET

THIS DOCUMENT CONTAINS INFORMATION OF A CONFIDENTIAL NATURE

AND IS TO BE KEPT SECRET AND NOT DISCLOSED TO ANY OTHER PERSON

WHOSE KNOWLEDGE OF ITS CONTENTS COULD BE DETRIMENTAL TO THE NATIONAL DEFENSE

OR TO THE NATIONAL SECURITY OF THE UNITED STATES OF AMERICA

IT IS THE POLICY OF THE UNITED STATES GOVERNMENT TO KEEP THIS INFORMATION SECRET

AND TO TAKE SUCH ACTION AS MAY BE NECESSARY TO ENFORCE THIS POLICY

CONFIDENTIAL - SECURITY

CONFIDENTIAL - SECURITY

CONFIDENTIAL - SECURITY

OFFICE OF
CHIEF ENGINEER
NOV 28
1912
NOR. PAC. RY.
ST. PAUL, MINN.

St. Paul, Nov. 15th, 1912..

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:-

I have received the following order from the Supply
Agent:

WLD 13520-64 lineal feet 36" concrete pipe to be shipped
Northern Pacific Ry. Co. care of A. M. Burt, Plains, Mont. Notify
K. B. Skibiness, Supervisor, Bridges & Buildings; for bridge 262-1
Main Line Comptroller #2219, to be furnished from the plant at
Auburn. Will you please arrange to furnish this if plant has not
been shut down, and advise.

Yours truly,

Chief Engineer.

REG R

WLD-13520

WLD-13520

St. Paul, Minn., Nov. 14 1912.

Mr. W.L. Darling,

Chief Engineer, Bldg.

Dear Sir:

Please ship the Northern Pacific Railway Company,
care of Mr. A.M. Burt, Plains, Mont. Ntfy K.B. Skibiness, Sup. B.&B.

QUANTITY	DESCRIPTION OF ARTICLES	FOR WHAT PURPOSE
64	Lin. Ft. 36-inch concrete pipe.	For Bridge 262-1 Main Line Compt. #2219

(Engr. Dept. have plant at Auburn, Wn.
to make this mat'l.)

*no ordering - Bridge over
shown on map
instructions to make this
yes sir if he knows not shut down
The 11/15*

AMB-642

Appd. Gen. Supt Gen. Mgr.

Yours truly,



Supply Agent.

ST. PAUL, MINN.
NOR. PAC. RY.
1912
NOV
CHIEF ENGINEER
OFFICE OF

TARIEF
PARCHMENT
W.B.B. & CO.

TARIEF

NT

P. M.

VAL

25 7/10/17
SEP 10 1912
TACOMA, WASH.
TACOMA, SEPT. 4, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Following is report of cost of making concrete
pipe at Auburn for month of August:

Labor making pipe,	\$817.95
" loading pipe,	45.05
" on plant extensions for making reinforced concrete piles, and painting plant,	364.79
Total roll,	<u>\$1227.79.</u>

1856 lineal feet of 24-inch pipe made, no 36-inch
pipe, making the cost of making the pipe, per lineal foot,
44 cents. July cost 46.2 cents.

Yours truly,

Dict.
JCB-A

J. E. Dredger
Assistant Engineer.

W. L. Darling
W. L. Darling

11586
3677
6-E-1

Tacoma, October 3, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

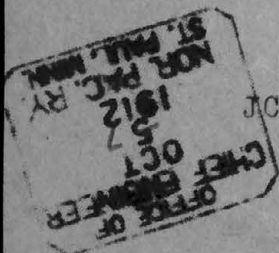
Following is statement of cost of making concrete pipe at Auburn for the month of September and comparison with the cost during August:

Total pay roll at the plant for September was \$861.97, of which \$139.20 was chargeable to extensions for making concrete piles, leaving \$722.27 labor charge for making the pipe. During the month 1752 lineal feet of 24-inch pipe made and 64 lineal feet of 36-inch. The labor cost on 24-inch pipe was 39 cents per foot and on 36-inch pipe 60 cents per foot, as against cost of 44 cents per foot for 24-inch pipe in August and no 36-inch pipe made in August. Cost of 24-inch pipe in July 46 cents per foot and 36-inch 61 cents. This for your information.

Yours truly,

[Signature]
Assistant Engineer.

JCB-A



Saint Paul, September 9, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to your letter of August 7th

6-E-1;

Mr. Smith advises that there is no material
to get out for the Operating Department; therefore
as soon as Construction Department work is finished
the plant should be shut down.

Yours truly,

WLD-D

Chief Engineer

Saint Paul, August 29, 1912.

OFFICE OF
CHIEF ENGINEER
AUG 30
1912
NOR PAC RY
ST. PAUL, MINN.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

In reference to recent correspondence regarding
Mr. Breedlove making reinforced concrete pipe for the Oper-
ating Department:

I attach Mr. Perkins' report of the 21st, which
indicates that there is no pipe of this sort required on
his territory, outside of the possibility of substituting
it for vitrified, or cast pipe.

As I note that Mr. Breedlove states that it would
be necessary to procure reinforcing material, I doubt whether
he could get the pipe manufactured in time for this season's
use. If you have plenty of reinforcing material on hand,
it is another question, and I would be inclined to recommend
that it all be worked up into pipe, as I understand that
Mr. Breedlove is making it at a very much reduced price.

Yours truly,

W C Smith

7/16
FROM OFFICE OF
ENGINEER OF MAINTENANCE OF WAY
TACOMA, WASH.

Tacoma, Washington, August 21, 1912.

Mr. W. C. Smith,

Chief Engineer of Maintenance of Way,

Saint Paul, Minnesota.

Dear Sir:-

Referring to your request for information as to the approximate amount of culvert pipe which will be required in this territory this season.

The greater part of the divisions have all orders filled for this material, but I have taken the matter up with Supervisors and find the following items originally estimated as vitrified or cast pipe, on which a concrete pipe could be applied:

IDAHO DIVISION

Authorized on Form 134:

Farmington Branch,	Bridge 1 ^A ,	16 ft. 24" Vit. Pipe
Wash. Central Branch,	" 23 ^E ,	24 " " " "

The following items not authorized but requiring repairs which will be included on Form 134 this year and should be done early the coming winter, if possible:

P. & L. Branch,	Bridge 15 ^A ,	16 ft. 24" Vit. Pipe
	" 195 ^C ,	32 " 36" Wood Box
	" 200 ^A ,	40 " 36" " "
	" 203 ^A ,	40 " 24" " "

OFFICE OF
CHIEF ENGR. OF M. OF W.

AUG

24

1912

NOR. PAC. RY.

ST. PAUL, MINN.

#2.

Wash. Central Branch, Bridge 2^B, 24 ft. 24" replacing broken Vit. Pipe.

Total requirements, Idaho Division:

Authorized: 40 ft. 24" Vit. Pipe

Not authorized: 80 ft. 24"
72 ft. 36"

PASCO DIVISION

Walla Walla Branch, Bridge 1^W, 132 ft. not authorized for 36" Cast Pipe

Bridge 18^B, 84 ft. 24" Tile Pipe

" 20^A, 84 ft. 24" " "

" 20^B, 84 ft. 24" " "

" 20^H, 76 ft. 24" " "

" 20^I, 153 ft. 24" " "

Requisitions have been submitted but not filled covering above. Concrete pipe could be substituted.

Total, Pasco Division: 132 ft. 36"
499 ft. 24"

SEATTLE DIVISION

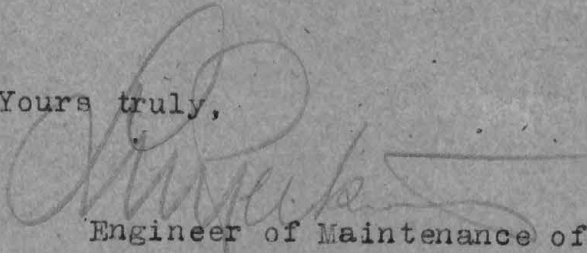
I do not know, at present, of any prospective requirements of culvert pipe, though, undoubtedly, some will develop on bridge inspection. These, however, will probably be small, and it has been my intention to apply, so far as possible, on the Seattle Division branches, some cast iron water pipe 20" to 24" which the Claim Department had to take over as rejected by consignee.

#3.

TACOMA DIVISION

On the Tacoma Division, all orders for culvert pipe have been filled and I do not know, at present, of any prospective requirements.

Yours truly,


Engineer of Maintenance of Way.

LMP-W

3677

6-E-1

Tacoma, August 7, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Please be referred to my letter of July 10th asking if we will be called upon to make any reinforced concrete pipe for the Operating Department.

We will complete the requirements for the Tacoma-Tenino Line in three or four weeks and if there is to be any other pipe made we should know it promptly.

Yours truly,

JCB-A

W. L. Darling
Assistant Engineer.

*W.L.D.
no record
8/28/12*

*W.L.D. note
see note
you of now
W.L.D. Darling
8/19/12*

ST. PAUL, MINN.
JULY 19/2
4 PM
OFFICE OF
ENGINEER

Mr. Darling:

Herewith as per your message of the 14th

J. C. Breedlove.
8-15-12

3677

OFFICE OF
CHIEF ENGINEER
AUG
1912
NO. 130
ST. PAUL, MINN.



FORM 1338

3677

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered on this blank.

After transmitting telegrams which in their judgment would have served the Company's interest as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

St. Paul,

J C Breedlove,

August 14th, 1912..

Tacoma.

COPY

Solidify Solidify 7th about making pipe for Operating
Department. Please forward copy of your letter July 10th.

W L Darling.

REG R

Tacoma, July 10, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

COPY

Dear Sir:

We will have completed making of reinforced concrete pipe for the Point Defiance line, this including the portion of the line under Mr. Cook's supervision, in about six weeks time. If there will be any pipe to be made for the Operating Department we should know it promptly, so we can get the necessary cement and reinforcing rods on hand so as to keep the plant going continuously.

Yours truly,

JCB-A

Assistant Engineer.

Tacoma, August 7, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Following is comparative statement of cost of making reinforced concrete pipe at Auburn for the months of June and July:

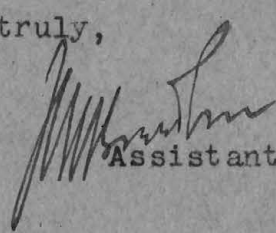
Total amount of July Payroll;	\$1892.05
Labor on pile extension,	\$192.85
" "setting up boiler,	39.60
" " gravel screen extension,	79.00
" " changing forms,	34.80
" " derrick alterations,	60.40
" " painting building,	25.20
	<u>431.85</u>
Making ZPipe,	\$1460.20

During the month of July there was made 1248 feet of 24" pipe and 1440 feet of 36" pipe. The cost per lineal foot of making pipe was as follows:

	July	June
Cost per foot for 24" pipe,	46.1¢	45.4¢
" " " " 36" "	61.4¢	60.5¢

Yours truly,

JCB-A


Assistant Engineer.

OFFICE OF
ENGINEER
12
NOV 1912
ST. PAUL, MINN.

3477

6-E-1

Tacoma, August 3, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

I hand you herewith seven pictures showing concrete culvert pipe, forms, reinforcing, stack yard, operation of removing outside form and general layout of plant at Auburn.

Yours truly,

W. L. Darling

Assistant Engineer.

JCB-A

Enc

W. L. Darling

X

COPY

3677

On Montana Division, July 25, 1912.

Mr. L. M. Perkins,
Division Engineer,
Tacoma.

Dear Sir:

Mr. Breedlove has a full cement testing outfit which he is using in connection with the concrete work in Point Defiance tunnel. It is the same outfit that was used on the S. P. & S., and is available for any cement testing that you may have.

If you will take the matter up with Mr. Breedlove he will be glad to do such work as you need.

Yours truly,

WLD-D

Chief Engineer

Copies
WCS JCB

3677
St. Paul, Minnesota. July 15, 1912. HES

Mr. J. C. Breedlove,

Assistant Engineer, Tacoma, Wash.

Dear Sir:-

Your favor of the 10th regarding concrete pipe plant at Auburn.

I do not know of any additional information needed at this time. It is my understanding of Mr. Darling's letter that he wished you to submit a recommendation regarding the method of making pipe, together with cost of same. I do not see that this can be done with any accuracy until you have operated your plant at least one full season. In operating these plants a large proportion of the unit costs of material is due to overhead expense or plant charges and the cost of the output is largely dependent upon the quantity of same.

Yours truly,

Bridge Engineer.

✓ Cy W L Darling

Tacoma, July 10, 1912.

Mr. H. E. Stevens,
Bridge Engineer,
St. Paul.

COPY

Dear Sir:

See Mr. Darling's letter of July 4th about cost
to manufacture pipe at the Auburn and Glendive plants.

Is there any information that you would like
that you do not have?

Yours truly,

(Signed) J. C. Bradburn

Assistant Engineer.

JCb-A

Copy to Mr. Darling. ✓

(7/11/12)

OFFICE OF
MILITARY ENGINEERS
JUL
14
1912
NOE
PAUL MINN

4
3677
Saint Paul, July 4, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma, Washington.

Dear Sir:

Referring to correspondence relative to
the cost of manufacturing pipe at Auburn and Glendive:

I wish you and Mr. Stevens would consider this
matter together, and arrive at an approximate cost,
and method of making pipe at both plants, and submit
a recommendation of the method and design to be used
for pipe manufacture.

Yours truly,

WLD-D

Chief Engineer

Copy to Mr. Stevens.

St. Paul, Minnesota. July 3, 1912. HES

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Your memo on the attached file regarding labor costs on concrete pipe.

Mr. Breedlove's statement that my labor unit costs are an average for all classes of material manufactured at Glendive, and the involved theory by which he endeavors to prove same, although very interesting is entirely incorrect. It should be borne in mind that we also have a few records in St. Paul, and my figures were taken from the detailed statements of the 1909 and 1910 operation as used in billing out the products of the plant to the various divisions: These statements were gotten up in excellent shape, and the costs of labor and material, maintenance and operation completely divided up amongst the various items, --- labor cost for pipe being \$3.83 as previously stated, for piles \$3.94, and for slabs \$2.15.

I should have taken the costs of the Glendive plant operation in 1911 if the accounts had been turned in in such shape as to show clearly the unit costs to be charged to the various products. As nearly as I can make out from these accounts, the labor costs on concrete pipe for the season

Mr. Darling, page 2.

of 1911 as shown in material and distribution book, is as follows:

Labor charged to manufacture of pipe.....	\$686.49
" " " maintenance of pipe forms.....	\$107.90
Pro rata of labor to be charged to pipe in stock account transfer.....	\$416.47

Total pipe labor, incl. maintenance.....	\$1,210.86

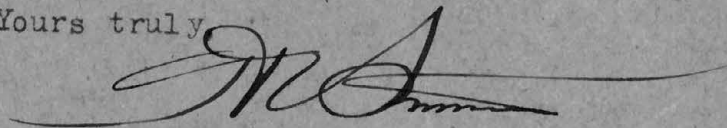
If however we assume the figures given in Mr. Breedlove's letter of June 22nd, the labor costs for the 1911 season at Glendive would figure as follows:

133 c.y. 24" pipe @ \$7.01	\$932.33
147 c.y. 36" pipe @ \$6.82	\$902.54
18 c.y. 48" pipe @ \$5.87	\$105.66

	\$2,040.53

I am also attaching copy of letter from Mr. Bell to Mr. Smith dated June 8th, 1912, in which he tries to show that the cost of plant operation in 1911 is a little less than the operation in 1910. This cost of operation in 1911 seems to depend somewhat upon what it is desired to prove. For this reason I threw out the 1911 figures and went back to the 1910 figures which have been properly gotten out and audited.

Yours truly



Bridge Engineer.

COPY

St. Paul, Minnesota. January 8, 1912.

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

Following is a report of the material manufactured at Glendive Concrete Plant for year ending October 10, 1911, together with a comparison of cost of manufacture for year 1911 with years 1909 and 1910.

Material Made 1911.

<u>No.</u>	<u>Pcs.</u>	<u>Kind.</u>	<u>Cu. Yds.</u> <u>Concrete</u>
38		S.T. slab spans	665
10		D.T. " "	163
150		24" pipe - 1200 lin.ft.	133
120		36" " 960 " "	147
12		48" " 96 " "	18
20		16'0" Piles 320 " "	17
35		20'6" " 717.5 " "	37
20		25'0" " 500 " "	26
20		29'6" " 590 " "	31
Total			1237

The cost of the above material including depreciation charges on plant follows:

<u>No.</u>	<u>Kind</u>	<u>Manu-</u> <u>facture</u>	<u>Plant</u> <u>Expense</u>	<u>Roy-</u> <u>alty</u>	<u>Total</u>	<u>Cost</u>
48	Slab spans	\$135.59	\$53.51		\$189.10	\$9076.80
1200	lin.ft. 24" pipe	.9369	.5717	.05	1.5586	1870.32
960	" " 36" "	1.3136	.7899	.05	2.1535	2067.36
96	" " 48" "	1.6270	.9635	.05	2.6405	253.47
2127.5	" " piling	.6039	.3357		.9396	1999.40
						\$15267.35

For the season 1909-10 a plant depreciation charge of \$3617.00 was made against the total product of 4120 cu. yds. or a charge of 87.8¢ per cu. yd. of product. For the season

1911 the plant depreciation charged was \$3462.00 against the product of 1237 cu. yds. or a charge of \$2.80 per cu. yd. In order to compare the cost of production of material made in 1911 with that made during 1909-10, this years product should only have the same plant depreciation charge per cu. yd. as the 1909-10 material, or 87.8% per cu. yd. The following table is made on this basis, charging 87.8% only per cu. yd. plant depreciation for 1909-10 and 1911 products.

<u>No.</u>	<u>Kind</u>	<u>1909-10</u> <u>Unit</u> <u>Price</u>	<u>1911</u> <u>Unit</u> <u>Price</u>	<u>1909-10</u> <u>Cost</u>	<u>1911</u> <u>Cost</u>
48	Slab spans	\$157.00	\$156.18	\$7536.00	\$7496.64
1200	lin.ft. 24" pipe	1.51	1.3486	1812.00	1618.32
960	" " 36" "	2.06	1.7435	1977.60	1673.76
96	" " 48" "	2.74	2.3605	263.04	226.61
2127.5	" piling	.69	.8396	1467.97	1786.25
Total Cost				\$13056.61	\$12801.58
Difference in total cost					\$255.03

Yours truly,

(sgd) Jno. W. Bell

3677
OFFICE OF
CHIEF ENGINEER
JUN
25
1912
ST. PAUL, MINN.

Tacoma, June 22, 1912

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

Answering yours of June 17th in reply to mine of the 5th about labor cost of pipe at Auburn concrete plant for the month of May, and Mr. Stevens' statement that our labor cost is \$5.00 per cubic yard of concrete placed while at Glendive for 1910 the labor cost was only \$3.83 per cubic yard:

Mr. Stevens has apparently overlooked the fact that at Glendive concrete slabs, piles and pipe were all being made and unit cost which he has derived is the unit cost for total quantities of concrete included in the three above classes.

Mr. Bell happens to have with him a detail of the cost for operation of Glendive plant during 1911 and states that his records show that the cost of operation at Glendive for 1911 was two per cent in excess of the cost of operation for 1910. During 1911 there were 1237 cubic yards of concrete made into slabs, pipe and piles at Glendive distributed as follows:

Slabs,	828	cubic yards
Pipe,	298	" "
Piles,	111	" "
Total,	1237	" "

The total amount of payrolls for that year was

\$4824.57, making the average labor cost per cubic yard \$3.90.

The labor distribution for the three items noted above results in a unit cost for these three items as follows:

Slabs,	\$2.44	per	cubic	yard
Piles,	6.87	"	"	"
Pipe, 24-inch,	7.01	"	"	"
" 36-inch,	6.82	"	"	"
" 48-inch,	5.87	"	"	"

As stated above, the cost of operation at Glendive for 1911 was two per cent in excess of that for 1910, so that the cost of 24-inch pipe at Glendive during 1910 would be \$6.87 per cubic yard, as against \$5.86, our cost at Auburn.

Yours truly,

Johnston
Assistant Engineer.

JCB-A

2677
Saint Paul, June 17, 1912.

Mr. J. C. Breedlove,
Assistant Engineer,
Tacoma.

Dear Sir:

Referring to your letter of the 5th instant
about the cost of work at Auburn concrete plant:

Mr. Stevens states that your labor for May
figures about \$5 per cubic yard. Glendive charges on
the outfit for 1910 labor were only \$3.85 per yard.

Yours truly,

WLD-D

Chief Engineer

Tacoma, June 5, 1912.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear Sir:

With reference to May payroll for the Auburn
concrete plant:

The amount of labor on this roll is \$1297.69, of
which \$214.25 is chargeable to plant, putting in bulkheads
to keep gravel from running over loading track, leaving
\$1083.44 chargeable to making of pipe. During the month
1664 lineal feet of 24-inch pipe was made and 176 lineal feet
of 36-inch pipe. Each foot of the 36-inch pipe is equivalent
to one and one-half feet of 24-inch pipe, so on basis of
24-inch pipe, the total amount of pipe made is equivalent to
1928 lineal feet, or a cost of 56 cents per lineal foot.
During the month of April, labor charge of making pipe
was \$665.86. During that month 664 lineal feet of 24-inch
pipe was made making cost of labor \$1.00 per foot. The high
cost was due to lack of forms and not being able to work the
labor to get the full efficiency.

Will send you each month statement of cost of
making pipe.

Yours truly,

J. M. Bowdler
Assistant Engineer.

ADDITIONAL COPY.

St. Paul, Minnesota. July 3, 1912. HES

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Your memo on the attached file regarding labor costs on concrete pipe.

Mr. Breedlove's statement that my labor unit costs are an average for all classes of material manufactured at Glendive, and the involved theory by which he endeavors to prove same, although very interesting is entirely incorrect. It should be borne in mind that we also have a few records in St. Paul, and my figures were taken from the detailed statements of the 1909 and 1910 operation as used in billing out the products of the plant to the various divisions: These statements were gotten up in excellent shape, and the costs of labor and material, maintenance and operation completely divided up amongst the various items, --- labor cost for pipe being \$3.83 as previously stated, for piles \$3.94, and for slabs \$2.15.

I should have taken the costs of the Glendive plant operation in 1911 if the accounts had been turned in in such shape as to show clearly the unit costs to be charged to the various products. As nearly as I can make out from these accounts, the labor costs on concrete pipe for the season

Mr. Darling, page 2.

of 1911 as shown in material and distribution book, is as follows:

Labor charged to manufacture of pipe.....	\$686.49
" " " maintenance of pipe forms.....	\$107.90
Pro rata of labor to be charged to pipe in stock account transfer.....	\$416.47

Total pipe labor, incl. maintenance.....	\$1,210.86

If however we assume the figures given in Mr. Breedlove's letter of June 22nd, the labor costs for the 1911 season at Glendive would figure as follows:

133 c.y. 24" pipe @ \$7.01	\$932.33
147 c.y. 36" pipe @ \$6.82	\$902.54
18 c.y. 48" pipe @ \$5.87	\$105.66

	\$2,040.53

I am also attaching copy of letter from Mr. Bell to Mr. Smith dated June 8th, 1912, in which he tries to show that the cost of plant operation in 1911 is a little less than the operation in 1910. This cost of operation in 1911 seems to depend somewhat upon what it is desired to prove. For this reason I threw out the 1911 figures and went back to the 1910 figures which have been properly gotten out and audited.

Yours truly,

Bridge Engineer.



FORM 1386

WLD-D

TELEGRAM.

All Radiogram Messages must be written in ink on these blanks, which must not be used for other purposes, and those for particular persons (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending station and name of receiving station must be entered on this blank.

After transmitting telegrams which in any way might have served the Company's interest as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 253, and forward same to Superintendent of Telegraph.

St. Paul, July 15, 1912.

J.C. Breedlove

Tacoma

Solomon 13th. Plans for forms of reinforced concrete OK.

W. L. Darling

**TELEGRAM.**

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered on this blank.

After transmitting telegrams which in their judgment would have served the Company's interest as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 238, and forward same to Superintendent of Telegraph.

81 by o r t 315 A.M.

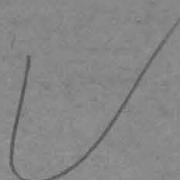
Tacoma July 13th 1912

W L Darling

St Paul

See my message 9th, will you please advise if plans for forms for reinforced concrete piles are all right, important to get this matter lined up so that we can work piles in connection with pipe .

J C Breedlove.





FORM 1386

WLD-D

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered on this blank.

After transmitting telegrams which in their judgment should have served the Company's interest as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 1386, and forward same to Superintendent of Telegraph.

St. Paul, July 13, 1912.

J.C.Breedlove
Tacoma

Solomon 9th OK to make requisition in accordance with plans
for reinforced concrete piles.

W. L. Darling



FORM 1386

TELEGRAM.

All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and those for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name of receiving station must be entered on this blank.

After transmitting telegrams which in their judgment would have served the Company's interest as well if sent by train mail, or which appear unnecessarily long, operators are required to attach a copy to Form 233, and forward same to Superintendent of Telegraph.

99 by v f

Tacoma July 9-12

W.L. Darling,

StPaul.

See my letter June 29th Sending plans forms for Reinforced concrete piles. Please advise if OK to make requisition according to these plans.

J.C. Breedlove.

1229 pm

104

✓

CHIEF OFFICE OF
JULY 10 1912
ST. PAUL

OFFICE OF
CHIEF ENGINEER
JUL 12 1912
NOR. PAC. RY.
ST. PAUL, MINN.

St. Paul, Minnesota. July 10, 1912. HES

Mr. W. L. Darling,
Chief Engineer.

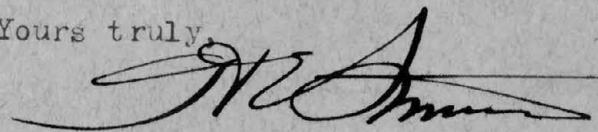
Dear Sir:-

I am returning you herewith sketches proposed for reinforced concrete pile forms, etc., for the Auburn concrete plant.

There is no objection to the round pile proposed, but I do not think they will find it as convenient or economical to make as the octagonal section we have heretofore been using. I think there will be difficulty in holding the reinforcement in proper position, and believe that a spirally wound reinforcement of eight longitudinal bars giving equal area to the four proposed would be more suitable and more convenient to handle and hold in place if it is desired to use a round type of pile.

The galvanized iron form for the point of the pile was tried out at Glendive, and proved a failure.

Yours truly,



Bridge Engineer.

*Has Willard
have you received
The W. E. 1*

Tacoma, June 29, 1912

OFFICE OF
CHIEF ENGINEER
JUL 5 1912
NOR. PAC. RY.
ST. PAUL, MINN.

Mr. W. L. Darling,
Chief Engineer,
St. Paul.

Dear sir:

I hand you herewith one blueprint each of the following plans:

First: Forms for reinforced concrete piles.

Second: Cast iron brackets for reinforced concrete pile forms.

Third: Template and handle for bending reinforcing rods for reinforced concrete piles.

Fourth: Template for bending rods for reinforced concrete piles.

Fifth: Plan of galvanized point for reinforced concrete piles.

All these in connection with extension of Auburn concrete pipe plant recently authorized so that we can make concrete piles required for the Point Defiance line work. Will you please advise if these plans meet with your approval and if so I will make requisitions and arrange for getting the plant started.

yours truly,

W. E. 1

Assistant Engineer.

JCB-A