Northern Pacific Railway Company. Engineering Department Records.

(2373)

Burlington Route

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY

OFFICE OF CHIEF ENGINEER,
Burlington Building.
547 West Jackson Boulevard, Chicago, Ill.

A. W. NEWTON,
Chief Engineer.

March 23rd, 1923.

Mr. H. E. Stevens, Chief Engineer,
Northern Pacific Railway Co.,
St. Paul, Minn.

Dear Sir:-

As requested in your letter of March 5th, I hand you herewith detailed cost figures for different sizes of concrete pipe, as manufactured by the C.B.& Q.R.R; the prices are as of October 1922. Statement is also attached showing how the overhead is arrived at.

With reference to the last paragraph of your letter, stating that you include in your prices a percentage to cover overhead. Our Accounting Department advises that it is its opinion that we cannot under the accounting rules of the Interstate Commerce Commission, include Interest, Depreciation, Taxes, etc. in our charge-out prices.

Yours truly,

A W Newton

Chief Engineer.

RTS:b

Chicago, March 21, 1923
J-1116

Mr. G. A. Haggander

I am returning Mr. Stevens' letter to Mr. Newton, sent me with yours of the 14th, file [illegible]-311.

Per conversation between yourself and the writer Monday, I am attaching figures showing how the prices on various sizes of pipe were arrived at at the time they were last computed. as of Oct. 1922 —

The overhead expense (or 31%) hasn't been itemized, but I am giving illustration below showing the elements of expense that represent the $2.53 or 31% on 24" pipe.

I think this will answer the purpose in a general way in case you care to transmit it to the Northern Pacific.

Fuel, Oil, etc.	.2500
Proportion Engr. Salary	.3409
Proportion Gen'l. Foreman's Salary	.1909
Interest on Raw Materials @6%	.0454
Commercial Frt. on Raw Materials	.1607
Interest, Depreciation, Taxes & Insurance on Invest.	.9383
Proportion of cost repairs to plant & equipment	.2790
Interest on finished product @ 6%	.0395
Taxes on finished product	.0062
	2.5309

H.

J. G. Stuart

Prices on [illegible]

PIPE 12-in. x 4-ft.

Material	Quantity	Price	Amount	
Cement	1.26 sacks	.47½ sack	.60	
Corrugated Bars	10#	1.78½ cwt	.19	
Gravel	.18 cu yds	.21 yd	.04	
Netting 40"-4½'	15 sq ft	2.64 hd sq ft	.40	
Wire #16 iron	2½ oz	3.37 cwt	.01	
			1.24	
	Store handling 3%		.04	1.28
Labor			.92	
	Supervision 6%		.05	.97
				2.25
Overhead expense	31%			.70
				2.95 ea.

PIPE 18-in. x 6-ft.

Material	Quantity	Price	Amount	
Cement	2.75 sacks	.47½ sack	1.30	
Corrugated Bars	14#	1.78½ cwt	.25	
Gravel	.39 cu yds	.21 yd	.08	
Netting 34"-6½'	20 sq ft	2.64 hd sq ft	.53	
Netting 38"-6½'	21 sq ft	2.64 hd sq ft	.55	
Wire #16 iron	4 oz	3.37 cwt	.01	
			2.72	
	Store handling 3%		.08	2.80
Labor			1.64	
	Supervision 5%		.08	1.72
				4.52
Overhead expense	31%			1.40
				5.92 ea.

PIPE 24" x 8'

Material	Quantity	Price	Amount	
Cement	6.24 sacks	.47½ sack	2.96	
Corrugated Bars	16 3/10#	1.78½ cwt	.30	
Gravel	.89 cu yds	.21 yd	.19	
Netting 46"-17½'	65 sq ft	2.64 hd sq ft	1.72	
Wire #16 iron	4 oz	3.37 cwt	.01	
			5.18	
	Store handling 3%		.15	5.33
Labor			2.08	
	Supervision 5%		.10	2.18
				7.51
Overhead expense	31%			2.33
				9.84 ea.

Prepared Oct 1902

PIPE 36-in x 6-ft.

Material	Quantity	Price	Amount	
Cement	8.56 sacks	.47½ sack	4.07	
Corrugated Bars	52#	1.78½ cwt	.93	
Gravel	1.22 cu yds	.21 yd	.26	
Netting 48"	92 sq ft	2.64 hd sq ft.	2.43	
Wire #16 iron	1#	3.37 cwt	.03	
			7.72	
	Store handling 3%		.23	7.95
Labor			2.69	
	Supervision 5%		.13	2.82
				10.77
Overhead expense 31%				3.34
				14.11 ea.

PIPE 48-in x 6-ft.

Material	Quantity	Price	Amount	
Cement	10.68 sacks	.47½ sack	5.07	
Corrugated Bars	303#	1.78½ cwt	5.41	
Gravel	1.52 cu yds	.21 yd	.32	
Grasshoppers	6 pcs	.95 hd	.06	
Wire #16 iron	3-5/16#	3.37 cwt	.11	
			10.97	
	Store handling 3%		.32	11.29
Labor			4.52	
	Supervision 5%		.23	4.75
				16.04
Overhead expense 31%				4.97
				21.01 ea.

PIPE 60-in x 6-ft.

Material	Quantity	Price	Amount	
Cement	16.76 sacks	.47½ sack	7.96	
Corrugated Bars	349#	1.78½ cwt	6.23	
Corrugated Bars	51#	1.50 cwt	.77	
Gravel	2.39 cu yds	.21 yd	.50	
Grasshoppers	8 pcs	.95 hd	.08	
Wire #16 iron	3-1/8#	3.37 cwt	.11	
			15.65	
	Store handling 3%		.47	16.12
Labor			6.70	
	Supervision 5%		.34	7.04
				23.16
Overhead expense 31%				7.18
				30.34 ea.

PIPE 72-in x 5-ft.

Material	Quantity	Price	Amount	
Cement	24½ sacks	.47½ sack	11.64	
Corrugated Bars	499	1.78½ cwt	8.91	
Corrugated Bars	90	1.78½ cwt	1.61	
Gravel	3½ cu yds	.21 yd.	.74	
Grasshoppers	8 pcs	.95 hd.	.08	
Wire #16 iron	5½	3.37 cwt	.19	
			23.17	
	Store handling 3%		.70	23.87
Labor			7.74	
	Supervision 5%		.39	8.13
				32.00
Overhead expense 31%				9.92
				41.92

FORM 1886

Ga 65

Telegram—Be Brief

MFC

Time Filed

M.

Saint Paul, March 9, 1923.

A R Cook
Seattle Wash

R-28 Concrete slab and pile requirements on system for 1923 as follows: Bridge 70 Pasco ten 15 foot and twenty 20 foot piles, ten single track slabs 7x16. Bridge 107 Pasco ten 15 foot and thirty 20 foot piles, fourteen single track slabs 7x16. Bridge 123-1 Pasco two single track slabs 7x16. Bridge 62 Idaho fifteen 30 foot piles. Better have Koren check lengths of piles for his territory. A-4

M F CLEMENTS

FORM 1386

NORTHERN PACIFIC YELLOWSTONE PARK LINE

Telegram—Be Brief

Time Filed

M.

548CF

MAR 7 1923

Seattle Mar 6 1923 M F Clements

St Paul

My R 28 please advise R 7

A R Cook

1043 PM

FORM 1336

Telegram—Be Brief

Time Filed

MAR 1 1923 M.

464cfv

Seattle Feb 28 MFClements

StPaul

Please advise me how many concrete piles and length of same also shingle and double track slabs you will require this season. R-28

ARCook

8p

MFC 9a65

Saint Paul, January 8, 1923.

Mr. H. E. Stevens,

Chief Engineer.

I hand you herewith a letter from Mr. Cook in regard to concrete pipe to be manufactured at the Auburn Concrete Plant.

For the past two or three years we have been shipping pipe from Auburn as far east as Helena and I think it advisable to continue that arrangement. If Foley Brothers move the concrete plant to Darling, the territory east of Helena can be supplied from the Darling plant.

The following is a list of pipe required for the territory west of Helena in 1923:

5600	lin. ft.	of	24"	pipe
2200	"	"	36"	"

Mr. Cook's last weekly report lists the following pipe on hand:

4240	lin. ft.	of	24"	pipe
1232	"	"	36"	"

It would be advisable to manufacture the pipe one year ahead and assuming the same amount for 1923 and 1924, the total to be manufactured for both years will be -

6960	lin. ft.	of	24"	pipe
3168	"	"	36"	"

Yours truly,

Bridge Engineer.

The following is a list of pipe required for the territory west of Helena in 1923

5600 lin ft 24 in pipe
2200 " " 36 " "

Mr Cooks last weekly report lists the following pipe on hand

4240 lin ft 24 in pipe
1232 " " 36 in "

It would be advisable to manufacture the pipe one year ahead and assuming the same amount for 1923 and 1924 to total to be manufactured for both years will be

6960 lin ft 24 in pipe
3168 " " 36 in pipe

Form 823 *22-65* 2-7-13 15Bks. RP

NORTHERN PACIFIC RAILWAY COMPANY
REQUEST FOR EXAMINATION OF MATERIAL

TEST REQUEST NO. *178*

MR. *H. G. Burnham* *Seattle Wash Jan 2nd* 19*23*
Engineer of Tests

PLEASE EXAMINE *Three test Cubes 6"x6 made at Auburn Concrete Plant Auburn, Wash, from material used in manufacturing pipe, piles Etc*

RECEIVED AT

FROM *Auburn, Wash January 2nd 1922*

CAR NO. *Express* INITIALS

TO APPLY ON REQUISITION NO. ORDER NO.

NO. OF PIECES	DIMENSIONS OR PATTERN NO.	REMARKS
3	*6"x6" Test Cubes*	*For 28 day test*
		Cubes made 12-19-22
		Please send result of tests to
		A. R. Cyr
		Seattle Wash
M. F. C.		

REPLY TO REQUEST FOR EXAMINATION OF MATERIAL, NO.

ST. PAUL, MINN., 191

MR.

REPORT OF {INSPECTION / ANALYSIS / TEST} NO. WAS MADE TO MR. 191

ENGINEER OF TESTS.

JAN 5 1922

9a 65

Form 823 2-7-13 15Bks. RP

NORTHERN PACIFIC RAILWAY COMPANY
REQUEST FOR EXAMINATION OF MATERIAL

TEST REQUEST NO. 121

MR. H. G. Burnham Seattle Wash July 10th 1922
Engineer of Tests

PLEASE EXAMINE Three test cubes 6x6" made at Auburn Concrete Plant Auburn, Wash, from material used for manufacturing pipe, posts etc. JUL 13 1922

RECEIVED AT

FROM Auburn Wash July 8 - 1922

CAR NO. Express INITIALS

TO APPLY ON REQUISITION NO. ORDER NO.

NO. OF PIECES	DIMENSIONS OR PATTERN NO.	REMARKS
3	6"x6 Test Cubes	For 30 day test
		Cubes made 6-17-22
		1-2-4 mixture
		Please send result of test to
		A. R. Cook
		Seattle, Wash
M.T.C.		

REPLY TO REQUEST FOR EXAMINATION OF MATERIAL, NO.

ST. PAUL, MINN., 191

MR.

REPORT OF {INSPECTION / ANALYSIS / TEST} NO. WAS MADE TO MR. 191

ENGINEER OF TESTS.

FORM 1386

Telegram—Be Brief

Time Filed
9a-65 M.

MFC

Saint Paul, May 15, 1922

A R Cook
Seattle Wash

S-26 Make up additional 25 foot piles to supply 25 pieces. Have marked requisitions for Auburn delivery. A-12

M F CLEMENTS

FORM 1386

Telegram—Be Brief

Time Filed

M.

MAY 15 1922

180 CF GI

Seattle may 13 1922 M F Clements

Stpaul

A 11 have on hand at Auburn thirty six 30 ft piles two 25 ft piles have nine 25 pile cages made up and plenty of rods on hand to make balance of 25 ft piles. S-26.

A R Cook.

338pm.

FORM 1386

NORTHERN PACIFIC

Telegram—Be Brief

Time Filed

M.

MFC

A R Cook   Saint Paul, May 13, 1922

Seattle, Washington

I Have requisitions for ten thirty foot and twenty-five twenty-five foot concretepiles. Do you have piles or rods for making them at Auburn. A-11

M F CLEMENTS

9a-65

MFC

Saint Paul, May 15, 1922.

Mr. A. R. Cook,
Prin. Asst Engineer,
Seattle, Washington.

Dear Sir:-

Referring to your letter of May third in regard to concrete pipe required for the Rocky Mountain Division for 1922.

All orders for maintenance on the Rocky Mountain Division have been filled. A requisition for 80 feet of 24" pipe was made by Mr. Blum a few days ago for a line change on the Third District, Rocky Mountain Division and you will receive an order for this within the next few days.

Yours truly,

Bridge Engineer.

MAY 15 1922

Missoula, Montana,
May 11th, 1922.

Mr. M. F. Clements,
Bridge Engineer,
St. Paul, Minnesota.

Dear Sir:

Referring to your letter of May 8th, in reference to placing orders for concrete pipe so as to release the congested condition of the pipe yard at Auburn.

All pipe approved for the Rocky Mountain Division for this year has been received and placed with the exception of 80 feet of 24" recommended for the line change at bridge 156 near Plateau. It is my understanding that this was to be ordered by the Engineering Department and placed by the contractor. If I am wrong please advise and I will make requisition to cover the 80 feet.

Yours truly,

J. Flemming

Supervisor.

MFC

Saint Paul, May 8, 1922.

Mr. J. Flemming,
Supervisor,
Missoula, Montana.

Dear Sir:-

All of the concrete pipe for the Rocky Mountain Division will be shipped from Auburn, Washington. If you have not already made them, will you kindly prepare and submit requisitions to cover all of your pipe. The plant Superintendent at Auburn is anxious to make delivery of pipe for your division to provide more working room in the storage yard at the plant.

Yours truly,

Bridge Engineer.

Cy-ARCook

Re: Concrete pipe required for
Rocky Mountain Divn. for 1922.

MAY 6 1922

Seattle, Wash., May 3rd, 1922.

Mr. M. F. Clements:

Referring to your wire of date February 15th, 1922 A-6 regarding concrete pipe required for Rocky Mountain Division for 1922.

Up to date we have received store order for Rocky Mountain Division ST 3127 covering 80' 10 pieces of 36 inch pipe and 104' 13 pieces of 24 inch pipe for shipment to Helena and Missoula. This pipe has been shipped and Form 1924 been made to cover.

Would suggest that if Auburn Concrete Plant is to furnish balance of pipe for Rocky Mountain Division as outlined in your wire, that store orders for same be furnished at an early date so that pipe shipments can be made while empty flats are available for shipment.

A. R. Cook

CES-S

FORM 1388

Telegram—Be Brief

Time Filed
9a 65 M.

128 BY G[1]

Tacoma Feb 24 1922 M F Clements

Stpaul

A 11 both requisitions should be filled. 363 covers additional material to take care of Rocky Mtn divn requirements S-26

A R Cook.

434pm.

FORM 1386

Telegram—Be Brief

Time Filed

M.

MFC

Saint Paul, Feb. 25, 1922

A R Cook
Tacoma

Acoustical Requisition 363 for wire mesh.

Do I understand Requisition 363 will supersede your requisition 339. A-11

M F CLEMENTS

Re: Requisition 363 for wire mesh

Tacoma, Washington,

February 20, 1922.

Mr. M. F. Clements, Bridge Engineer,

St. Paul, Minnesota.

Dear Sir:

Acknowledging your telegram A-6 in re requisition for wire mesh for the Auburn concrete pipe requirements:

The original plans for the pipe called for two strips of 46" in width. This was tried out, also one strip of 44" and the other 48". It was found that mesh runs in the shaper and considerable difficulty was experienced on that account in shaping up the mesh for the pipe so that finally, the inside drum not being of sufficient width, two strips of 44" were used and Mr. Farmer states that this has been the method of constructing the mesh reinforcing every since the plant opened during which time he has been employed either in one capacity or another, so that two pieces of 44" work out better than any other width, making sufficient lap but do not extend the full length of the pipe as indicated on the plan. We can, however, use the 48" mesh which you have at Glendive. My requisition #363 following.

Yours truly,

A. R. Cook

ARC-R Principal Assistant Engineer

FORM 1386

NORTHERN PACIFIC

Telegram—Be Brief

Time Filed
9a 36 M.

57 BY G1

Tacoma Feb 16 1922 M F Clements

Stpaul

A six Pipe for territory east of Paradise has not been taken into our calculations Based our production on requirements pardise west adding 38 percent 25 inch 25 percent 36 inch pipe for emergency requirements east of Paradise will necessitate additional mtl Reqn will follow in few days which will probably take care of all 48 inch mesh that you have at Glendive R-28

A R Cook.

156pm.

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
M.

Telegram—Be Brief

MFC

Saint Paul, Feb. 15, 1922

A R Cook
Tacoma Wash

Your requisition 339 calls for 34 rolls 44 inch wire mesh. Concrete pipe requires one width 44 inch and one width 48 inch. Have you sufficient 48 inch wire mesh. We have 4200 feet 48 inch mesh at Glendive. We will require 5790 lineal feet 24 inch pipe and 1980 lineal feet 36 inch pipe west of Helena in 1922. Does your requisition cover all requirements for 1922. A-6

M F CLEMENTS

Form 4189 11-16 3M E

Northern Pacific Railway Company

OFFICE OF ENGINEER OF TESTS.

Report No. 22038

MAY 10 1922

St. Paul, Minn., May 9th 19 22

To A.R. Cook, Princ. Asst. Engr., Seattle, Wn.

CONCRETE COMPRESSION SPECIMENS.

Sent in by A.R. Cook Representing Work at Auburn Concrete Plant

Test Request No. 112 On Pipe, Piles, etc.

RESULTS OF COMPRESSION TESTS:

Test No.	Size	Area	Age	Mix	Maximum Load in Lbs.	Ultimate Strength Per Sq. In. in Lbs.
1	6"x6"x6"	36 sq.in.	60 days	1-2-4	74370	2066
2	"	"	"	"	83790	2328
3	"	"	"	"	47070	1308

REMARKS:

It will be noted that cube No. 3 evidences ultimate strength considerably lower than the average cube of this age and mix. The cube appeared soft and crumbly in some parts.

FC.(1)
CC-HES.(3)

H. G. BURNHAM

Engineer of Tests.

FORM 1386

Telegram—Be Brief

Time Filed 12a-65 M.

MFC

May 10, 1922

A R Cook
Seattle Wash

S-4 Reinforcing rods in NP 18068 at Auburn from Pine City, Minnesota was local shipment taken over by Claim Department. Unload at Auburn. A-6

M F CLEMENTS

MFC

Saint Paul, May 10, 1922.

Mr. A. R. Cook,
Prin. Asst. Engineer,
Seattle, Washington.

Dear Sir:-

Referring to your message S-4 to Mr. Stevens in regard to 83 bundles of reinforcing rods which were shipped in N.P. Car 18068 from Pine City, Minnesota to Auburn.

This material was shipped to a party at Pine City but the material was not accepted by the owner and in settling the claim it was necessary for the Company to take over the rods.

You may take them into the Auburn stock and use them for any purpose for which they are suitable.

Yours truly,

Bridge Engineer.

L- 70

Mr. [illegible]. E. Stevens.

Referring to your notation on telegram in regard to NP 18068, in regard to 83 bundles reinforcing rods , at Auburn concrete plant, billed to Pine City, Minn. these are the rods referred to in M.F. Clements letter of March 6th, file MFC.

H

5-8-22

OAK

M F Clements
Please note & advise OAK
#89 5/9

FORM 1386

NORTHERN PACIFIC YELLOWSTONE PARK LINE

Telegram—Be Brief

Time Filed

M.

110 CF GI

Seattle may 2-1922 H E Stevens

Stpaul.

Received NP. 18068 with 83 bundles reinforcing rods at Auburn concrete plant billed from Pine City Minn various lengths and sizes some cut and bent no requisition to cover advise regarding same S-4

A R Cook.

1246pm 3
3

C. C. Kyle Can you advise anything about this shipment.

H E Stevens

5
3

FORM 1386

NORTHERN PACIFIC

Telegram—Be Brief

MFC

Time Filed 9a 65 M.

Saint Paul, May 9, 1922

A R Cook
Seattle, Wash.

Abstemious to Stevens regarding No. 15 black wire at Auburn. This wire has not been annealed. If you will put it on wood fire and bring to bright cherry color and cool in air, you will have no trouble in bending it. A-4

M F CLEMENTS

Re: Annealed wire for use
at Auburn Concrete Plant.

Seattle, Washington,
May 6th, 1922.

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

Dear Sir:

On April 24th, 1922, I received Kelly Howe Thompson invoice dated March 31st, 1922, amount paid by draft, $10.29, for 300 lbs. #15 galvanized black annealed wire. The original order on my requisition PAE-T #363, G.S.K. #2393 called for #16 wire. There was a credit allowance of 30¢ to make up the difference on the invoice.

It is impossible to use #15 wire at the Auburn Concrete Plant. It is too stiff and I am today writing my requisition PAE-S #480 for 500 lbs. of #16.

Will you kindly advise the disposition of the 300 lbs. of #15 wire which is on hand at the Auburn Concrete Plant, samples of which are attached herewith.

Yours truly,

A. L. Cook

AOE-R Principal Assistant Engineer

cc to Mr. S. H. Robson

OFFICE OF
CHIEF ENGINEER
MAY
9
1922
NOR. PAC. RY.
ST. PAUL, MINN.

Ga 65

MFC

Saint Paul, April 26, 1922.

Mr. H. E. Stevens,

Chief Engineer.

Referring to Mr. Cook's letter of April 18th in regard to the sale of concrete pipe to the City of Enumclaw.

The following is a detail of the price per lineal foot which we should charge for the pipe:

Material and labor	$3.10
Depreciation of plant	.35
Labor loading	.05
Freight on raw materials	.09
	3.59
Add 10%	.36
	$3.95

Freight from Auburn to Enumclaw to be added.

Mr. Cook's letter and wire returned.

Yours truly,

Bridge Engineer.

Form 4189 6a65 11-16 3M E

Northern Pacific Railway Company

OFFICE OF ENGINEER OF TESTS.

Report No. 21659

St. Paul, Minn., March 24th 1922

To A.R. Cook, Princ. Asst. Engr. - Tacoma, Wn.

CONCRETE COMPRESSION SPECIMENS.

Sent in by Princ. Asst. Engr. Representing Work at Auburn Concrete Plant

Test Request No. 104 On Mfgr. of pipe, piles, Etc.

RESULTS OF COMPRESSION TESTS:

Test No.	Size	Area	Age	Mix	Maximum Load in Lbs.	Ultimate Strength Per Sq. In. in Lbs.
1	6"x6" x6"	36 sq.in.	36 days	1-2-4	67800	1883
2	"	"	"	"	70100	1947
3	"	"	"	"	64740	1800

REMARKS: Thirty day test on the above cubes was not possible as the cubes were not received until March 22nd. It will be noted however that these cubes evidence an ultimate strength considerably lower than the average cube of their respective age and mix.

FC.(1)
CC-HES.(3)

H. G. BURNHAM

Engineer of Tests.

Form 4189 11-16 3M E

Northern Pacific Railway Company

OFFICE OF ENGINEER OF TESTS.

Report No. 21660

St. Paul, Minn., March 24th 1922

To A.H. Cook, Prin. Asst. Engineer, Tacoma, Wn.

CONCRETE COMPRESSION SPECIMENS.

Sent in by A.H. Cook Representing Work at Auburn Conrete Plant

Test Request No. 102 On Mfgr. of pipe, piles, etc.

RESULTS OF COMPRESSION TESTS:

Test No.	Size	Area	Age	Mix	Maximum Load in Lbs.	Ultimate Strength Per Sq. In. in Lbs.
1	6"x6"x6"	36 sq. in.	102 days	1-2-4	48250	1340
2	"	"	"	"	53380	1483
3	"	"	"	"	53720	1492

REMARKS: Ninety day test on the above cubes was not possible as the cubes were not received until March 23rd. It will be noted however that these cubes evidence an ultimate strength considerably lower than the average cube of their respective age and mix.

FC.(1)
CC-HES.(3)

M. G. BURNHAM

Engineer of Tests.

9a65

MFC

Saint Paul, December 30, 1921.

Mr. C. C. Kyle,

Acting General Storekeeper.

Referring to your memo. A-9089, December 28th, in regard to brass screening wire on ED Requisition 973.

I cannot give you the gauge of the wire that goes to make up a screen of this kind. The screen is to be used for taking muddy water out of sand in the screening plant at the Auburn Concrete Plant and it is immaterial whether the screen has 22 or 30 openings per inch. Any brass screening wire of commercial size which will furnish openings between 22 and 30 meshes per inch will be satisfactory.

Yours truly,

Bridge Engineer.

A-9089

Mr. H. E. Stevens.

Referring to ED requisition 973, item one pc. brass screening wire 5 ft. wide, 6 ft. long with 22 openings to the inch.

Please advise gauge of wire that should be used in this.

12-28-21

M-d

Ga-6

MAR 28 1920

Saint Paul, March 26th, 1920.

Mr. M. F. Clements,

Bridge Engineer.

Please note attached memorandum from Mr. Cribbs about figures which the Accounting Department desire us to obtain for them.

I feel this will involve considerable additional work, but I wish you would look into the matter with Mr. Cribbs and see what can be done. If it is not too big a job, please handle with Mr. Cribbs direct.

Chief Engineer.

HES-ar
Enclosure

Mr. Stevens:

The Accounting Dept. is asking for information (verbal request) as to value of stock on hand at Auburn Feb. 29, 1920 and also for value of stock on hand Dec. 31, 1917, and for the same information as to balance in ~~investment~~ account for both dates for Auburn, and also for balance in ~~investment account~~ for both dates for Glendive. I understand Accounting Dept. has not been able to get much information from their own records. We may be able to give some figures from our records, but it may require considerable work. We have plenty of work without this, but perhaps we may have to tackle this additional job.

I am attaching Mr. Cook's 1919 report, his letter of March 5 and Mr. Clements letter of March 9, which Mr. Gemmell handed me to note, and which I believe you have not yet seen. The prices for finished product which Mr. Cook recommends for 1920 are shown on page 11.

HOC 3/20/20

MFC

Saint Paul, June 29, 1921.

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

Dear Sir:-

On May 27th I wrote you in regard to making cubes for compression tests of concrete made at the Auburn concrete plant. This letter should have reached you by June first. Mr. Stevens was in your office at a later date and he states that you did not have any information in regard to these tests. I assume that my letter did not reach you.

I am sending you several copies of a drawing which has been prepared of a mould and also specifications covering the method of making test cubes. You can have the moulds made at a tin shop at South Tacoma in two or three days time and I wish you would arrange to make test cubes as soon as possible, sending them to the Engineer of Tests at Como, Saint Paul, with a regular form of test request.

One test should consist of nine pieces so that they may be broken at the end of a 28 day, three months and six months period, and I think you should make a test at least once a month.

We will want to make it an established practice that compression tests be made of concrete on all jobs of any magnitude and the specifications call for test cubes on all work that has a total of 100 cubic yards of concrete.

Yours truly,

Encl. Bridge Engineer.

MFC

Saint Paul, June 29, 1921.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of June 28th in regard to test cubes of concrete being poured at Auburn.

I hand you herewith one print of drawing 1816-57 which I sent to Mr. Cook May 27th, with instructions that he have the moulds made at South Tacoma and prepare test cubes according to the instructions on the print. It is possible that Mr. Cook did not receive my letter and it should have been in his hands before your recent trip west.

I have again written Mr. Cook asking him to prepare test cubes and send them to Mr. Burnham, so that they could be broken at the end of one month, three months and six months, and to prepare cubes for such a test during each month that the Auburn plant is in operation.

I think it would be advisable to furnish copies of this drawing to each supervisor and district engineer, with instructions that test cubes be prepared for all concrete work of any magnitude.

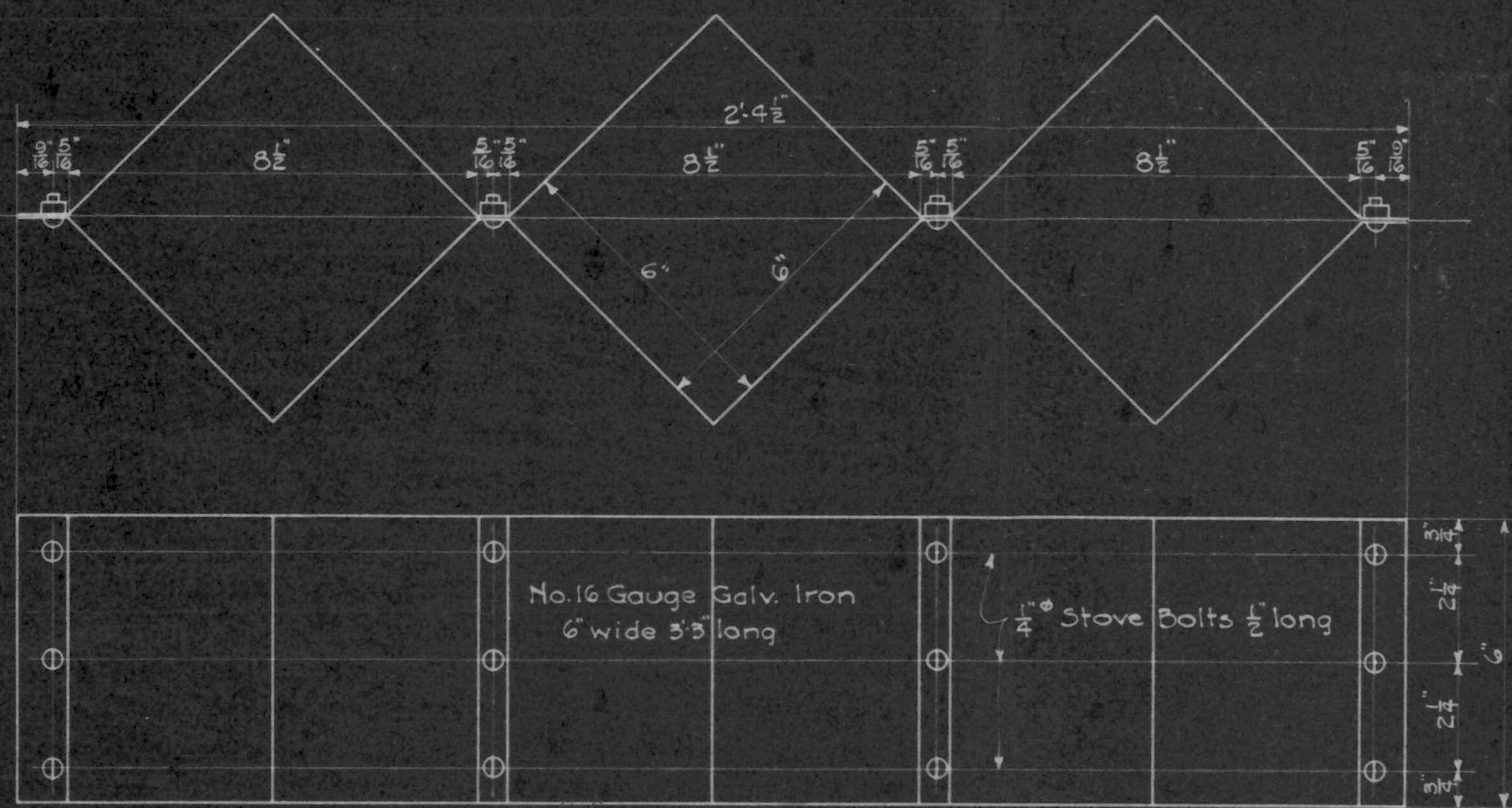
Yours truly,

M E Clements

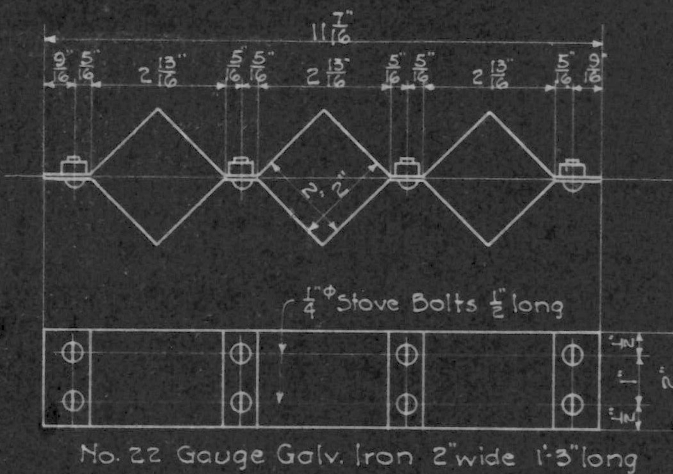
Bridge Engineer.

Encl.

Verbally instructed by
HES to send out instr
6/30



Form for 6" Concrete Cubes for Testing



Form for 2" Concrete Cubes for Testing

Notes on Construction of Forms

The metal shall be bent to the form shown with sharp corners true to line and surface. When resting on a plain surface all edges of the top or bottom shall be in contact with that surface.

Specifications for Molding Test Pieces

Laboratory test pieces shall be made on special construction work where a cement testing laboratory is in operation. Field test pieces shall be made for all construction work which has a total of 100 cu yds of concrete.

The laboratory test piece shall be a 2 inch cube. The field test piece shall be a 6 inch cube.

The molds shall be oiled before using. During the molding of the test piece, the mold shall rest on a clean plain surface made of plate glass or steel.

Mortar for laboratory test shall consist of one part cement and three parts standard sand by weight.

Concrete for field test shall consist of mixed run concrete.

The mortar for laboratory test shall be hand mixed on a plain surface of plate glass or steel and placed in the mold in layers about 1 inch thick.

The concrete for field test shall be taken from the forms immediately after the spading and leveling is complete. Care shall be exercised to procure an average sample. Molds shall be filled in three or more layers.

Each layer of mortar or concrete shall be tamped with a metal tamper to eliminate air and excess water. In finishing the test piece the mortar or concrete shall be heaped above the mold and smoothed off with a trowel. As soon as the test pieces from one sample are molded, the top of each shall be covered with a piece of glass which is brought to a firm bearing on the fresh mortar. The cover glass shall remain in place until the molds are removed.

Test pieces shall be kept in the molds for 48 hours after molding and shall be stored in a moist place protected from the sun, wind and cold. After removal from the molds they should be stored in a sand bank wet down each day. They shall not be allowed to dry out.

The test pieces shall be shipped to the Engineer of Tests to reach his office at the end of a 28 day period. The average of three cubes shall be used in a single test. The test pieces shall be placed in wooden boxes protected at the edges and corners with saw dust, paper or rags. The boxes should be 1 1/2 inches larger on the inside dimension than the cubes.

N P RY

PLAN OF MOLDS AND SPECIFICATIONS FOR COMPRESSION TEST PIECES FOR MORTAR AND CONCRETE

Scale 3" = 1'-0" May 19 - 1921

1816 - 57

3876

Saint Paul, June 28th, 1921.

Mr. M. F. Clements:

Have you made any arrangements for securing test cubes of the concrete being poured at Auburn in the construction of flumes and pipe?

Mr. Cook did not seem to understand that any test was desired, but as the gravel from this pit is now becoming quite variable and carries a fairly high percentage of clay, I think we ought to secure tests as usual.

Chief Engineer.

HES-ar

MFC

Saint Paul, June 29, 1921.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of June 28th in regard to test cubes of concrete being poured at Auburn.

I hand you herewith one print of drawing 1816-57 which I sent to Mr. Cook May 27th, with instructions that he have the moulds made at South Tacoma and prepare test cubes according to the instructions on the print. It is possible that Mr. Cook did not receive my letter and it should have been in his hands before your recent trip west.

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I think it would be advisable to furnish copies of this drawing to each supervisor and district engineer, with instructions that test cubes be prepared for all concrete work of any magnitude.

Yours truly,

Encl.

Bridge Engineer.

Saint Paul, June 28th, 1921.

JUN 29 1921

Mr. M. F. Clements:

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Mr. Cook did not seem to understand that any test was desired, but as the gravel from this pit is now becoming quite variable and carries a fairly high percentage of clay, I think we ought to secure tests as usual.

Chief Engineer.

HES-ar

MFC

Saint Paul, May 27, 1921.

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

Dear Sir:-

I hand you herewith five copies of a drawing showing plan of a mold and specifications for making cubes for compression tests of concrete. You may arrange with the local store to make up the forms for field test.

Will you kindly have test cubes prepared at the Auburn Concrete Plant for the material in the Auburn pit? You should make at least nine test pieces, three of which are to be broken at the end of 28 days, three at a three months period and three at a six months period.

We will want to make it an established practice that compression tests be made of concrete on all jobs of any magnitude and the specifications call for test cubes on all work that has a total of 100 cubic yards of concrete.

You will make the regular form of test request on the Engineer of Tests.

Yours truly,

Bridge Engineer.

Encl.

MFC

Saint Paul, May 27, 1918.

Mr. A. T. Holmgren,

Assistant Engineer,

Thorp, Washington.

Dear Sir:-

Will you kindly write a specification covering the sampling, making of cubes, storage and shipment of six inch compression test cubes. I want to get up such a specification to establish a uniform method of manufacture and handling of test pieces.

Yours truly,

Bridge Engineer.

Como, St. Paul, Minn.,
May 13, 1918.

Analysis & Test
Cement
General

Mr. M. F. Clements:

With reference to yours of May 2nd requesting copy of Preliminary Report of Committee C-1 upon Cement, of the American Society for Testing Materials, year 1916:

Upon reference to my files I find that the copy of report referred to was sent to Mr. Stevens upon November 4th, 1916. I unfortunately do not have a further copy of this report to hand you, but find that the substance of same, under the heading "Specifications and Tests for Compressive Strength of Portland Cement Mortar", is published upon page 590 of the 1916 Proceedings of the A.S.T.M., which will I believe, furnish you the necessary information in this regard.

H. G. Burnham.

14-H

MFC

Saint Paul, May 2,1918.

Mr. H. G. Burnham,

Engineer of Tests,

Como.

Dear Sir:-

About one year ago we discussed the adoption of the Joint Committee's specifications for cement. At that time you sent Mr. Stevens an advanced circular giving a preliminary report of the Committee of the American Society, American Society of Testing Materials and the United States Government. That report was changed slightly but its final adoption and the final report does not give any methods of making compression test pieces or compression tests. If you still have a copy of the preliminary report, which I believe was No. C-1, will you kindly loan it to me, as I wish to prepare some instructions to field men for making test pieces. I would like to have the information published in the preliminary report.

Yours truly,

Bridge Engineer.

9/4

Thorp, Wash. May 31.1918.

Mr. M. F. Clements.
Bridge Engineer.
St. Paul. Minn.

Dear Sir:-

Replying to your letter of the 27th. regarding the framing of specifications covering concrete cubes for testing.

Following outlines will be of great benefit and should be adhered to in order to procure the desired results and at the same time do justice to both aggregates and the cement, especially when these factors are known.

Moulds.

Large moulds are preferable, 8"by 16" cylinders recommended by the A. S. of T. E. we used 6" cubes on the Spokane Grade Separation with good results, and they are from point of economy and weight easier handled both in field and shipment.

Wooden moulds should have built in bottoms, or else placed on a iron plate with sand or mud around the bottom to prevent leakage: Moulds should be cleaned and oiled before using.

Sampling.

Concrete for the specimens should be taken direckly from the forms, immediately after the spading and leveling out is completed: As a rule three or more batches are dumped in one place,This will insure an average of placed concrete and care should be exercised to procure an average sample.If consistent three samples or specimens should be taken, as an average of three is more desirable.

The moulds should be placed near place of filling in a protected place free from vibrations, specimens should be struck off level with a trowle.

Moulds are to be filled in three layers, not less, pudling or tamping each layer with tamper or trowle, in order to eliminate air. When very wet concrete is sampled it will shrink and expel water after standing, this should be remedyed with dry mortar of same mix and cube struck off.

Marking.

Cubes are hard to mark, lumber crayon is of very little value, scratching the number on the top marr's the concrete and I would suggest that a linen tag fastened to a light wire be used, the wire could be slipped down in the concrete as soon as the mould is filled, the wire bent over the side of mould, in this way it will not interfere with the finishing off of the cube and then too, brief record right at hand, linen tag and india ink should be used in orded to maintain illegibillity.

<u>Storing</u>.

Specimens should be kept in the moulds for the first two days after moulding, during which time they should be kept in a moist place, protected from sun- wind or cold: After removal from moulds, best place to keep them in the field, would be, covered in a sand bank sprinkled or wet down every day, or else in a dug-out: They should not be allowed todry out.

At least two days before testing specimens should be removed from moist place and allowed to dry out.

<u>Shipping</u>.

Specimens should be placed in packing boxes, protecting edges and corners with stuffing of saw dust- paper or rags: On the Spokane Grade Separation as well as other places, boxes were made about 1-1/2" larger than the cubes, and on account of weight never more than three cubes were shipped in one box, even if we had greater number to ship.

Yours truly.

H. T. Holmgren

Resident Engineer.

PREPRINT.—This preprint is subject to correction and modification and is not to be republished as a whole or in part pending its formal release by the American Society for Testing Materials through its Secretary-Treasurer. It is issued primarily to stimulate written discussion, which may be transmitted to the Secretary-Treasurer for presentation at the approaching Nineteenth Annual Meeting, June 27 to 30, 1916.

REPORT OF COMMITTEE C-1
ON
CEMENT.

Committee C-1 submits herewith, as appended to this report:

1. A revision of the requirements for Portland cement in the present Standard Specifications for Cement (C-1-09);[1]
2. Proposed Tentative Specifications and Methods of Tests for Compressive Strength of Portland Cement Mortar.

The committee recommends that the proposed revised specifications for Portland cement be given the title "American Specifications and Methods of Tests for Portland Cement." In the judgment of the committee, they are entitled to this distinction because they are the result of several years' work of the special committees representing the Board of Direction of the American Society of Civil Engineers, the United States Government Departmental Committee, and Committee C-1. It is highly desirable to convey not only to those who use cement in this country, but also to our export trade, that there is a single uniform American specification for this important product.

These revised specifications, under the by-laws of the Society, would normally be printed for one year as tentative, and be submitted to letter ballot of the Society in 1917. It is understood that certain changes in the by-laws will be recommended by the Executive Committee at this annual meeting, by which the contents of the Year-Book will hereafter be printed biennially beginning 1916. In view of the fact that the specifications for Portland cement have not been revised since 1909, it would be undesirable in the judgment of the committee to postpone the publication of the revised specifications as a standard until

[1] 1915 Year-Book, p. 350.

1918. On the other hand, it would be also undesirable to have these specifications become effective immediately, since that would not afford sufficient time for the adjustment of the cement mills to meet the increased requirements of these specifications, and in view of the fact that most contracts provide that the cement shall meet the requirements of the Specifications for Portland Cement of the American Society for Testing Materials, the committee recommends that these specifications be referred to letter ballot of the Society at once, with the understanding that if adopted they shall become effective January 1, 1917.

The committee further recommends that the proposed Tentative Specifications and Methods of Tests for Compressive Strength of Portland Cement Mortar be received for publication as a tentative standard.

The results of the letter ballot of the committee on these two recommendations are as follows:

Title.	Affirmative.	Negative.	Not Voting.
1. Proposed Revised Specifications entitled "American Specifications and Methods of Tests for Portland Cement"	..	..	..
2. Proposed Tentative Specifications and Methods of Tests for Compressive Strength of Portland Cement Mortar	..	..	..

This report has been submitted to letter ballot of the committee, which consists of — members, of whom — have voted affirmatively, — negatively, and — have refrained from voting.

Respectfully submitted on behalf of the committee,

GEORGE F. SWAIN,
Chairman.

RICHARD L. HUMPHREY,
Secretary.

These specifications will be submitted to the Special Committees representing the Board of Direction of the American Society of Civil Engineers and the Government Departmental Committee, and as a result of their consideration, slight modifications may be offered at the Annual Meeting by Committee C-1 of this Society.

PROPOSED AMERICAN SPECIFICATIONS AND METHODS OF TESTS FOR PORTLAND CEMENT.[1]

Serial Designation: C 1 – —.

The specifications for this material are issued under the fixed designation C1; the final number indicates the year of original issue, or in the case of revision, the year of last revision.

ADOPTED, 1904; REVISED, 1908, 1909, ——.

SPECIFICATIONS.

Definition. 1. Portland cement is the product obtained by finely pulverizing clinker produced by calcining to incipient fusion, an intimate and properly proportioned mixture of argillaceous and calcareous materials, with no additions subsequent to calcination excepting water and calcined or uncalcined gypsum.

I. CHEMICAL PROPERTIES.

Chemical Limits. 2. The following limits shall not be exceeded:

Loss on ignition, per cent	4.00
Insoluble residue, per cent	0.85
Sulfuric anhydride (SO_3), per cent	1.75
Magnesia (MgO), per cent	4.00

II. PHYSICAL PROPERTIES AND TESTS.

Specific Gravity. 3. The specific gravity[2] of cement shall be not less than 3.10. Should the test of cement as received fall below this requirement, a second test may be made upon an ignited sample.

[1] Including white Portland cement in which the following chemical limitations shall not be exceeded:

Loss on ignition, per cent	4.00
Insoluble residue, per cent	0.85
Sulfuric anhydride (SO_3), per cent	2.00
Magnesia (MgO), per cent	4.00

[2] The specific gravity test will not be made unless specifically ordered.

Fineness. 4. The residue on a standard No. 200 sieve shall not exceed 22 per cent by weight.

Soundness. 5. A pat of neat cement, after 24 hours in moist air, when immersed in steam, shall remain firm and hard, and show no signs of distortion, cracking, checking, or disintegration.

Time of Setting. 6. Initial set shall develop in not less than 30 minutes when the Vicat needle is used or 45 minutes when the Gillmore needle is used. Final set shall be attained within 10 hours.

Tensile Strength. 7. (*a*) Test pieces (see Section 38) of standard mortar composed of one part cement and three parts standard sand, by weight, shall give tensile strengths equal to or higher than the following:

Age at Test, ays.	Storage of Test Pieces.	Tensile Strength, lb. per sq. in.
7	1 day in moist air, 6 days in water..................................	200
28	1 day in moist air, 27 days in water.................................	300

(*b*) Each value shall be the average of the results of tests from not less than three test pieces. The tensile strength of standard mortar at the age of 28 days shall be higher than the strength determined at the age of 7 days.

III. PACKAGES, MARKING AND STORAGE.

Packages and Marking. 8. The cement shall be delivered in suitable bags or barrels with the brand and name of the manufacturer plainly marked thereon unless shipped in bulk. A bag shall contain 94 lb. net. A barrel shall contain 376 lb. net.

Storage. 9. The cement shall be stored in such a manner as to permit easy access for proper inspection and identification of each shipment, and in a suitable weather-tight building which will protect the cement from dampness.

IV. INSPECTION.

Inspection. 10. Every facility shall be provided the purchaser for careful sampling and inspection at either the mill or at the site of the work, as may be specified by the purchaser. At least 10 days from the time of sampling shall be allowed for the completion of the 7-day test, and at least 31 days shall be allowed for the completion of the 28-day test. The cement shall be tested in accordance with the methods hereinafter prescribed. The 28-day test may be waived if ordered.

V. REJECTION.

11. The cement may be rejected if it fails to meet any of the requirements of these specifications. **Rejection.**

(*a*) Cement shall not be rejected on account of failure to meet the fineness requirement if upon retest after drying at 100° C. for one hour it meets this requirement.

(*b*) Cement failing to meet the test for soundness in steam may be accepted if it passes a retest using a new sample at any time within 28 days thereafter.

(*c*) Packages varying more than 5 per cent from the specified weight may be rejected; and if the average weight of packages in any shipment, as shown by weighing 50 packages taken at random, is less than that specified, the entire shipment may be rejected.

METHODS OF TESTS.

VI. SAMPLING.

12. Each sample tested, whether individual or composite, should weigh about 8 lb. and shall represent not more than 200 bbl. **Number of Samples.**

13. A car test sample from cement shipped in packages shall consist of at least ½ lb. of cement taken from 1 sack in each 40 sacks (or 1 bbl. in each 10 bbl.), combined to make one sample. **Method of Sampling.**

A car test sample of cement shipped in bulk shall consist of at least ½ lb. of cement from approximately each 40 cu. ft., combined to make one sample.

Cement may be sampled at the mill by any of the following methods, as may be agreed upon:

(*a*) *From the Conveyor Delivering to the Bin.*—At least 8 lb. of cement shall be taken from approximately each 100 bbl.

passing over the conveyor and mixed to make a composite sample.

(b) *From Filled Bins by means of Sampling Tubes.*—Proper sampling tubes inserted vertically may be used for sampling cement to a maximum depth of 10 ft. Proper sampling tubes inserted horizontally may be used where the construction of the bin permits. Samples shall be taken from points well distributed over the face of the bin and each sample so taken shall represent not more than 200 bbl.

(c) *From Filled Bins at Points of Discharge.*—Sufficient cement shall be drawn from the discharge openings to obtain samples representative of the cement contained in the bin, as determined by the appearance at the discharge openings of indicators placed on the surface of the cement directly above these openings before drawing of the cement is started. One composite sample shall be taken for not more than 200 bbl. of cement contained in the bin.

(d) *From Packages Ready for Shipment.*—One composite sample shall be taken for not more than 200 bbl. of cement. The composite sample shall consist of at least ½ lb. of cement taken from 1 sack in each 40 sacks (or 1 bbl. in each 10 bbl.) combined to make one sample.

Treatment of Sample. 14. Samples preferably shall be shipped and stored in air-tight containers.

Samples shall be passed through a sieve having 20 meshes per linear inch in order to thoroughly mix the sample, break up lumps and remove foreign materials.

VII. CHEMICAL ANALYSIS.

LOSS ON IGNITION.

Method. 15. One gram of cement is heated in a weighed covered platinum crucible, of 20 to 25-cc. capacity, as follows, using either method (a) or (b) as ordered:

(a) The crucible is placed in a hole in an asbestos board, clamped horizontally so that about three-fifths of the crucible projects below, and blasted at a full red heat for 15 minutes with an inclined flame; the loss in weight is checked by a second blasting for 5 minutes. Care must be taken to wipe off particles

of asbestos that may adhere to the crucible when withdrawn from the hole in the board. Greater neatness and shortening of the time of heating are secured by making a hole to fit the crucible in a circular disk of sheet platinum and placing this disk over a somewhat larger hole in an asbestos board.

(b) The crucible is placed in a muffle at any temperature between 900 and 1000° C. for 15 minutes and the loss in weight is checked by a second heating for 5 minutes.

16. An analytical tolerance of 0.25 is allowed, and all results in excess of the specified limit but within this tolerance shall be reported as 3 or 4 per cent. **Tolerance.**

INSOLUBLE RESIDUE.

17. To a 1-g. sample of cement are added 10 cc. of water and 5 cc. of concentrated hydrochloric acid; the liquid is warmed until effervescence ceases. The solution is diluted to 50 cc. and digested on a steam bath or hot plate until it is evident that decomposition of the cement is complete. The residue is filtered, washed with cold water, and the filter paper and contents are digested in about 30 cc. of a 5-per-cent solution of sodium carbonate, the liquid being held at a temperature just short of boiling for 15 minutes. The remaining residue is filtered, washed with cold water, then with a few drops of hot hydrochloric acid, 1:9, and finally with hot water, and then ignited at a red heat and weighed as the insoluble residue. **Method.**

18. An analytical tolerance of 0.15 is allowed, and all results in excess of the specified limit but within this tolerance shall be reported as 0.85 per cent. **Tolerance.**

SULFURIC ANHYDRIDE.

19. One gram of the cement is dissolved in 5 cc. of concentrated hydrochloric acid diluted with 5 cc. of water, with gentle warming; when solution is complete 40 cc. of water are added, the solution is filtered, and the residue washed thoroughly with water. The solution is diluted to 250 cc., heated to boiling and 10 cc. of a hot 10-per-cent solution of barium chloride are added slowly, drop by drop, from a pipette and the boiling continued until the precipitate is well formed. The solution is digested **Method.**

on the steam bath until the precipitate has settled. The precipitate is filtered, washed, and the paper and contents are placed in a weighed platinum crucible and the paper slowly charred and consumed without flaming. The barium sulfate is then ignited and weighed. The weight obtained multiplied by 34.3 gives the percentage of sulfuric anhydride.

The acid filtrate obtained in the determination of the insoluble residue may be used for the estimation of sulfuric anhydride instead of using a separate sample.

Tolerance. 20. An analytical tolerance of 0.10 is allowed, and all results in excess of the specified limit but within this tolerance shall be reported as 1.75 per cent.

MAGNESIA.

Method. 21. To 0.5 g. of the cement in an evaporating dish are added 10 cc. of water to prevent lumping and then 10 cc. of concentrated hydrochloric acid. The liquid is gently heated and agitated until attack is complete. The solution is then evaporated to complete dryness on a steam or water bath. To hasten dehydration the residue may be heated to 150 or even 200° C. for one-half to one hour.

The residue is treated with 10 cc. of concentrated hydrochloric acid diluted with an equal amount of water. The dish is covered and the solution digested for ten minutes on a steam bath or water bath. The diluted solution is filtered and the separated silica washed thoroughly with water.[1]

Five cubic centimeters of concentrated hydrochloric acid and sufficient bromine water to precipitate any manganese which may be present, are added to the filtrate (about 250 cc.). This is made alkaline with ammonium hydroxide, boiled until there is but a faint odor of ammonia and the precipitate iron and aluminum hydroxides, after settling, are washed with hot water, once by decantation and slightly on the filter. Setting aside the filtrate, the precipitate is transferred by a jet of hot water to the precipitating vessel and dissolved in 10 cc. of hot hydrochloric acid. The paper is extracted with acid, the solution and washings being added to the main solution. The

[1] Since this procedure does not involve the determination of silica, a second evaporation is unnecessary.

aluminum and iron are then reprecipitated at boiling heat by ammonium hydroxide and bromine water in a volume of about 100 cc., and the second precipitate is collected and washed on the filter used in the first instance if this is still intact.

To the combined filtrates from the hydroxides of iron and aluminum, reduced in volume if need be, 1 cc. of ammonium hydroxide is added, the solution is brought to boiling, 25 cc. of a saturated solution of boiling ammonium oxalate added, and the boiling continued until the precipitated calcium oxalate has assumed a well-defined granular form. The precipitate after one hour is filtered and washed, then with the filter is placed wet in a platinum crucible, and the paper burned off over a small flame of a Bunsen burner; after ignition it is redissolved in hydrochloric acid and the solution diluted to 100 cc. Ammonia is added in slight excess, and the liquid is boiled. The lime is then reprecipitated by ammonium oxalate, allowed to stand until settled, filtered and washed. The combined filtrates from the calcium precipitates are acidified with hydrochloric acid, concentrated on the steam bath to about 150 cc., and made slightly alkaline with ammonium hydroxide, boiled and filtered (to remove a little aluminum and iron and perhaps calcium). When cool, 10 cc. of saturated solution of sodium-ammonium-hydrogen phosphate are added with constant stirring. When the crystallin ammonium-magnesium orthophosphate has formed, ammonia is added in moderate excess. The solution is set aside for several hours in a cool place, filtered and washed with water containing 2.5 per cent of NH_3. The precipitate is dissolved in a small quantity of hot hydrochloric acid, the solution diluted to about 100 cc., 1 cc. of a saturated solution of sodium-ammonium-hydrogen phosphate added, and ammonia drop by drop, with constant stirring, until the precipitate is again formed as described and the ammonia is in moderate excess. The precipitate is then allowed to stand about two hours, filtered and washed as before. The paper and contents are placed in a weighed platinum crucible, the paper is slowly charred and the resulting carbon carefully burned off. The precipitate is then ignited to constant weight over a Meker burner, or a blast not strong enough to soften or melt the pyrophosphate. The weight of magnesium pyrophosphate obtained multiplied by 72.5 gives the percentage of magnesia. The precipitate so obtained always contains some calcium and usually small quantities iron, aluminum, and manganese as phosphates.

Tolerance. 22. An analytical tolerance of 0.4 is allowed, and all results in excess of the specified limit but within this tolerance shall be reported as 4.00 per cent.

VIII. DETERMINATION OF SPECIFIC GRAVITY.

Apparatus. 23. The determination of specific gravity shall be made with a standardized Le Chatelier apparatus, shown in Fig. 1. This consists of a flask *D* of about 120-cc. capacity, the neck of which is about 20 cm. long; in the middle of this neck is a bulb *C*, above and below which are two marks *F* and *E*; the volume between these two marks is 20 cc. The neck has a diameter of about 9 mm., and is graduated to 0.1 cc. above the mark *F*. Benzine (62° Baumé naphtha) or kerosene free from water should be used in making the determination.

Method. 24. The flask is filled with either of these liquids to the lower mark *E*, and 64 g. of cement, cooled to the temperature of the liquid, are slowly introduced through the funnel *B* (the stem of which should be long enough to extend into the flask to the top of the bulb *C*), taking care that the cement does not adhere to the sides of the flask, and that the funnel does not touch the liquid. After all the cement is introduced, the level of the liquid will rise to some division of the graduated neck; this reading, plus 20 cc., is the volume displaced by 64 g. of the cement.

The specific gravity is then obtained from the formula

$$\text{Specific gravity} = \frac{\text{Weight of cement (g.)}}{\text{Displaced volume (cc.)}}$$

The flask, during the operation, is kept immersed in water in a jar *A*, in order to avoid variations in the temperature of the liquid in the flask, which should not exceed 0°.5 C. The results of repeated tests should agree within 0.01.

The determination of specific gravity shall be made on the cement as received; if it should fall below 3.10, a second determination should be made after igniting the sample as described in Section 15.

The apparatus may be cleaned in the following manner: The flask is inverted and shaken vertically until the liquid flows

freely, and then held in a vertical position until empty; any traces of cement remaining can be removed by pouring into the flask a small quantity of clean liquid benzine or kerosene and repeating the operation.

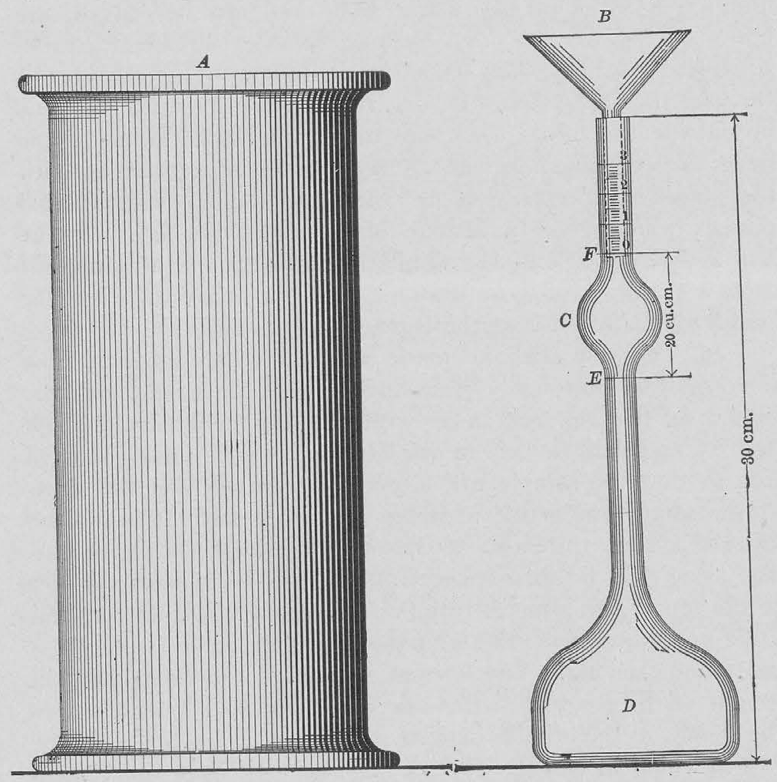


FIG. 1.—Le Chatelier's Specific-Gravity Apparatus.

IX. DETERMINATION OF FINENESS.

Apparatus. 25. Wire cloth for standard sieves for cement shall be woven (not twilled) from brass, bronze, or other suitable wire, and mounted on frames not less than $1\frac{1}{2}$ in. below the top of the frame and without distortion. The sieve frames shall be circular, approximately 8 in. in diameter, and may be provided with a pan and cover.

A standard No. 200 sieve is one having nominally an

0.0029-in. opening and 200 wires per inch standardized by the U. S. Bureau of Standards, and conforming to the following requirements:

The No. 200 sieve should have 200 wires per inch, and the number of wires in any whole inch shall not be outside the limits of 192 to 208. No opening between adjacent parallel wires shall be more than 0.0050 in. in width. The diameter of the wire should be 0.0021 in. and the average diameter shall not be outside the limits 0.0019 to 0.0023 in. The value of the sieve as determined by sieving tests made in conformity with the standard specification for these tests on a standardized cement which gives a residue of 25 to 20 per cent on the No. 200 sieve, or on other similarly graded material, shall not show a variation of more than 1.5 per cent above or below the standards maintained at the Bureau of Standards.

Method. 26. The test shall be made with 50 g. of cement. The sieve shall be thoroughly clean and dry. The cement shall be placed on the No. 200 sieve, with pan and cover attached, if desired, and shall be held in one hand in a slightly inclined position so that the sample will be well distributed over the sieve, at the same time gently striking the side about 150 times per minute against the palm of the other hand on the up stroke. The sieve shall be turned every 25 strokes about one-sixth of a revolution in the same direction. The operation shall continue until not more than 0.05 g. passes through in one minute of continuous sieving. The fineness shall be determined from the weight of the residue on the sieve expressed as a percentage of the weight of the original sample.

Mechanical sieving devices may be used, but the cement shall not be rejected if it meets the fineness requirement when tested by the hand method.

Tolerance. 27. A determination tolerance of 1 is allowed, and all results in excess of the specified limit but within this tolerance shall be reported as 22 per cent.

X. MIXING CEMENT PASTES AND MORTARS.

Method. 28. The quantity of dry material to be mixed at one time shall not exceed 1000 g. nor be less than 500 g. The proportions of cement or cement and sand shall be stated by weight in grams of the dry materials; the quantity of water shall be expressed in cubic centimeters (1 g. = 1 cc.).

The temperature of the room and the mixing water shall be maintained as nearly as practicable at 21° C. (70° F.).

The dry materials shall be weighed, placed upon a non-absorbent surface, thoroughly mixed dry if sand is used, and a crater formed in the center, into which the proper percentage of clean water shall be poured; the material on the outer edge shall be turned into the crater by the aid of a trowel. After an interval of ½ minute for the absorption of the water the operation shall be completed by continuous, vigorous mixing, squeezing and kneading with the hands for at least one minute.[1] During the operation of mixing, the hands should be protected by rubber gloves.

XI. NORMAL CONSISTENCY.

29. The Vicat apparatus consists of a frame *A* (Fig. 2) bearing a movable rod *B*, weighing 300 g., one end *C* being 1 cm. in diameter for a distance of 6 cm., the other having a removable needle *D*, 1 mm. in diameter, 6 cm. long. The rod is reversible, and can be held in any desired position by a screw *E*, and has midway between the ends a mark *F* which moves under a scale (graduated to millimeters) attached to the frame *A*. The paste is held in a conical, hard-rubber ring *G*, 7 cm. in diameter at the base, 4 cm. high, resting on a glass plate *H* about 10 cm. square. **Apparatus.**

30. In making the determination, 500 g. of cement, with a measured quantity of water, are kneaded into a paste, as described in Section 28, and quickly formed into a ball with the hands, completing the operation by tossing it six times from one hand to the other, maintained about 6 in. apart; the ball resting in the palm of one hand is pressed into the larger end of the rubber ring held in the other hand, completely filling the ring with paste; the excess at the larger end is then removed **Method.**

[1] In order to secure uniformity in the results of tests for the time of setting and tensile strength the manner of mixing above described should be carefully followed. At least one minute is necessary to obtain the desired plasticity which is not appreciably affected by continuing the mixing for several minutes. The exact time necessary is dependent upon the personal equation of the operator. The error in mixing should be on the side of over mixing.

by a single movement of the palm of the hand; the ring is then placed on its larger end on a glass plate and the excess paste at the smaller end is sliced off at the top of the ring by a single oblique stroke of a trowel held at a slight angle with the top of the ring. During these operations care must be taken not to compress the paste. The paste confined in the ring, resting on

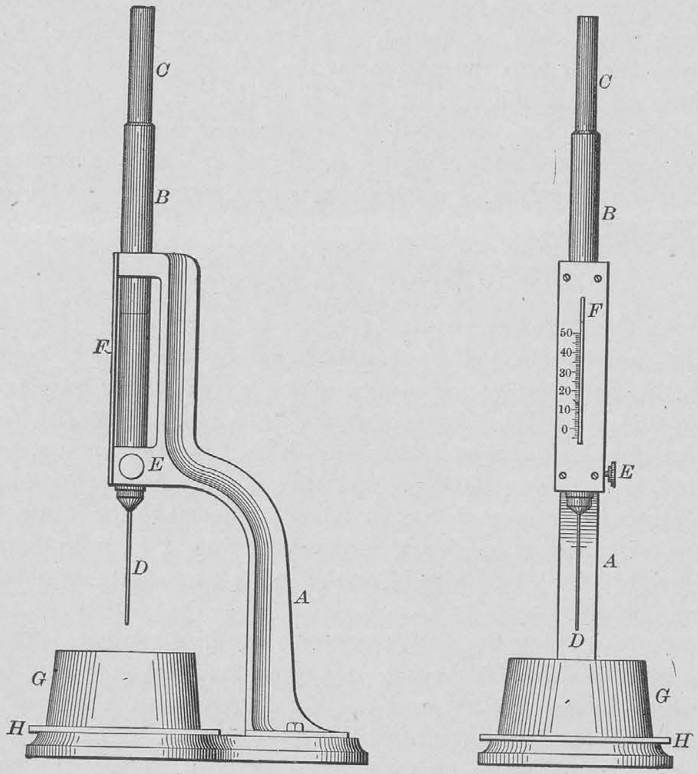


FIG. 2.—Vicat Apparatus.

the plate, is placed under the rod, the larger end of which is brought in contact with the surface of the paste; the scale is then read, and the rod quickly released. The paste is of normal consistency when the cylinder settles to a point 10 mm. below the original surface in ½ minute after being released. The apparatus must be free from all vibrations during the test.

Trial pastes are made with varying percentages of water until the normal consistency is obtained. The amount of water required shall be expressed in percentage by weight of the dry cement.

The consistency of standard mortar shall depend on the amount of water required to produce a paste of normal consistency from the same sample of cement. Having determined the normal consistency of the sample, the consistency of standard mortar made from the same sample shall be as indicated in Table I, the values being in percentage of the combined dry weights of the cement and standard sand.

TABLE I.—PERCENTAGE OF WATER FOR STANDARD MORTARS.

Percentage of Water for Neat Cement Paste of Normal Consistency	Percentage of Water for One Cement, Three Standard Ottawa Sand Mortar.	Percentage of Water for Neat Cement Paste of Normal Consistency.	Percentage of Water for One Cement, Three Standard Ottawa Sand Mortar.
15	9.0	23	10.3
16	9.2	24	10.5
17	9.3	25	10.7
18	9.5	26	10.8
19	9.7	27	11.0
20	9.8	28	11.2
21	10.0	29	11.3
22	10.2	30	11.5

XII. DETERMINATION OF SOUNDNESS.[1]

31. A steam apparatus, which can be maintained at a temperature between 98 and 100° C., or one similar to that shown in Fig 3, is recommended. The capacity of this apparatus may be increased by using a rack for holding the pats in a vertical or inclined position. **Apparatus.**

32. A pat from cement paste of normal consistency about 3 in. in diameter, ½ in. thick at the center, and tapering to a **Method.**

[1] Unsoundness is usually manifested by change in volume which causes distortion, cracking, checking or disintegration.

Pats improperly made or exposed to drying may develop what are known as shrinkage cracks within the first 24 hours and are not an indication of unsoundness. These conditions are illustrated in Fig. 4.

The failure of the pats to remain on the glass or the cracking of the glass to which the pats are attached does not necessarily indicate unsoundness.

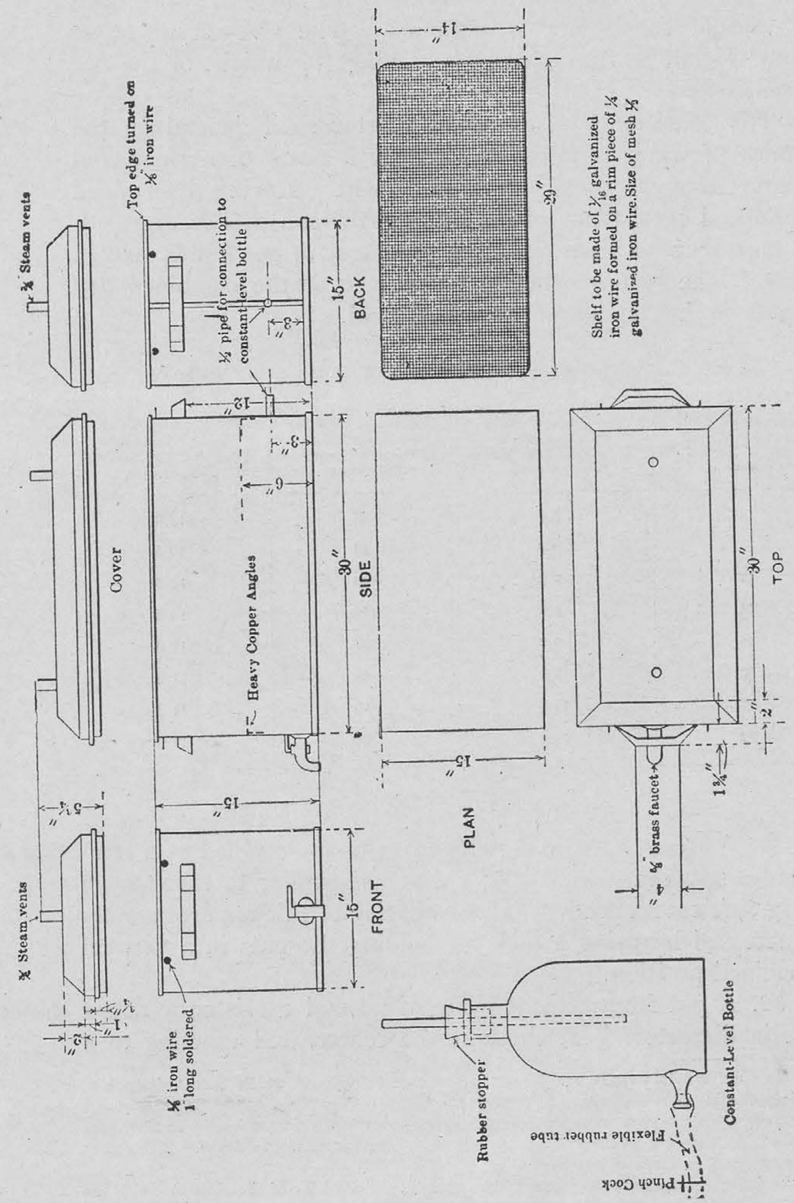


FIG. 3.—Apparatus for Making Accelerated Test for Soundness of Cement.

To be made of sheet copper weighing 22 oz. per sq. ft., tinned inside.
All seams to be lapped where possible. Hard solder only to be used.

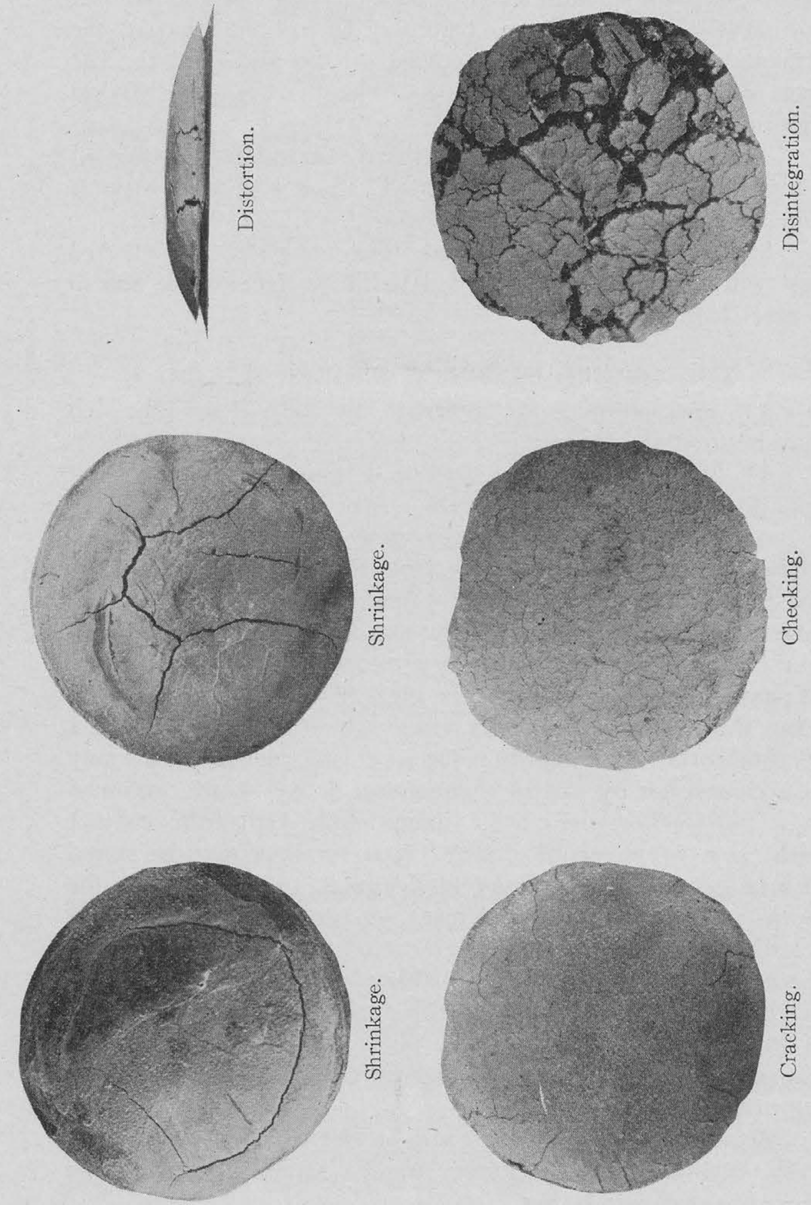


FIG. 4.—Typical Failures in Soundness Test.

thin edge, shall be made on clean glass plates about 4 in. square, and stored in moist air for 24 hours. In molding the pat, the cement paste shall first be flattened on the glass and the pat then formed by drawing the trowel from the outer edge toward the center.

The pat shall then be placed in an atmosphere of steam at a temperature between 98 and 100° C. upon a suitable support 1 in. above boiling water for 5 hours.

Should the pat leave the plate, distortion may be detected best with a straight edge applied to the surface which was in contact with the plate.

XIII. DETERMINATION OF TIME OF SETTING.

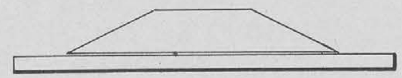
33. The following are alternate methods, either of which may be used as ordered:

Vicat Apparatus. 34. The time of setting shall be determined with the Vicat apparatus described in Section 20. (See Fig. 2.)

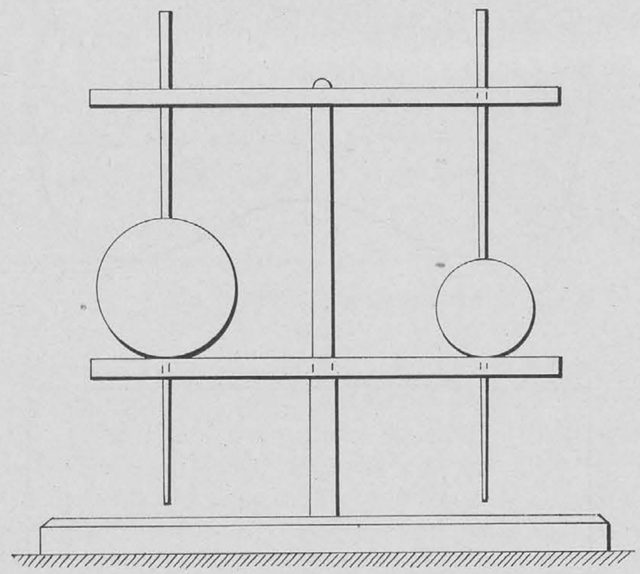
Vicat Method. 35. A paste of normal consistency is molded in the hard-rubber ring *G* as described in Section 30, and placed under the rod *B*, the smaller end of which is then carefully brought in contact with the surface of the paste, and the rod quickly released. The initial set is said to have occurred when the needle ceases to pass a point 5 mm. above the glass plate; and the final set, when the needle does not sink visibly into the paste. The test specimens should be kept in moist air during the test. This may be accomplished by placing them on a rack over water contained in a pan and covered by a damp cloth, kept from contact with them by means of a wire screen; or they may be stored in a moist closet. Care should be taken to keep the needle clean, as the collection of cement on the sides of the needle retards the penetration, while cement on the point may increase the penetration. The time of setting is affected not only by the percentage and temperature of the water used and the amount of kneading the paste receives, but by the temperature and humidity of the air, and its determination is therefore only approximate.

Gillmore Apparatus. 36. The time of setting shall be determined by the Gillmore needles. The Gillmore needles should preferably be mounted as shown in Fig. 5 (*b*).

Gillmore Method. 37. The time of setting shall be determined as follows: A pat of neat cement paste about 3 in. in diameter and $\frac{1}{2}$ in. in thickness with a flat top (Fig. 5 (*a*)), mixed to a normal consistency, shall be kept in moist air at a temperature maintained as nearly as practicable at 21° C. (70° F.). The cement is considered to have acquired its initial set when the pat will bear,



(*a*) Soundness Pat with Top Surface Flattened for Determining Time of Setting.



(*b*) Gillmore Needles.

FIG. 5.

without appreciable indentation, the Gillmore needle $\frac{1}{12}$ in. in diameter, loaded to weigh $\frac{1}{4}$ lb. The final set has been acquired when the pat will bear without appreciable indentation, the Gillmore needle $\frac{1}{24}$ in. in diameter, loaded to weigh 1 lb. In making the test, the needles should be held in a vertical position, and applied lightly to the surface of the pat.

XIV. TENSION TESTS.

Form of Test Piece. 38. The form of test piece shown in Fig. 6 shall be used. The molds shall be made of non-corroding metal and have sufficient material in the sides to prevent spreading during mold-

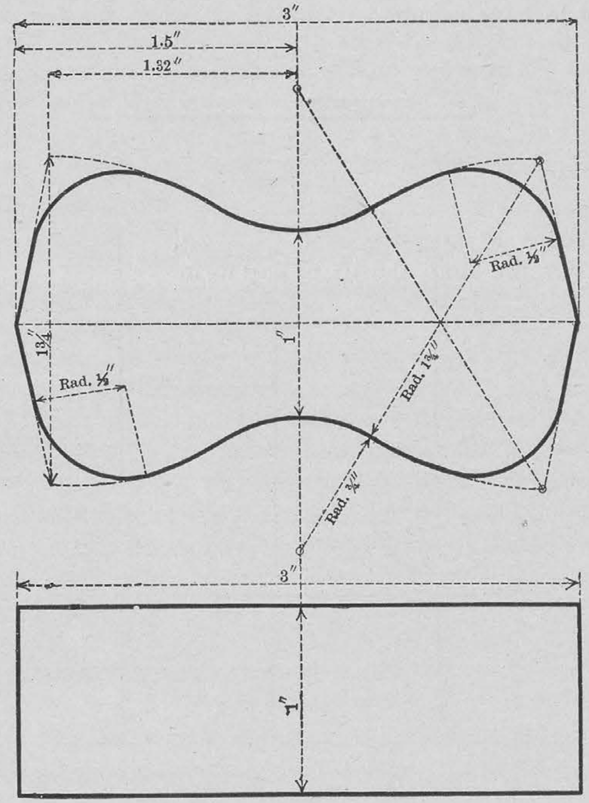


FIG. 6.—Details for Briquette.

ing. Gang molds when used shall be of the type shown in Fig. 7. Molds shall be wiped with an oily cloth before using.

Standard Sand. 39. The sand to be used shall be natural sand from Ottawa, Ill., screened to pass a No. 20 sieve and retained on a No. 30 sieve. This sand may be obtained from the Ottawa Silica Co., at a cost of two cents per pound, f. o. b. cars, Ottawa, Ill.

This sand having passed the No. 20 sieve shall be considered standard when not more than 5 g. pass the No. 30 sieve after one minute continuous sieving of a 500-g. sample.

The sieves shall conform to the following specifications:

The No. 20 sieve shall have between 19.5 and 20.5 wires per whole inch of the warp wires and between 19 and 21 wires per whole inch of the shoot wires. The diameter of the wire should be 0.0165 in. and the average diameter shall not be outside the limits of 0.0160 and 0.0170 in.

The No. 30 sieve shall have between 29.5 and 30.5 wires per whole inch of the warp wires and between 28.5 and 31.5 wires per whole inch of the shoot wires. The diameter of the wire should be 0.0110 in. and the average diameter shall not be outside the limits 0.0105 to 0.0115 in.

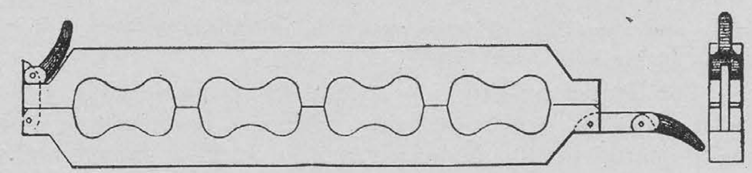


FIG. 7.—Details for Gang Mold.

Molding. 40. Immediately after mixing, the standard mortar shall be placed in the molds, pressed in firmly with the thumbs and smoothed off with a trowel without ramming. Additional mortar shall be heaped above the mold and smoothed off with a trowel; the trowel shall be drawn over the mold in such a manner as to exert a moderate pressure on the material. The mold shall then be turned over and the operation of heaping, thumbing and smoothing off repeated.

Testing. 41. Tests shall be made with any standard machine. The briquettes shall be broken as soon as they are removed from the water. The bearing surfaces of the clips and briquettes shall be free from grains of sand or dirt. The briquettes shall be carefully centered and the load applied continuously at the rate of 600 lb. per minute.

Testing machines should be frequently calibrated in order to determine their accuracy.

42. Briquettes that are manifestly faulty, or which give strengths differing more than 15 per cent from the average value of all test pieces broken at the same period and made from the same sample, shall not be considered in determining the tensile strength.

XV. STORAGE OF TEST PIECES.

Apparatus. 43. A moist closet should consist of a soapstone, slate or concrete box, or a wooden box lined with metal, the interior surface being covered with felt or broad wicking kept wet, the bottom of the box being covered with water. The interior of the closet should be provided with non-absorbent shelves on which to place the test pieces, the shelves being so arranged that they may be withdrawn readily.

Methods. 44. Unless otherwise specified all test pieces, immediately after molding, shall be placed in the moist closet for from 20 to 24 hours.

The briquettes shall be kept in molds on glass plates in the moist closet for at least 20 hours. After 24 hours in moist air the briquettes shall be immersed in clean water in storage tanks of non-corroding material.

The air and water shall be maintained as nearly as practicable at 21° C. (70° F.).

AMERICAN SOCIETY FOR TESTING MATERIALS

PHILADELPHIA, PA., U. S. A.

AFFILIATED WITH THE

INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS.

PROPOSED TENTATIVE SPECIFICATIONS AND METHODS OF TESTS FOR COMPRESSIVE STRENGTH OF PORTLAND CEMENT MORTAR.[1]

Criticisms of these Tentative Specifications and Methods are solicited and should be directed, preferably before January 1, 1917, to Mr. Richard L. Humphrey, Secretary of Committee C-1 on Cement, Harrison Building, Philadelphia, Pa.

SPECIFICATIONS.

Compressive Strength. 1. (*a*) A test piece of standard mortar composed of one part cement and three parts standard sand, by weight, shall give compressive strengths equal to or higher than the following:

Age at Test, days.	Storage of Test Pieces.	Compressive Strength, lb. per sq. in.
7	1 day in moist air, 6 days in water	1200
28	1 day in moist air, 27 days in water	2000

(*b*) Each value shall be the average of the results of tests from not less than three test pieces. The compressive strength of standard mortar at the age of 28 days shall be higher than the strength determined at the age of 7 days.

[1] These tentative specifications and methods of tests, when adopted as standard by the Society, will be inserted in and made a part of the American Specifications and Methods of Tests for Portland Cement.

METHODS OF TESTS.

Mixing Standard Martar. 2. The requirements governing the preparation of standard sand mortars for tension test peices shall apply to compression test pieces.

Form of Test Piece. 3. A cylindrical test piece 2 in. in diameter and 4 in. in length is recommended for use in making compression tests of

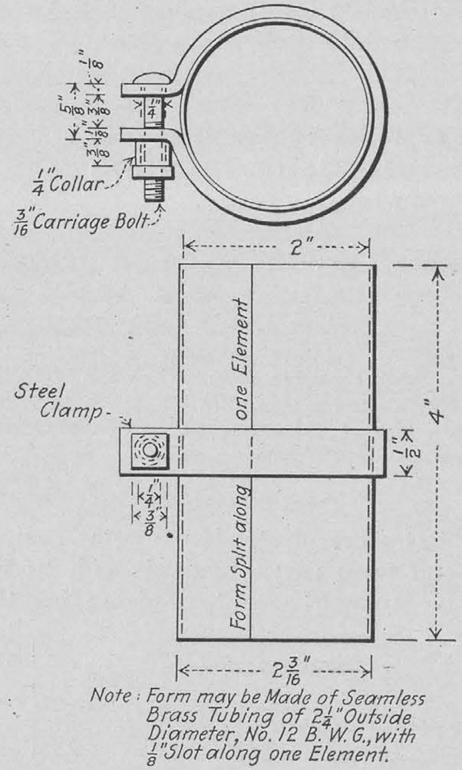


FIG. 1.—Details for 2 by 4-in. Cylinder Form.

standards mortars. The molds shall be made of non-corroding metal. A satisfactory form of mold is shown in Fig. 1. The ends of the mold shall be parallel. The tubing used in the molds shall be of sufficient thickness to prevent appreciable distortion. The molds shall be oiled before using. During the

mold

molding of the test piece, the mold shall rest on a clean, plane surface (preferably a piece of plate glass which is allowed to remain in place until the mold is removed).

Molding. 4. The mortar[1] shall be placed in the mold in layers about 1 in. in thickness, each layer being tamped by means of the steel tamper shown in Fig. 2. The weight of tamper is approximately $\frac{3}{4}$ lb. In finishing the test piece, the mortar shall be heaped above the mold and smoothed off with a trowel. As soon as the test pieces from one sample are molded, the top of each test piece shall be covered with a piece of glass which is brought to a firm bearing on the fresh mortar. The cover glasses shall remain in place until the molds are removed.

The compression test pieces shall be stored in the same manner as the tension test pieces.

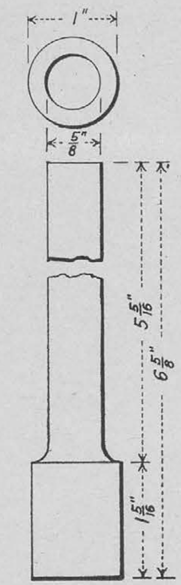


FIG. 2.—Details for Steel Tamper.

Testing. 5. Tests of standard-mortar cylinders may be made in any testing machine which is adapted to meet the specified requirements. The test pieces shall be tested as soon as removed from the water. The ends of the test cylinders shall be smooth, plane surfaces. The metal bearing plates of the testing machine shall be placed in direct contact with the ends of the test piece. During the test a spherical bearing block shall be used on top of the cylinder. In order to secure a uniform distribution of the load over the test cylinder the spherical bearing block must be accurately centered. The diameter of the spherical bearing block should be only a little greater than that of the test piece. The test piece shall be loaded continuously to failure. The moving head of the testing machine shall travel at the rate of not less than 0.05 or more than 0.10 in. per minute.

Testing machines should be frequently calibrated in order to determine their accuracy.

[1] If sufficient mortar for six 2 by 4-in. cylinders is to be mixed in a single batch, approximately 3000 g. of material will be required. In this case the mixing shall be continued for $1\frac{1}{2}$ minutes.

6. Cylinders that are manifestly faulty, or which give strengths differing more than 15 per cent from the average value of all test pieces tested at the same period and made from the same sample, shall not be considered in determining the compressive strength.

Form 1386

Telegram—Be Brief

MFC

Time Filed
9a 65 M.

Saint Paul, June 14, 1921

A R Cook
Tacoma Wash

R12 Have not ordered any 3/8 rods for Auburn.plant. You should make requisition for 3/8 rods. Order in lengths that you require or in multiples of those lengths which total less than length of flat car. A-6

M F CLEMENTS

FORM 1386

NORTHERN PACIFIC YELLOWSTONE PARK LINE

Telegram—Be Brief

Time Filed

M.

N. PAC. R. OFFICE JUN 14 1921 BRIDGE ENGR. ST. PAUL, MINN.

248BYV

Tacoma June 13 21

MFClemenst

STP

Account of making 1922 pipe at Auburn will be shy three eighths inch rods Advise if you have ordered anything extra If not I will make requisition for 1500 pieces three eighths inch by fifty six feet R-12

A R Cook

1045p

GA-65

MFC

Saint Paul, May 25, 1921.

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

Dear Sir:-

Referring to your letter of May 17th to Mr. Stevens in regard to prices for changing out concrete pipe at Auburn in 1921.

Mr. Stevens is out of the city and I will answer your letter direct.

You state that my figures do not reach the probable cost of operation by about $813.00. I do not know how you arrived at this figure. The amount set aside for depreciation is applied upon the cost of repairs, interest on investment, gravel pit charge and a sinking fund for obsolescence. If you will deduct these items from your statement of cost in your report of April 26th, you will arrive at the cost of manufacture.

Deduct	$2188.06
	105.70
	460.00
	130.00
	$2883.76

$13,693.10 - $2,883.76 = $10,809.34

Distribute this over the pipe manufactured to date of April 15, 1921 and the cost will be:

24" pipe, 3984 ft. @ $1.954	=	$7,784.74
35" pipe, 1024 ft. @ 2.954	=	3,024.90
		$10,809.64

In my letter of May third I gave the manufacturing cost as $2.10 for 24" and $3.10 for 36" pipe, which is an extra allowance of $0.146 per lineal foot for manufacture. This applied to the total pipe manufactured gives you an excess of $1787.00 for manufacture, instead of a deficit of $813.00 as stated in your letter, and this will take care of any unforseen items which may increase the cost of pipe manufacture.

Consider now the depreciation which takes care of interest on depreciated investment, gravel pit charge, repairs and sinking fund.

For the years 1914, 1915 and 1916 a fixed amount was charged off regardless of the amount of pipe manufactured. In the years 1917 and 1918 a fixed percentage of 22 percent of the manufacturing cost was used. From 1919 to date a price per lineal foot of pipe has been used and the depreciation varies with the amount received in excess of the cost.

I think the amount to be added to the cost of manufacturing pipe to apply on depreciation should be a constant per lineal foot of pipe and in fixing 22 cents for 24 inch pipe and 33 cents for 36" pipe I have used the average for the entire output at Auburn for the years 1914 to date.

In fixing the amount of depreciation to be charged to flumes, I used the same rate of depreciation per cubic yard that results from the above prices for depreciation on pipe.

I note that you are building flumes at a figure below the estimated cost and I am of the opinion that you will also make pipe at a lower figure during the remainder of the season.

I am of the opinion that my prices for charging out finished pipe are high and the amount available for depreciation will be greater than estimated.

24" Concrete Pipe	$2.35
36" " "	3.45
Flumes	4.50 plus cost of manufacture.

Yours truly,

Bridge Engineer.

Cy-HEStevens.

RPC

Saint Paul, May 25, 1921.

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

Dear Sir:-

Referring to your letter of May 17th to Mr. Stevens in regard to prices for changing out concrete pipe at Auburn in 1921.

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I note that you are building flumes at a figure below the estimated cost and I am of the opinion that you will also make pipe at a lower figure during the remainder of the season.

I am of the opinion that my prices for charging out finished pipe are high and the amount available for depreciation will be greater than estimated.

24" Concrete Pipe	$2.35	
36" " "	3.45	
Flumes	4.50	plus cost of manufacture.

Yours truly,

Bridge Engineer.

Cy-HHStevens.

GC-65

MFC

Saint Paul, May 3, 1921.

Mr. H. E. Stevens,

Chief Engineer.

Mr. Cook has reported the cost of manufacturing concrete pipe at the Auburn plant from November 1, 1920 to April 15, 1921 and has made recommendations for increasing the price of 24 inch and 36 inch pipe.

I have analyzed Mr. Cook's statement of costs in 1921 and have used them to anticipate the cost of pipe and flumes for the remainder of the year, or until all pipe and flumes on our present construction program are completed.

The estimated output for 1921 will be:

1100	pieces	24 inch reinforced concrete pipe
430	"	36 " " " "
962	"	10 foot flume sections

The total estimated cost of manufacture will be:

8800'	- 24" pipe	@ $2.10	=	$18,480.00
3540'	- 36" "	@ 3.10	=	10,974.00
962	Sections flume	@ $25.25	=	24,290.50
				$53,744.50

To the above unit costs must be added depreciation of plant which covers interest on investment, gravel pit charge, repairs and sinking fund. The average amount to be added for depreciation since the plant was constructed has been 22 cents for 24 inch pipe and 33 cents for 36 inch pipe, and fixing a like depreciation charge on the flumes based on the ratio of concrete yardage in the two types of units, the charge per section of flume should be $4.50.

The price per foot to be used in charging out pipe should be:

2.10 plus 22 = $2.32 use $2.35
3.10 " 33 = 3.43 use 3.45

The flume price per section should be

25.25 plus 4.50 = $29.75

I do not think it advisable to fix a price for the flumes until they have been completed, as the construction cost may vary from the estimated cost. The estimated cost of flume sections in the A.F.E. 905-20 for Stampede Tunnel is $33.85.

I attach a print showing the charges to Investment and Operating Accounts at the Auburn plant from 1914 to date and the estimated cost for 1921.

Yours truly,

Bridge Engineer.

Encl.

MFC

Saint Paul, May 3, 1921.

Mr. H. E. Stevens,

Chief Engineer.

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25.25 plus 4.50 = $29.75

I do not think it advisable to fix a price for the flumes until they have been completed, as the construction cost may vary from the estimated cost. The estimated cost of flume sections in the A.F.E. 905-20 for Stampede Tunnel is $33.85.

I attach a print showing the charges to Investment and Operating Accounts at the Auburn plant from 1914 to date and the estimated cost for 1921.

Yours truly,

Bridge Engineer.

Encl.

9A-65

Re: Manufacture of pipe at
Auburn Concrete Plant.

MAY 2 1921

Tacoma, Wash., April 29, 1921

Mr. W. H. Farmer, Supt.,
Auburn Concrete Plant,
Auburn, Washington.

Dear Sir:

The Chief Engineer has authorized the manufacture this season at Auburn Concrete Plant of sufficient pipe to take care of next season's requirements. This means that the total output of the plant for 1921 should be 1100 pieces of 24" pipe and 430 pieces of 36" pipe. Your report of April 23rd, 1921 shows that you had made up to and including that date, 540 pieces of 24" pipe and 128 pieces of 36" pipe, leaving 560 pieces of 24" pipe and 302 pieces of 36" pipe still to be made.

The pipe already made will take care of this season's requirements and the manufacture of pipe for future requirements should be handled as a by product in connection with the manufacture of the drainage sections for the Stampede Tunnel, pipe making being used to fill in so the plant can be operated economically.

Yours truly,

(Signed) A. R. COOK

Principal Assistant Engineer

CES-S

cc to MFC

Re: Annual Report - Auburn
Concrete Plant, 1920.

Tacoma, Wash., April 27, 1921

Mr. M. F. Clements,
Bridge Engineer,
St. Paul, Minnesota.

Dear Sir:

I am enclosing herewith in duplicate a statement of the cost of operation of the Auburn Concrete Plant for November and December 1920, sheets Nos. 1 to 7 inclusive. No manufactured product was turned out of the plant during this time, the force having been engaged, during November and December 1920, in the work of rehabilitating the plant in preparation for turning out pipe for 1921, and the manufacture of the flume for the Stampede Tunnel. The labor cost of repairs and renewals, amounting to $1124.89 for months of November and December, has been charged to Operation Account with the view to distributing a portion of this expense to the Stampede work, and this was also done with the cost of repairs and renewals from January 1st to April 15th. I have not filled in the items pertaining to depreciation on this report as the practice in past years does not seem to have been uniform as shown on the blue print schedule which you sent me, and you undoubtedly have figures in your office which would show proper percentage to be charged to depreciation.

I am also enclosing a statement, sheets Nos. 1 and 2, of the cost of operation for November and December 1920 and January 1st to April 15th, 1921, prepared for the purpose of determining the proper charge to be made for the pipe turned out during 1921. The total cost shown, $13693.10, does not include the charges for material stock received during this period which would enter into the cost of the manufactured product, but does include cost for stock used.

The stock used for making the pipe has been estimated from tables prepared several years ago and which have been found to be fairly accurate for unit weights used for pipe. The value of the 1921 product made to date at 1920 prices, $2.00 for 24" pipe and $3.00 for 36" pipe, would only amount to $11040.00 and I would recommend that the price be increased to $2.50 for 24" and $3.75 for 36" pipe. This price for 1921 product, however, is dependent on the charge you fix for depreciation. Recommended prices would probably take care of the largely increased cost for this year. A percentage of $2188.00, repair and renewal items, will be charged to the Stampede work, this percentage to be determined later on. We should be advised what price is to be used for charging out the 1921 product as soon as possible in order that we may prepare Form 1924 for the pipe already shipped out to the various divisions.

Yours truly,

A R Cook

Principal Assistant Engineer

CES-S

encls.

cc to HES

ANNUAL REPORT

AUBURN CONCRETE PLANT

1920

Office of Principal Assistant Engineer,
Tacoma, Washington, April 26th, 1921.

AUBURN CONCRETE PLANT - 1920

S U M M A R Y

Columns

	Total Investment 12/31/1919.	16853.51
2	Additions to Capital Investment during 1920.	192.20
1	Total Investment 12/31/1920.	17045.71
3	Interest on depreciated investment 6%	460.60
4	Gravel Pit charges.	.00
5	Repairs and Renewals (material only).	211.64
6	Sum of Columns 3-4-5.	673.24

AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION SEASON OF 1920

	Total	Operation	Sinking Fund	Capital Account
Inventory 12/31/1919 Material	12217.46	12217.46		
Material & Supplies recd 1920	2490.61	2210.23	179.43	100.95
Labor on Steel Shed Capital A/C	91.25			91.25
Labor Repairs and Renewals charged Operation A/C	1124.89	1124.89		
Labor Operation(exclusive of repairs and renewals)	591.55	591.55		
Less Inventory 1/1/21 Material	12572.40	12572.40		
Credit Reinforcing Rods shipped out.	629.31	629.31		
	3314.05	2942.42	179.43	192.20
Manufactured product on hand 12/31/19	24961.50			
Manufactured product shipped away 1920	14837.00			
Manufactured product on hand 1/1/21.	10124.50			
Interest on depreciated investment 6% on $7676.62	460.60		460.60	
	3774.65	2942.42	640.03	192.20

CREDITS TO AUBURN CONCRETE PLANT

MANUFACTURED PRODUCT SHIPPED AWAY DURING 1920 AND BILLED OUT ON BOOKS.

Pipe	Pcs.	Lin. Ft.	Price	Operation	Investment	Total
24"	498	3984	$2.00			7968.00
36"	166	1328	3.00			3984.00
Piles						
30 ft.	19	570				
25 ft.	4	100				
20 ft.	14	280				
Total Piles		950	1.90			1805.00
Slabs Single						
8						1080.00
						14837.00

Credits to Auburn Concrete Plant, Operation Account, for reinforcing rods shipped from stock.

Reinforcing rods shipped out				629.31

Charges to Auburn Concrete Plant, Operation Account, Material received during 1920.

	Operation	Investment	Total
Reinforcing rods received	893.70		
200 bbls. cement	720.00		
200# #16 wire	14.71		
Lumber for saddles	253.18		
Coal 50 tons and misc. supplies	325.64		
Drayage	3.00		
Total Material	2210.23	2210.23	2210.23

Pay Roll 1920

	Operation	Investment	Total
Nov. Pay Roll (Repairs & renewals)	830.27		
Dec. Pay Roll (Repairs & renewals)	294.62	1124.89	
Dec. Pay Roll (Operation exclusive of repairs & renewals)	591.55	591.55	
Total Pay Roll charge Operation A/C		1716.44	1716.44
			3926.67

AUBURN CONCRETE PLANT

MANUFACTURED PRODUCT ON HAND DECEMBER 31st-1920.

Pipe	No. Pcs.	Lin. Ft.	Price per Ft.	Amount
24"	11	88	2.00	176.00
36"	27	216	3.00	648.00
Piles				
30'	14	420		
25'	10	250		
20'	58	1160		
15'	33	495		
10'	42	420		
		2745	1.90	5215.50
Slabs	**No. Pcs.**			
Single	21		135.00 Each	2835.00
Double	10		125.00	1250.00
		TOTAL		10124.50

PRODUCTS MANUFACTURED AND ON HAND

	Pipe		Piles					Slabs	
	24"	36"	30'	25'	20'	15'	10'	7x16 Single	6-1/2x16 Double
On hand 1/1/1920	509	193	33	14	72	33	42	29	10
Total 1920 product	--	--	--	--	--	--	--	--	--
Total shipped away 1920.	498	166	19	4	14	--	--	8	--
Surplus on hand 12/31/1920.	11	27	14	10	58	33	42	21	10

AUBURN CONCRETE PLANT

INVENTORY OF MATERIAL ON HAND JANUARY 1, 1921

Corrugated Reinforcing Rods

Size	Length	Unit Wt.	Weight	Price Per Cwt.	Amount
1-1/8" Rd.	2433'-4"	3.38#	8200	3.85065	307.59
1-1/8" Rd.	43041'-1"	3.38#	145479	3.12	4538.94
1" Sq.	396'-11"	3.4#	1350	2.09	28.22
1" Rd.	32	3.67#	117	2.09	2.45
3/4" Sq.	42710'-8"	1.913	81705	2.84	2320.42
3/4" Rd.	2782' -6"	1.502	1479	2.84	42.00
5/8" Sq.	1487'-8"	1.33	1979	2.14	42.35
5/8" Rd.	1389'-6"	1.043	1449	2.14	31.00
1/2" Sq.	4608'-8"	0.85	3918	2.68	105.00
1/2" Rd.	22095'	0.688+	15221	3.75065	586.10
1/2" Rd.	21452'-3"	0.67	14373	2.68	385.20
3/8" Rd.	19774'	0.375	7415	3.14	232.83
1-1/4" Rd.	94'-9"	5.31	503	2.94	14.79
1-1/4" Sq.	13261'-11"	0.167	2215	2.76	61.13
Plain reinforcing Rods					
1-1/4" Rd.	5762'-11"	4.173	24048	2.94	707.01
1/4" Rd.	36000'	0.167	6012	2.76	165.93
Plain Reinforcing Plates for concrete piling.					
2-1/8"x1-1/8"x1'-3-3/4"					
2 hole	9557 pcs.	1.25 ea.	11948	5.13	612.83
			327411		10183.79

Reinforcing Rods to be taken from Auburn Concrete Plant stock for use in Stampede Tunnel flume.

AFE 905-20 Transfer not yet made on book account

1/2" Rd.						
17'-6"	134 pcs.	2345'	0.67	1571#	2.68	42.10
35'	532 pcs.	18620'	0.67	12475#	2.68	334.33
27'-6"	10 pcs.	275'	0.67	184#	2.68	4.93
3/8" Rd.						
56'-0"	780 pcs.	43680'	0.375	16380#	3.14	514.33
				30610#		895.69

Wire Mesh Reinforing for Pipes Style #153

48"	7500 lin.ft.	30000 sq. ft.		
44"	4100 lin.ft.	15033 sq. ft.		
		45033 sq. ft.	.032	1441.06

Annealed Wire

#16	335#	4.27 cwt.	14.30	
#16	200#	5.95 cwt.	11.90	
#12	400#	3.98 cwt.	15.92	
#11	75#	4.58 cwt.	3.44	45.56

Malthine Paper

4-1/2 rolls	1.40	6.30
	Total Material on hand 1/1/1921	12572.40

AUBURN CONCRETE PLANT

Statement of additions to Capital Investment charged to Investment account for 1920.

Steel Shed AFE 1200-14 ED 146-20

Labor Charges from Pay Roll 1920

November	Draftsman making sketch	4.75	
November	Labor building steel shed	70.57	
December	Labor building steel shed	15.93	91.25

Material charges for 1920

December	11 squares roofing	37.29	
	Drayage	4.00	
	Lumber for steel shed	59.66	100.95
	Total addition to Capital Account		192.20

AUBURN CONCRETE PLANT

Statement of charges for Repairs and Renewals charged to Investment account during 1920.

Material

Feb.	1 bronze plate for boiler		.47	
Dec.	1 set knives for bolt cutter		2.35	
"	Lumber		26.64	
"	Wire screen		19.25	
"	1-4" Wood block		1.07	
"	50 ft. Wire		13.55	
"	1 doz. Crosby Clamps		4.29	
"	(1100# nails	41.60		
	(22 sheets galv. iron	32.71		
	(Pipe fittings	7.70		
	(Oil can	2.04		
	(18# 1/2" nuts	1.41		
	(175# nails	6.43		
	(2-10 qt. Galv. water pails	1.11		
	(1-1/2" Globe valve	.74		
	(2 gal. Boiler Paint	.94		
	(1 repaired can	.95		
	(125# 1/2" x 10" Bolts	5.25		
	(18# 5/8" Washers	1.71		
	(6 Padlocks	2.89		
		105.48		
	Store Expense	6.33	111.81	
	Total		179.43	$179.43

AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION NOV. AND DEC. 1920 AND JAN. 1 TO APR.15,1921.

Pay Roll Nov.1 to Apr.15th Operation A/C (exclusive of repairs and renewals)				4873.33	
Pay Roll Nov.1 to Apr.15th Operation A/C repairs and renewals				2188.06	7061.39 ✓
Material and Supplies (exclusive of cost of cement reinforcing rods, mesh and wire)					1173.08 ✓
Royalty on Pipe 498 pcs. 24"	3984				
128 pcs. 36"	1024	5008	@ 5¢		250.40

Mesh used for pipe(Estimated)

498 pcs. 24" x 66-2/3 sq.ft.	33200 sq.ft.	.032		1062.40
128 pcs. 36" x 89-1/3 sq.ft.	11435 sq.ft.	.032		365.92

Reinforcing rods used for pipe (Estimated)

498 pcs. 24" x 1.33#	= 662#	1/4" Rd.	2.76	18.27	
498 pcs. 24" x29.97#	= 15044#	3/8" Rd.	3.14	472.38	490.65
128 pcs. 36" x 1.33#	170#	1/4" Rd.	2.76	4.69	
128 pcs. 36" x 43.62#	5583#	3/8" Rd.	3.14	175.30	179.99

Cement (Estimated)

498 pcs. 24" x 550#	273900#			
128 pcs. 36" x 800#	102400#			
	376300#	941 Bbls. @	2.55 bbl.net	2400.00

Wire (Estimated)

498 pcs. 24" x 0.5	249#	4.27	10.63	
128 pcs. 36" x 0.54	69#	4.27	2.94	13.57

Sand & Gravel (Estimated)

498 pcs. 24" x 24 cu.ft. = 11952 cu.ft. = 443 c.y. @ 10¢	44.30	
128 pcs. 36" x 36 cu.ft. = 16560 cu.ft. = 614 c.y. @ 10¢	61.40	105.70

Interest on depreciated investment

For 1920	460.00
For 1921 approximately	130.00
	13693.10
	695.70
	12997.40
	250.40
	12747.00

Value of 1921 product made to 4/15/1921 @ 1920 prices.

24" pipe	498 pcs.	3984 lin.ft.	2.00 per ft.	7968.00
36" pipe	128 pcs.	1024 lin.ft.	3.00 per ft.	3072.00
Total value of product at 1920 prices.				11040.00

Recommended Price

24" pipe	498 pcs.	3984 lin.ft.	2.50 per ft.	9960.00
36" pipe	128 pcs.	1024 lin.ft.	3.75 per ft.	3840.00
Total value at recommended prices.				13800.00

Note: Price per foot does not include cost of loading out pipe for shipment.

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AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION NOV. AND DEC.1920 AND JAN.1 TO APR.15,1921.

OPERATION A/C	Operation Expenses exclusive of Repairs & renewals.	Repairs & Renewals charged to Operation Account.	Total charges to Operation Account
1920 November Pay Roll	.00	830.27	830.27
1920 December Pay Roll	591.55	294.62	886.17
1921 January Pay Roll	627.99	770.09	1398.08
1921 February Pay Roll	1174.93	266.18	1441.11
1921 March Pay Roll	2006.53	26.90	2033.43
1921 March Credit for loading out pipe	56.17		56.17
1921 April 1 to 15th Pay Roll	528.50		528.50
Total	4873.33	2188.06	7061.39

OPERATION A/C

MATERIAL AND SUPPLIES (exclusive of Cement, Reinforcing Rods, wire mesh and wire).

1920 November and December	581.82	
1921 January 1st to April 15th incl.	591.26	
	1173.08	1173.08
		9234.47

ANNUAL REPORT

AUBURN CONCRETE PLANT

1920

Office of Principal Assistant Engineer,
Tacoma, Washington, April 26th, 1921.

AUBURN CONCRETE PLANT - 1920

SUMMARY

Columns

	Total Investment 12/31/1919.	16853.51
2	Additions to Capital Investment during 1920.	192.20
1	Total Investment 12/31/1920.	17045.71
3	Interest on depreciated investment 6%	460.60
4	Gravel Pit charges.	.00
5	Repairs and Renewals (material only).	179.43 ~~211.64~~
6	Sum of Columns 3-4-5.	640.03 ~~673.24~~

AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION SEASON OF 1920

	Total	Operation	Sinking Fund	Capital Account
Inventory 12/31/1919 Material	12217.46	12217.46		
Material & Supplies recd 1920	2490.61	2210.23	179.43	100.95
Labor on Steel Shed Capital A/C	91.25			91.25
Labor Repairs and Renewals charged Operation A/C	1124.89	1124.89		
Labor Operation (exclusive of repairs and renewals)	591.55	591.55		
Less Inventory 1/1/21 Material	12572.40	12572.40		
Credit Reinforcing Rods shipped out.	629.31	629.31		
	3314.05	2942.42	179.43	192.20
Manufactured product on hand 12/31/19	24961.50			
Manufactured product shipped away 1920	14837.00			
Manufactured product on hand 1/1/21.	10124.50			
Interest on depreciated investment 6% on $7676.62	460.60		460.60	
	3774.65	2942.42	640.03	192.20

CREDITS TO AUBURN CONCRETE PLANT

MANUFACTURED PRODUCT SHIPPED AWAY DURING 1920 AND BILLED OUT ON BOOKS.

Pipe	Pcs.	Lin. Ft.	Price	Operation	Investment	Total
24"	498	3984	$2.00			7968.00
36"	166	1328	3.00			3984.00
Piles						
30 ft.	19	570				
25 ft.	4	100				
20 ft.	14	280				
Total Piles		950	1.90			1805.00
Slabs Single						
8						1080.00
						14837.00

Credits to Auburn Concrete Plant, Operation Account, for reinforcing rods shipped from stock.

Reinforcing rods shipped out			629.31

Charges to Auburn Concrete Plant, Operation Account, Material received during 1920.

Reinforcing rods received	893.70		
200 bbls. cement	720.00		
200# #16 wire	14.71		
Lumber for saddles	253.18		
Coal 50 tons and misc. supplies	325.64		
Drayage	3.00		
Total Material	2210.23	2210.23	2210.23

Pay Roll 1920

Nov. Pay Roll (Repairs & renewals)	830.27		
Dec. Pay Roll (Repairs & renewals)	294.62	1124.89	
Dec. Pay Roll (Operation exclusive of repairs & renewals)	591.55	591.55	
Total Pay Roll charge Operation A/C		1716.44	1716.44
			3926.67

AUBURN CONCRETE PLANT

MANUFACTURED PRODUCT ON HAND DECEMBER 31st-1920.

Pipe	No. Pcs.	Lin. Ft.	Price per Ft.	Amount
24"	11	88	2.00	176.00
36"	27	216	3.00	648.00
Piles				
30'	14	420		
25'	10	250		
20'	58	1160		
15'	33	495		
10'	42	420		
		2745	1.90	5215.50
Slabs	No. Pcs.			
Single	21		135.00 Each	2835.00
Double	10		125.00	1250.00
		TOTAL		10124.50

PRODUCTS MANUFACTURED AND ON HAND

	Pipe		Piles					Slabs	
	24"	36"	30'	25'	20'	15'	10'	7x16 Single	6-1/2x16 Double
On hand 1/1/1920	509	193	33	14	72	33	42	29	10
Total 1920 product	--	--	--	--	--	--	--	--	--
Total shipped away 1920.	498	166	19	4	14	--	--	8	--
Surplus on hand 12/31/1920.	11	27	14	10	58	33	42	21	10

AUBURN CONCRETE PLANT

INVENTORY OF MATERIAL ON HAND JANUARY 1, 1921

Corrugated Reinforcing Rods

Size	Length	Unit Wt.	Weight	Price Per Cwt.	Amount
1-1/8" Rd.	2433'-4"	3.38#	8200	3.85065	307.59
1-1/8" Rd.	43041'-1"	3.38#	145479	3.12	4538.94
1" Sq.	396'-11"	3.4#	1350	2.09	28.22
1" Rd.	32	3.67#	117	2.09	2.45
3/4" Sq.	42710'-8"	1.913	81705	2.84	2320.42
3/4" Rd.	2782' -6"	1.502	1479	2.84	42.00
5/8" Sq.	1487'-8"	1.33	1979	2.14	42.35
5/8" Rd.	1389'-6"	1.043	1449	2.14	31.00
1/2" Sq.	4608'-8"	0.85	3918	2.68	105.00
1/2" Rd.	22095'	0.688+	15221	3.75065	586.10
1/2" Rd.	21452'-3"	0.67	14373	2.68	385.20
3/8" Rd.	19774'	0.375	7415	3.14	232.83
1-1/4" Rd.	94'-9"	5.31	503	2.94	14.79
1-1/4" Sq.	13261'-11"	0.167	2215	2.76	61.13
Plain reinforcing Rods					
1-1/4" Rd.	5762'-11"	4.173	24048	2.94	707.01
1/4" Rd.	36000'	0.167	6012	2.76	165.93
Plain Reinforcing Plates for concrete piling.					
2-1/8"x1-1/8"x1'-3-3/4"					
2 hole	9557 pcs.	1.25 ea.	11948	5.13	612.83
			327411		10183.79

Reinforcing Rods to be taken from Auburn Concrete Plant stock for use in Stampede Tunnel flume.

AFE 905-20 Transfer not yet made on book account

1/2" Rd.						
17'-6"	134 pcs.	2345'	0.67	1571#	2.68	42.10
35'	532 pcs.	18620'	0.67	12475#	2.68	334.33
27'-6"	10 pcs.	275'	0.67	184#	2.68	4.93
3/8" Rd.						
56'-0"	780 pcs.	43680'	0.375	16380#	3.14	514.33
				30610#		895.69

Wire Mesh Reinforing for Pipes Style #153

48"	7500 lin.ft.	30000 sq. ft.		
44"	4100 lin.ft.	15033 sq. ft.		
		45033 sq. ft.	.032	1441.06

Annealed Wire

#16	335#	4.27 cwt.	14.30	
#16	200#	5.95 cwt.	11.90	
#12	400#	3.98 cwt.	15.92	
#11	75#	4.58 cwt.	3.44	45.56

Malthine Paper

4-1/2 rolls	1.40	6.30
Total Material on hand 1/1/1921		12572.40

AUBURN CONCRETE PLANT

Statement of additions to Capital Investment charged to Investment account for 1920.

Steel Shed AFE 1200-14 ED 146-20

Labor Charges from Pay Roll 1920

November	Draftsman making sketch	4.75	
November	Labor building steel shed	70.57	
December	Labor building steel shed	15.93	91.25

Material charges for 1920

December	11 squares roofing	37.29	
	Drayage	4.00	
	Lumber for steel shed	59.66	100.95
	Total addition to Capital Account		192.20

AUBURN CONCRETE PLANT

Statement of charges for Repairs and Renewals charged to Investment account during 1920.

Material

Feb.	1 bronze plate for boiler		.47	
Dec.	1 set knives for bolt cutter		2.35	
"	Lumber		26.64	
"	Wire screen		19.25	
"	1-4" Wood block		1.07	
"	50 ft. Wire		13.55	
"	1 doz. Crosby Clamps		4.29	
"	(1100# nails	41.60		
	(22 sheets galv. iron	32.71		
	(Pipe fittings	7.70		
	(Oil can	2.04		
	(18# 1/2" nuts	1.41		
	(175# nails	6.43		
	(2-10 qt. Galv. water pails	1.11		
	(1-1/2" Globe valve	.74		
	(2 gal. Boiler Paint	.94		
	(1 repaired can	.95		
	(125# 1/2" x 10" Bolts	5.25		
	(18# 5/8" Washers	1.71		
	(6 Padlocks	2.89		
		105.48		
	Store Expense	6.33	111.81	
	Total		179.43	$179.43

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AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION NOV. AND DEC. 1920 AND JAN. 1 TO APR.15,1921.

Pay Roll Nov.1 to Apr.15th Operation A/C (exclusive of repairs and renewals)		4873.33	
Pay Roll Nov.1 to Apr.15th Operation A/C repairs and renewals		2188.06	7061.39
Material and Supplies (exclusive of cost of cement reinforcing rods, mesh and wire)			1173.08
Royalty on Pipe 498 pcs. 24" 3984 / 128 pcs. 36" 1024	5008 @ 5¢		250.40

Mesh used for pipe(Estimated)

498 pcs. 24" x 66-2/3 sq.ft.	33200 sq.ft.	.032	1062.40
128 pcs. 36" x 89-1/3 sq.ft.	11435 sq.ft.	.032	365.92

Reinforcing rods used for pipe (Estimated)

498 pcs. 24" x 1.33#	= 662# 1/4" Rd.	2.76	18.27	
498 pcs. 24" x29.97#	= 15044# 3/8" Rd.	3.14	472.38	490.65
128 pcs. 36" x 1.33#	170# 1/4" Rd.	2.76	4.69	
128 pcs. 36" x 43.62#	5583# 3/8" Rd.	3.14	175.30	179.99

Cement (Estimated)

498 pcs. 24" x 550#	273900#			
128 pcs. 36" x 800#	102400#			
	376300#	941 Bbls. @	2.55 bbl.net	2400.00

Wire (Estimated)

498 pcs. 24" x 0.5	249#	4.27	10.63	
128 pcs. 36" x 0.54	69#	4.27	2.94	13.57

Sand & Gravel (Estimated)

498 pcs. 24" x 24 cu.ft. = 11952 cu.ft. = 443 c.y. @ 10¢	44.30	
128 pcs. 36" x 36 cu.ft. = 16560 cu.ft. = 614 c.y. @ 10¢	61.40	105.70

Interest on depreciated investment

For 1920	460.00
For 1921 approximately	130.00
	13693.10

Value of 1921 product made to 4/15/1921 @ 1920 prices.

24" pipe	498 pcs.	3984 lin.ft.	2.00 per ft.	7968.00
36" pipe	128 pcs.	1024 lin.ft.	3.00 per ft.	3072.00
Total value of product at 1920 prices.				11040.00

Recommended Price

24" pipe	498 pcs.	3984 lin.ft.	2.50 per ft.	9960.00
36" pipe	128 pcs.	1024 lin.ft.	3.75 per ft.	3840.00
Total value at recommended prices.				13800.00

Note: Price per foot does not include cost of loading out pipe for shipment.

210
310

AUBURN CONCRETE PLANT

STATEMENT OF COST OF OPERATION NOV. AND DEC.1920 AND JAN.1 TO APR.15,1921.

OPERATION A/C	Operation Expenses exclusive of Repairs & renewals.	Repairs & Renewals charged to Operation Account.	Total charges to Operation Account
1920 November Pay Roll	.00	830.27	830.27
1920 December Pay Roll	591.55	294.62	886.17
1921 January Pay Roll	627.99	770.09	1398.08
1921 February Pay Roll	1174.93	266.18	1441.11
1921 March Pay Roll	2006.53	26.90	2033.43
1921 March Credit for loading out pipe	56.17		56.17
1921 April 1 to 15th Pay Roll	528.50		528.50
Total	4873.33	2188.06	7061.39

OPERATION A/C

MATERIAL AND SUPPLIES (exclusive of Cement, Reinforcing Rods, wire mesh and wire).

1920 November and December	581.82	
1921 January 1st to April 15th incl.	591.26	
	1173.08	1173.08

Ga-65

APR 23 1921

Saint Paul, April 22nd, 1921.

Mr. A. R. Cook,

Principal Assistant Engineer.

Your letter of the 18th regarding operation of the Auburn concrete plant.

In opening this plant I assumed it would be necessary to take care of all or a part of next season's requirements; in fact, this ought to be done, in order to take care of next season's requirements in time to be available early in the season of 1922.

After the completion of the 1921 orders the manufacture of pipe for future requirements should be handled as a by-product in connection with the manufacture of the drainage sections for the Stampede Tunnel - pipe making being used to fill in so the plant can be economically operated.

H. E. STEVENS,

Chief Engineer.

HES-ar

cc-Mr. M. F. Clements.

GA 61

RRB

Saint Paul, March 16, 1921

Mr. H. E. Stevens:

I have changed Requisition PAE-T No. 48 covering material for the Auburn Concrete Plant, to agree with Mr. Cook's message S-8, copy of which is attached.

M F CLEMENTS.

Encl.

Sent 3/16/21

FORM 1386

Telegram—Be Brief

Time Filed

M.

MAR 16 1920

177 BY R

Tacoma Mar 15 1921 M F Clements

StPaul

A-11 send 33 rolls 44 inch and balance 48 inch. S-8

A R Cook

530pm

FORM 1386

Telegram—Be Brief

MFC

Time Filed

M.

Saint Paul, March 14, 1921.

A R Cook
Tacoma Wash

Your requisition 48 calls for 46 rolls wire mesh 44 inches wide. Should this be 23 rolls 48 inches and 23 rolls 44 inches? We have 33 rolls of each size at Glendive which will not be used this year. A-11

M F CLEMENTS

GA-65

MFC

Saint Paul, February 28, 1921.

Mr. H. E. Stevens,

Chief Engineer.

We will require for 1921 the following material from the concrete plants:

Concrete Pipe:	24"	36"	48"
East of Helena	1522 ft.	376 ft.	104 ft.
West of Helena	3982 ft.	744 ft.	200 ft.
On hand at Glendive	264 ft.	1384 ft.	0
Auburn working			
	1258		

Slabs:

East of Helena	70 - 1/2 spans
West of Helena	0
On hand at Glendive	0
On hand at Auburn	21

Piles:

East of Helena	150
West of Helena	0
On hand at Glendive	30
On hand at Auburn	135

If authority is given for the five concrete trestles on the Budget, we will require slabs and piles from Glendive to complete them. We are also short 1258 lineal feet of concrete pipe for the territory east of Helena. The pipe can be supplied by Massey from Minneapolis and we can contract the slabs and piles.

It would not seem to me advisable to operate the concrete plant at Glendive this year.

Mr. Wakefield is holding a number of requisitions for concrete pipe until a decision is reached in regard to the assignment of the pipe now on hand.

The Auburn plant can supply all needs west of Helena.

Yours truly,

Bridge Engineer.

9a-65

MFC

Saint Paul, December 8, 1920

Mr. H. E. Stevens,

Chief Engineer.

On Mr. Crassweller's message of December sixth, Mr. Prest requests the selling price of 24 inch reinforced concrete pipe at Auburn.

The following is the detail of cost:

Manufacture,	$2.00
Loading,	.30
Interest on plant investment,	.09
Value of gravel in pit,	.14
Freight on materials to plant,	.20
Selling price:	$2.73

Yours truly,

Bridge Engineer.

9a-65

RRB

Saint Paul, November 18, 1920

Mr. S. J. Bratager,

Prin. Assistant Engineer.

Referring to your notation on my letter to Mr. Stevens of November 17, relative to the manufacture of concrete blocks for building purposes at Glendive and Auburn concrete plants.

I have made the following estimates for both Glendive and Auburn, using a mixture of 1 to 5:

<u>GLENDIVE PLANT</u>:

<u>6"x12"x24" Cement Hollow Block - 1:5 Mixture</u>

Cement	0.158 sacks @ 0.80	$0.1264
Sand	0.788 cu.ft. @ 0.04	0.0315
Labor		0.1000
Transportation to plant		0.1182
Plant cost		0.0200
		$0.3961

<u>6"x16"x24" Cement Hollow Block</u>

Cement	0.178 sacks @ 0.80	$0.1424
Sand	0.892 cu.ft. @ 0.04	0.0357
Labor		0.1100
Transportation to plant		0.1385
Plant cost		0.0200
		$0.4466

<u>8"x12"x24" Cement Hollow Block</u>

Cement	0.211 sacks @ 0.80	$0.1688
Sand	1.051 cu.ft. @ 0.04	0.0420
Labor		0.1300
Transportation to plant		0.1576
Plant cost		0.0200
		$0.5184

elly

<u>8"x[illegible]"x24" Cement Hollow Block</u>

Cement	0.237 sacks	@ 0.80	$0.1896
Sand	1.189 cu.ft.	@ 0.04	0.0475
Labor			0.1470
Transportation to plant			0.1847
Plant cost			0.0200
			$0.5894

<u>AUBURN PLANT</u>:

<u>6"x12"x24" Hollow Cement Block 1:5 Mixture</u>

Cement	0.158 sacks	@ 0.80	$0.1264
Sand	0.788 cu.ft.	@ 0.02	0.0158
Labor			0.1000
Transportation to plant			0.0035
Plant cost			0.0200
			$0.2657

<u>6"x16"x24" Hollow Cement Block</u>

Cement	0.178 sacks	@ 0.80	$0.1424
Sand	0.892 cu.ft.	@ 0.02	0.0178
Labor			0.1100
Transportation to plant			0.0041
Plant cost			0.0200
			$0.2943

<u>8"x12"x24" Hollow Cement Block</u>

Cement	0.211 sacks	@ 0.80	$0.1688
Sand	1.051 cu.ft.	@ 0.02	0.0210
Labor			0.1300
Transportation to plant			0.0047
Plant cost			0.0200
			$0.3445

<u>8"x16"x24" Hollow Cement Block</u>

Cement	0.237 sacks	@ 0.80	$0.1896
Sand	1.189 cu.ft.	@ 0.02	0.0238
Labor			0.1470
Transportation to plant			0.0055
Plant cost			0.0200
			$0.3859

SUMMARY:

Size	Cost to Ry. at Glendive	Cost to Ry. at Auburn	Cost at Commercial Plant Saint Paul
6"x12"x24" Block	$0.3961	$0.2657	$0.28
6"x16"x24" "	0.4466	0.2943	0.35
8"x12"x24" "	0.5184	0.3445	0.38
8"x16"x24" "	0.5894	0.3859	

Yours truly,

Bridge Engineer.

9a-65

MFC

Saint Paul, November 17, 1920

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of November 13 in regard to the manufacture of concrete blocks for building purposes at Glendive and Auburn concrete plants.

The estimates are for the 6"x12"x24" and 6"x16" x24" sizes only and are on assumed sections which have volumes of 0.757 cubic feet and 0.868 cubic feet respectively.

Cost at Glendive:

The sand and cement to be shipped from Saint Paul and the work to be done in conjunction with other plant operations. Mixture one part cement to four parts sand.

6"x12"x24" Block:

Cement	.194 sacks @	$0.80	$0.1552
Sand	.788 cu.ft. @	0.04	0.0315
Labor			0.1000
Transportation to plant			0.1182
Plant cost			0.0200
			$0.4249

6"x16"x24" Block:

Cement	.223 sacks @	$0.80	$0.1784
Sand	.892 cu.ft. @	0.04	0.0357
Labor			0.1100
Transportation to plant			0.1385
Plant cost			0.0200
			$0.4826

Cost at Auburn:

The cement shipped from Bellingham and work to be done in conjunction with other plant operations. Mixture one part cement to four parts sand.

6"x12"x24" Block:

Cement	.194 sacks	@ $0.80	$0.1552
Sand	.788 cu.ft.	@ .02	0.0158
Labor			0.1000
Transportation to plant			0.0035
Plant cost			0.0200
			$0.2945

6"x16"x24" Block

Cement	.223 sacks	@ $0.80	$0.1784
Sand	.892 cu.ft.	@ 0.02	0.0178
Labor			0.1100
Transportation to plant			0.0041
Plant cost			0.0200
			$0.3303

Summary

Cost at Glendive	Ry. at Glendive	Ry. at Auburn	Commercial Plant at St. Paul
6"x12"x24" Block	$0.42	$0.29	$0.28
6"x16"x24" "	0.48	0.33	0.35

If these blocks are manufactured at a sand pit the cost may increase the Auburn prices approximately one cent per block.

I do not have definfte information in regard to the actual volume of the blocks manufactured at the commercial plants in Saint Paul, but the volume I have assumed provides ample air space and corresponds to the usual practice.

Your file returned herewith.

Yours truly,

Bridge Engineer.

GA-65

NOV 2 1920

Saint Paul, November 2nd, 1920.

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

Dear Sir:-

Your letter of the 28th regarding opening of the Auburn concrete plant.

I have not as yet received approval of rates recommended for the concrete plant. Neither have I approval for the revised plan proposed for drainage in the Stampede tunnel.

I expect definite information on these items very soon and will wire you promptly on receipt of same.

I think the reinforcing rods should be allowed to come forward, but delivery of cement should be held pending definite information.

Yours truly,

Chief Engineer.

HES-ar

cc-Mr. M.F.Clements.

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
9a-65. M.

Telegram—Be Brief

MFC

Saint Paul, Oct 29, 1920

J D Koren
Spokane Wash

A-15 Auburn will make 48 inch pipe at $7.00 per foot exclusive of transportation. A22

M F CLEMENTS

FORM 1386

Telegram—Be Brief

Time Filed
M.

147 sfwf

Spokane Oct 28 20 M F Clements

OCT 28 20

St Paul

Can forty eight inch concrete pipe be furnished for next year, if so what cost I am providing this size for 224 lin feet A-15

J D Koren

742pm

JDK

A15 - Auburn will make 48 inch pipe at $7 00 per ft exclusive of transportation

9a-65

MFC

Saint Paul, October 28, 1920

Mr. H. E. Stevens,

Chief Engineer.

Referring to your notation on Mr. Cook's letter of September 30 in regard to a price on 48" reinforced concrete pipe to be used for 1921 estimating purposes.

I have prepared an estimate of the cost of manufacturing 48" pipe based on the cost of 24" and 36" pipe atthe Auburn plant, and I think the price of $7.00 per foot should be used for the 48" concrete pipe.

Mr. Cook's letter is returned herewith.

Yours truly,

Bridge Engineer.

Encl.

Estimated Cost of 48 inch reinforced concrete pipe per lin ft to be built at Auburn in 1921

MFO 10/28/20

Sand & Gravel	.50
Cement	1.48
Rods	1,20
Wire	.05
Labor	1,95
Royalty	.05
Plant operation	.64
Depreciation	1.00
Gravel pit charge	.03
	6.90

Day $7 00 for estimating purposes

9a 65

MFC

Saint Paul, October 26, 1920

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of October 25 in regard to a monthly rate to be paid to the handy man and watchman for the Auburn Concrete Plant.

On Mr. Cook's Form 202 he has listed this man with the concrete moulders and the equivalent monthly rate for 26 days of eight hours each would be $156.00. If the man is put on a monthly rate he would receive pay for holidays, while the man on an hourly rate would not be paid. I think therefore, that a rate of $155.00 per month would be proper for this man.

File of papers returned herewith.

Yours truly,

Bridge Engineer.

Encl.

N.P. RY. CO.
OFFICE OF
OCT 26 1920
BRIDGE ENGR.
ST. PAUL

Saint Paul, October 25th, 1920.

Mr. M. F. Clements,
Bridge Engineer.

Please note the attached about rates of pay proposed for employes of the Auburn concrete plant.

I first thought we ought to classify the odd man as a concrete moulder and revised the Form 202 accordingly, but it now appears that this man would get in a lot of overtime if we gave him an hourly rate. Possibly Mr. Cook may have spoken to you about this work while you were on the Coast, and anyway, I would like to have your recommendation as to how the extra man should be classed and paid. If his hours are irregular I think we ought to fix a monthly rate without overtime if we can do so under the schedule.

Chief Engineer.

HES-ar

Encl.

99-65

MFC

Saint Paul, October 4, 1920.

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

Dear Sir:-

Referring to your letter of September 30 in regard to the rates for concrete pipe.

The rates for pipe authorized by Mr. Stevens are $2.00 for 24 inch pipe and $3.00 for 36 inch pipe, exclusive of the cost of loading. An increase will be made in the labor cost at the concrete plant and the total manufactured product will be greater, but the cost of overhead and the cost of fitting up and dismantling the plant will be distributed over a larger number of units and for that reason I think the prices are sufficient to cover the manufactured product for 1921.

Yours truly,

Bridge Engineer.

Re: Prices for concrete pipe
to be used in 1921.

OCT 4 1920

Tacoma, Wash., Sept. 30th, 1920

Mr. M. F. Clements,
Bridge Engineer,
St. Paul, Minnesota.

Dear Sir:

Referring to your letter of September 24th questioning prices for concrete pipe to be used in 1921, regarding which I wrote District Engineer Koren on September 16th. Kindly be referred to Mr. Stevens' letter of March 26th which reads as follows:

> "Your letter of the 5th with copy of annual report for Auburn Concrete Plant.
>
> Although it seems somewhat inconsistent to charge at so much higher rate the balance of the products manufactured in 1919, I see no other way out of the difficulty, and approve the prices you recommend."

If you will be referred to the annual report of the Auburn Concrete Plant for 1919, page 4, you will note that the prices recommended were \$2.00 for 24" and \$3.00 for 36" pipe, and note on the bottom of this page specifies these prices are exclusive of cost of loading products for shipment from plant.

Yours truly,

A. R. Cook

W-S

Principal Assistant Engineer.

9a-565

MFC

Saint Paul, Sept. 24, 1920

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

Dear Sir:-

Referring to your letter of September 16 to Mr. Koren in regard to prices for concrete pipe to be used in 1921.

It was my understanding when prices were fixed on the concrete materials at Auburn that the price of $2.00 for 24" pipe and $3.00 for 36" pipe covered the cost of loading out material. If the former price did not include the loading, you have made no change in the price which has already been authorized.

Yours truly,

Bridge Engineer.

Re: Prices for 1921 Bridge Work
for 24 and 36 inch concrete pipe.

SEP 20 1920

Tacoma, Wash., Sept. 16, 1920

Mr. J. D. Koren,
District Engineer,
Spokane, Wash.

Dear Sir:

Referring to your letter of the 15th inst. regarding prices to be used in estimates for 1921 bridge work for 24 and 36 inch concrete pipe, prices to include freight on raw materials to the plant.

The 1921 prices are as follows:

24" Pipe	Price Per Ft.
Price at plant per lineal foot	$2.00
Freight on raw material to Auburn	.09
Estimated cost of loading	.31
Cost F.O.B. car Auburn	$2.40

Weight on 1 piece 8 feet long 24" R.C.P. 3255#.

36" Pipe	Price Per Ft.
Price at plant per lineal foot	3.00
Freight on raw material to Auburn	.13
Estimated cost of loading	.37
Cost F.O.B. car Auburn	$3.50

Weight on 1 piece 8 feet long 36" R.C.P. 4700#

I think these prices will be O-K for estimate purposes, but if there are any changes I will advise you.

Yours truly,

A. R. Cook

Principal Assistant Engineer.

W-S

cc-MFC

Kindly advise if these prices will be all right for product to be furnished 1921.

A.R.Cook

9a-65

MFC

Saint Paul, October 4, 1920

Mr. H. E. Stevens,

Chief Engineer.

Referring to your notation on Mr. Cook's letter of September 27 in regard to rates of pay for employes at the Auburn concrete plant.

It has been customary in operating the Glendive concrete plant to take Assistant Engineer Condit off the maintenance work and put him in charge of the concrete plant. His rate if pay is now $275.00 per month and if he is again placed in charge of the concrete plant in 1921, he will receive that rate of pay. To be consistent, therefore, we should pay Mr. Farmer $275.00 per month as Superintendent of the Auburn concrete plant.

Mr. Cook has recommended 80 cents per hour for three of the former employes of the concrete plant and 75 cents for the remainder. If the hourly increase for carpenters be applied to the old rates, they would receive 77½ cents and 71½ cents per hour against the 80 cents and 75 cents recommended by Mr. Cook. However, I think Mr. Cook's rates are O. K. and the Engineer at the concrete plant should also receive 80 cents per hour.

In his letter regarding rates, Mr. Cook suggests that I make requisition for material to be used in making the concrete units for Stampede tunnel. I have already made requisition for the concrete inverts which consists of cement and miscellaneous reinforcing rods required to fill out the stock at Auburn. If a change is made in the design so that we placed concrete ditches instead of concrete inverts, it will be necessary to ship some additional half inch rods from other locations. I will have a requisition prepared and hold it until a decision has been made on the type of construction at Stampede.

Mr. Cook's letter is returned herewith.

Bridge Engineer.

Encl.

9a-65

MFC

Saint Paul, September 15, 1920

Mr. H. E. Stevens,

Chief Engineer.

Referring to your notation on Mr. Stotler's letter of September tenth in regard to pipe requirements for 1921.

I have a statement prepared early in the season showing the pipe on hand at Auburn and the requirements for 1920 and I presume all of the pipe estimated for 1920 will be used. The stock on hand at the end of 1920 will be:

83 pcs. 24" pipe
37 " 36" "

The additional requirements for 1921 to provide the amount estimated by Mr. Cook, will be:

617 pcs. 24" pipe
283 " 36" "

I think it advisable to make pipe at the same time that we are making precast concrete sections for the Stampede ditches so that the plant can be run in the most economical manner and I also think it advisable for the Engineering Department to handle the operation of the plant at Auburn.

Mr. Stotler's letter is returned herewith.

Yours truly,

Bridge Engineer.

Encl.

9a-65

Saint Paul, March 26th, 1920.

MAR 28 1920

Mr. A. R. Cook,

Principal Assistant Engineer,

Tacoma, Washington.

Dear Sir:-

Your letter of the 5th with copy of annual report for Auburn concrete plant.

Although it seems somewhat inconsistent to charge at so much higher rate the balance of the products manufactured in 1919, I see no other way out of the difficulty, and approve the prices you recommend.

Yours truly,

Chief Engineer.

cc-Mr. M.F.Clements.
Mr. H.A.Cribbs.

9A-65

MFC

Saint Paul, March 24, 1920.

Mr. A. R. Cook,

Prin. Asst. Engineer,

Tacoma, Washington.

Dear Sir:-

I have arranged with Mr. Wakefield to furnish 36" concrete pipe for the Camas Prairie Railroad from Glendive and requested the Supervisor on the Idaho Division to make his requisitions for 36" pipe, "to be furnished from Glendive".

With this change, you should have a small surplus of 36" pipe for the greaternpart of 1921, making it unnecessary to operate the Auburn Concrete Plant in 1920.

Yours truly,

Bridge Engineer.

9a-65

Re: Annual report of
Auburn Concrete Plant

MAR 20 1920

Tacoma, March 17, 1920.

Mr. M. F. Clements,
Bridge Engineer,
St. Paul, Minn.

Dear Sir:

Acknowledging your favor of the 9th inst. commenting on the annual report covering the Auburn Concrete Plant operations for the year 1919.

Noting your reference to depreciation, amount $3144.60. This depreciation was figured at the same rate per lineal foot that you used for your 1918 report, Mr. Springer understanding that that figure was arbitrary. I note that arriving at the depreciation, you are using a 1920 price which will make up all of the loss sustained through the 1919 price to reach your depreciation of the plant. Personally, I do not think that this is right and neither should the loss on pipe be figured into the depreciation. It seems to me that this loss should be charged to Profit and Loss Account. It would have to be in order to close the books as of December 31, 1919.

It seems to me that in order to arrive at some definite understanding regarding the matter of depreciation, an arbitrary percent, which should be constant, should be charged off each year as there is a considerable depreciation in the value of the plant if it is not run at all.

I think if you will follow this matter up, you will find that Mr. Springer has followed the proceedure which you recommended last year.

Commenting on the loss. The price used for 1919 sales was authorized by Mr. Stevens in his letter of April 7th, 1919, following a conference with you subsequent to your analysis of the previous year's operation.

Yours truly,

A. P. Cook

Principal Assistant Engineer

APC-R

9a-65

MFC

Saint Paul, March 9, 1920.

Mr. A. R. Cook,

Principal Assistant Engineer,

Tacoma, Washington.

Dear Sir:-

I have checked over your report on the operation of the Auburn concrete plant and find it to be in very good shape, with the exception of item 12, page one, Depreciation, amount $3144.60. It would appear that you have selected this as an arbitrary figure and worked out from it a cost price for the various products, while as a matter of fact, you had an established selling price which was less than the cost shown on page seven.

You manufactured 6080 feet of 24 inch pipe and have on hand 4072 feet, which would indicate that you had shipped 2008 feet sold at a price of $1.65. I based this statement on page three of your report, which indicates that you sold 24 inch pipe at the $1.65 rate.

Referring again to page seven. If you deduct the depreciation per foot from the total cost, exclusive of transportation, and subtract $1.65 from the result, you will have a loss of 15.7 cents per foot. Applied to the 2008 feet of pipe shipped, would mean a loss of $315.00 on the 24 inch pipe shipped in 1919.

If the prices that you have recommended on page eleven be applied to the remaining product manufactured in

1919, the depreciation for the year would be $2730.49 instead of $3144.60.

Yours truly,

Bridge Engineer.

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

99-65 M.

Telegram—Be Brief

MFC

Saint Paul, Marh 12, 1920

A R Cook
Prin. Asst. Engineer.

You will be short 37 pieces 36 inch concrete pipe at Auburn plant to fill 1920 requirements. Will ship 36 inch pipe for Idaho and Camas Prairie from Glendive. Do not load 36 inch pipe on Store Requisition ST-175F dated March fifth. Will have requisition revised. A-6

M F CLEMENTS

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
9a-65 M.

Telegram—Be Brief

MFC

J D Koren   Saint Paul, March 12, 1920
Spokane, Wash.

B-18 When Idaho Division requisition for concrete pipe is placed mark on requisition that 36 inch pipe should be furnished from Glendive. A-5

M F CLEMENTS

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

M.

Telegram—Be Brief

83 wf

MAR 17 1920

Spokane Mar 11 20

M F Clements

St Paul

A-2 CPRR have ordered concrete pipe on reqn 3807 Idaho divn have not yet ordered pipe B-18

J D Koren

606pm

ST 175 F

3-5

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
M.

Telegram—Be Brief

MFC

Saint Paul, Mar. 9, 1920

J D Koren
Spokane Wash

Have Superintendents made requisition for concrete pipe on Idaho and Camas Prairie? If so give me requisition numbers. A-2

M F CLEMENTS

9a-65

MFC

Saint Paul, March 12, 1920.

Mr. O. C. Wakefield,

General Storekeeper.

Camas Prairie Requisition 3807 covering concrete pipe for 1920 was placed on South Tacoma, your No. ST-175F, dated March fifth. I have checked up the requirements for 1920 and find that the Auburn plant will be short on 36 inch pipe.

Will you kindly revise your requisition for Camas Prairie material, eliminating the 36 inch pipe from the South Tacoma requisition and place that portion with the Storekeeper at Glendive.

Yours truly,

9a-65

MFC

Saint Paul, March 12, 1920.

Mr. H. E. Stevens,

Chief Engineer,

I have checked up the requirements for reinforced concrete products to be used during 1920 and find that we have sufficient pipe at Glendive and Auburn for all requirements if we extend the limits of the territory over which we have supplied pipe from Glendive.

Auburn will be short 37 pieces of 36" pipe. If the Idaho Division and the Camas Prairie Railway be supplied from Glendive, the Auburn plant can supply the remainder of the western territory.

The total requirements for standard slabs 7x16 is sixty pieces and we have 57 pieces in stock at the two plants. It would be necessary, in order to meet all the requirements, to ship slabs from Auburn to Fargo and I do not think it advisable to ship the manufactured product east of the Rocky Mountain or Montana Division.

In order to avoid the operation of the Glendive plant this year, I would suggest that we have the Yellowstone Division crew build slabs and piles, rigging up a temporary mixer and using the present forms on the platforms at Glendive, without going to the trouble of entirely equipping the plant for operation.

I think the slabs for the Fargo Division could be built at a station nearest the point where they are to be used and this would require that the Fargo Division build six slabs 7x16 and six slabs 6½x16, and the Yellowstone Division build at Glendive sufficient to take care of the Dakota and Yellowstone Division. There would be built at Glendive 19 pieces of 25 foot piles, 20 pieces of 30 foot piles, 4 slabs 7x16 and 8 special slabs without parapet, 7x16. The Montana and Rocky Mountain Divisions to be provided with piles and slabs from the Tacoma Division. This would mean the shipping of 14 slabs 7x16 and 35 piles 20 feet long.

At the end of the season the stock at the two plants will be as follows:

Glendive

33	pcs.	24" pipe
110	"	36" "
64	"	16' piles

Auburn

83	pcs.	24" pipe
7	"	7x16 slabs
10	"	6½x16 "
3	"	16' piles
37	"	20' "
14	"	25' "
16	"	30' "

This should be sufficient to take care of the early requirements on all divisions and it would be necessary to operate both plants next year to provide required pipe in 1921.

Yours truly,

Encl.

MFC

9a-65

Saint Paul, March 9, 1920.

Mr. H. E. Stevens,

Chief Engineer.

Mr. Cook has submitted an annual report on the Auburn concrete plant, dated March 2, 1920.

About one year ago you asked me to furnish unit costs for 1919 to be used in charging out materials from the Auburn and Glendive plants and I established the price of $1.65 for 24 inch pipe, $2.20 for 36 inch pipe and $1.55 for concrete piles. This was based on cost of materials and an estimated cost of labor.

It appears from Mr. Cook's report that these prices were too low and if all the material made in 1919 was charged out, there would be a loss, due to the operation of the plant, of approximately $500.00. There was charged against products $637.00 for interest and a pit charge and if these items be omitted, the plant broke even in cost.

Page one of Mr. Cook's report follows the general scheme I outlined a year ago with the exception of depreciation and it would appear that Mr. Cook has assumed an arbitrary figure for depreciation agreeing with the method followed in previous years. With a fixed price on manufactured products this method cannot be followed out, as the depreciation must equal the profit on the manufactured product which, in this case, was a minus quantity.

From the report it appears that 6080 feet of 24 inch pipe was manufactured and there remains in stock 4072 feet, which indicates that 2008 feet of the pipe has been charged out at the rate of $1.65, which was manufactured at a loss of 15.7 cents, making a loss on 24 inch pipe of $315.25.

On Page eleven of Mr. Cook's report he shows prices authorized for 1919 product and the actual cost in 1919, together with the prices recommended for 1920 shipments. The figures under actual cost of 1919 product are incorrect for the reason that they include about 17 percent depreciation which is an assumed quantity.

The prices recommended for 1920 of $2.00 for 24 inch pipe, $3.00 for 36 inch pipe and $1.90 for piles will provide sufficient profit on the 1919 product to wipe out the loss on the 24 inch pipe and make a total profit for the year on manufactured product of $2730.00, which is 15 percent of the manufactured cost. The percentage of manufactured cost which has been used for depreciation in the past varies from 16 to 30 percent.

I think the prices recommended by Mr. Cook for the 1920 shipments should be used.

Yours truly,

Encl.

MFC

Saint Paul, March 9, 1920.

Mr. H. E. Stevens,

Chief Engineer.

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I think the prices recommended by Mr. Cook for the 1920 shipments should be used.

Yours truly,

Encl.

94-65

NORTHERN PACIFIC RAILWAY COMPANY

CONCRETE PRODUCTS REQUIRED FOR 1920.

Division	Pipe 18" Req.	18" ON Hand	24" Req.	24" On Hand	36" Req.	36" On Hand	48" Req.	48" On Hand	Slabs 7'x16' Req.	7'x16' On Hand	6½'x16' Req.	6½'x16' On Hand	Piles 16' Req.	16' On Hand	20' Req.	20' On Hand	25' Req.	25' On Hand	30' Req.	30' On Hand
Lake Superior			56		14		0													
Saint Paul			29		20		20	0												
Minnesota			0		0		0													
Fargo			30		11		11	0	6		6				24	24	20	20		
Dakota			49		12												20	1		
Yellowstone			4						22	18	Special		15	15			39	39	20	0
Montana			48		15				22	10	8	4	40	40	50	15				
Rocky Mountain			56		33				2					64						
N. & I.	96	0	12		22															
Total East.Dist.	96		284	317	127	300	31		52	28	14	4	55	119	74	39	79	60	20	0
Idaho			73		33		4		8	6									17	17
Pasco			21		11		8													
Camas Prairie			155		30															
Seattle			86		3															
Puget Sound																				
Tacoma			91		153					21		10		33		72		14		16
Total West.Dist.			426	509	230	193	12		8	29		10		33		72		14	17	33
GRAND TOTAL:	96		710	826	357	493	43		60	57	14	14	55	152	74	111	79	74	37	33

9A 65

MFC

Saint Paul, March 4, 1920.

Mr. O. C. Wakefield,

General Storekeeper.

Referring to your memorandum of March third to Mr. Stevens in regard to the shipment of reinforced concrete pipe for the Camas Prairie Railroad.

This requisition should be placed on the Auburn concrete plant.

Yours truly,

MM-28

Mr.H.E.Stevens,

I have Camas Prairie RR. requisition No.3807 calling for 147 pieces 24" dia. x 8 ft. reinforced concredt pipe and 38 pieces 36" dia. x 8 ft. reinforced concrete pipe for repairs to culverts between Lewiston and Grangeville. Will you please advise if this requisition may be placed with Auburn Concrete Plant.

3/3/20

OCW

M-n

UNITED STATES RAILROAD ADMINISTRATION
Director General of Railroads
NORTHERN PACIFIC RAILROAD

9a-65

NOR. PAC. R. R. DEC 4 1919 ST. PAUL, MINN.

Re: Inventory of reinforcing material Auburn Concrete Plant

Tacoma, December 1, 1919.

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

Dear Sir:

Enclosing herewith inventory of reinforcing material on hand at the Auburn Concrete Plant, November 27th, 1919.

Yours truly
A. R. Cook
Principal Assistant Engineer

CES-R

cc to MFC

RRB

Miss W. Vile

GA 70

Statement of Reinforcing Rods

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces		Description
27	3/8" x 56'0"	Rd. Corrugated Reinforcing Rods
2	3/8 x 7'8"	Rd. Corrugated Reinforcing Rods
7	3/8" x 10'9"	" " " "
1	3/8" x 13'3"	" " " "
25	3/8" x 14'4"	" " " "
146	3/8" x 17'3"	" " " "
1149	3/8" x 56'0"	" " " "
51	1/2" x 2'0"	" " " "
336	1/2" x 3'0"	" " " "
124	1/2" x 3'3"	" " " "
9	1/2" x 3'4"	" " " "
721	1/2" x 4'0"	" " " "
17	1/2" x 5'3"	" " " "
17	1/2" x 5'6"	" " " "
79	1/2" x 6'3"	" " " "
282 234	1/2" x 6'6"	" " " "
394	1/2" x 6'9"	" " " "
43	1/2" x 7'0"	" " " "
1	1/2" x 14'6"	" " " "
241	1/2" x 15'6"	" " " "
166	1/2" x 17'6"	" " " "
72	1/2" x 27'6"	" " " "
30	1/2" x 30'4"	" " " "

Pag 2- **Statement of Reinforcing Rods**

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces		Description
80	70 10	1/2" x 30'6" Rd. Corrugated Reinforcing Rods
193	35 158	1/2" x 31'0" " " " "
21		1/2" x 33'6" " " " "
566		1/2" x 35'0" " " " "
24		5/8" x 2'0" " " " "
35		5/8" x 4'0" " " " "
53		5/8" x 5'0" " " " "
53		5/8" x 6'6" " " " "
29		5/8" x 7'6" " " " "
10		5/8" x 8'0" " " " "
18		5/8" x 9'0" " " " "
16		5/8" x 9'6" " " " "
17		5/8" x 14'6" " " " "
7		3/4" x 2'0" " " " "
10		3/4" x 2'3" " " " "
16		3/4" x 3'0" " " " "
17		3/4" x 3'6" " " " "
24		3/4" x 4'0" " " " "
60		3/4" x 4'3" " " " "
191		3/4" x 5'6" " " " "
7		3/4" x 6'9" " " " "
—		3/4" x 7'0" " " " "

9

Page -3-

Statement of Reinforcing Rods

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces	Description
42	3/4" x 7'6" Rd. Corrugated Reinforcing Rods
157	3/4" x 8'0" " " " "
1	3/4" x 9'6" " " " "
2	3/4" x 10'3" " " " "
2	3/4" x 10'9" " " " "
11	3/4" x 11'6" " " " "
11	3/4" x 12'0" " " " "
3	3/4" x 17'0" " " " "
38	3/4" x 17'6" " " " "
7	3/4" x 24'6" " " " "
20	3/4 x 27'6" " " " "
30 {24 26	3/4 x 29'6" " " " "
37	3/4 x 31'6" " " " "
106	3/4 x 35'0" " " " "
40	3/4 x 36'0" " " " "
19	3/4 x 37'0" " " " "
16	3/4 x 39'0" " " " "
1	1" x 3'6" " " " "
29	1-1/8" x 2'6" Rd. Corrugated Reinforcing Rods
14	1-1/8" x 3'0" " " " "
9	1-1/8" x 3'6" " " " "
49	1-1/8" x 4'0" " " " "
6	1-1/8" x 5'6" " " " "
35	1-1/8" x 7'0" " " " "

17

Statement of Reinforcing Rods

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces	Description
2	1-1/8" x 7'6" Rd. Corrugated Reinforcing Rods
3	1-1/8" x 9'0" " " " "
4	1-1/8" x 10'3" " " " "
31	1-1/8" x 10'6" " " " "
447	1-1/8" x 15'4" " " " "
56	1-1/8" x 19'0" " " " "
123	1-1/8" x 20'0" " " " "
771	1-1/8" x 24'4" " " " "
51	1-1/8" x 28'10" Rd. " " "
90	1-1/8" x 30'8" " " " "
140	1-1/8" x 39'8" " " " "
3	1-1/8" x 18'0" Curved for arch/Corrugated Reinforcing Rods.
14	1-1/8" x 25'0" " " " " " "
17	1-1/8" x 29'0" " " " " " "
826	1/4" x 0'20" Sq. Corrugated Reinforcing Rods
6201	1/4" x 0'23" Sq. " " "
97	1/4" x 8'0" " " " "
6	3/8" x 3'3" " " " "
12	3/8" x 5'6" " " " "
101	1/2" x 2'0" " " " "
140	1/2" x 2'8" " " " "
38	1/2" x 3'0" " " " "
62	1/2" x 4'0" " " " "
44	1/2" x 4'3" " " " "

Statement of Reinforcing Rods

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces	Description
253	1/2" x 5'0" Sq. Corrugated Reinforcing Rods
93	1/2" x 5'6" " " " "
49	1/2" x 6'6" " " " "
68	1/2" x 7'6" " " " "
94	1/2" x 8'0" " " " "
3	1/2" x 9'3" " " " "
4	1/2" x 10'0" " " " "
17	5/8" x 3'0" " " " "
47	5/8" x 3'6" " " " "
57	5/8" x 4'0" " " " "
30	5/8" x 6'6" " " " "
6	5/8" x 7'6" " " " "
79	5/8" x 10'6" " " " "
39	3/4" x 2'6" " " " "
103	3/4" x 3'0" " " " "
30	3/4" x 3'6" " " " "
12	3/4" x 4'3" " " " "
16	3/4" x 5'0" " " " "
61	3/4" x 6'0" " " " "
942 ✓	3/4" x 6'6" " " " "
3 ✓	3/4" x 7'0" " " " "
21 13	3/4" x 8'9" " " " "
41	3/4" x 9'0" " " " "
492 ✓	3/4" x 13'6" " " " "

16

ME-6. Statement of Reinforcing Rods

on hand at

Auburn Concrete Plant, November 1st, 1919.

Pieces		Description			
985	3/4" x 15'6"	Sq.	Corrugated	Reinforcing	Rods
431	3/4" x 16'6"	"	"	"	"
50	3/4" x 30'0"	"	"	"	"
50	3/4" x 31'0"	"	"	"	"
~~95~~ 93	3/4" x 4'6"	"	"	"	"
30	1" x 3'3"	"	"	"	"
16	1" x 4'10"	"	"	"	"
8	1" x 5'3"	"	"	"	"
17	1" x 6'0"	"	"	"	"
2	1" x 7'0"	"	"	"	"
4	1" x 19'0"	"	"	"	"
5	1¼" x 6'9"	"	"	"	"
1200	1/4" x 30'0"	Rd.	Plain	"	"
32	1-¼ x 6'9"	Rd.	"	"	"
30	1-¼ x 27'2"	Rd.	"	"	"
140	1¼ x 33'9"	Rd.	"	"	"

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
9a-65 M.

Telegram—Be Brief

NOV 17 1919

115 byf

Tacoma Nov 17-19 M F Clements

StPal

A 9 following Woven wire for Culvert pipes on hand at Auburn 25 rolls 48 inch 7500 lineal feet, 14 rolls 44 inch 4100 lineal feet R 29

A R Cook

Noted BRRB

237 pm

H P
TELEGRAPH OFFICE
NOV 17 PM 2 43

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed M.

Telegram—Be Brief

MFC

Saint Paul, Nov. 12, 1919

A R Cook
Tacoma, Wash.

Am estimating 1920 concrete plant requirements. How much woven wire for pipe will you have on hand at Auburn at end of 1919 plant operation? A-9

M F Clements

9a65

MFC

Saint Paul, June 12, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your note on Mr. Cook's letter of June sixth in regard to concrete pipe to be manufactured at Auburn.

Mr. Cook is correct in his statement that his list of pipe is in excess of mine. In checking over his statement originally I find that I used the estimated amount for Mr. Koren's territory only and did not include Mr. Stotler. Mr. Cook's statement is about 35 per cent in excess of mine; or, in other words, it will take until November first to complete the manufacture of pipe for the year 1920 instead of October first, as stated in my previous letter.

Mr. Cook's letter and file returned herewith.

Yours truly,

Encl.

9a-65

MFC

Saint Paul, May 24, 1919.

Mr. A. R. Cook,

Prin. Asst. Engineer,

Tacoma.

Dear Sir:-

I hand you herewith a set of prints Nos. 1816-49 to 54 inclusive, furnishing information in regard to charges on products manufactured at the Auburn concrete plant. These were made up to arrive at an average price to be charged to various products that would wipe out the capital invested in the plant itself. The summary sheet shows the total capital invested, interest on depreciated investment, gravel pit charge, depreciation, depreciated investment and a sinking fund that is established by the depreciation. Also the amount of depreciation that has been assessed against the various classes of manufactured products. This has been made up from various annual reports submitted in the past.

I am sending the prints for your information.

Yours truly,

Bridge Engineer.

Encl.

9a-65

Form 834

4-13-18 100M RP

Traingram Important

NORTHERN PACIFIC YELLOWSTONE PARK LINE

Train Service should be used in preference to the telegraph, when it is known that the train service will effect delivery at a time which will serve the Company's interests.

THIS BLANK should be passed to the Telegraph Operator at point of origin; he will place the blank in an envelope, marked Traingram, addressed to the Operator at point of destination. The Receiving Operator will give the Traingram immediate delivery to the addressee, or service it in the same manner a telegram is serviced.

St Paul 5-13-19

Mr M F Clements :

Referring to your memo. of the 2nd inst. regarding two cars 3/8" reinforcing rods for Auburn claimed shipped from Steelton Apr 25th

Would advise that Penn 276124 and 356849 were delivered Seattle division 8:30 AM May tenth BX

P H McCauley

Form 1386

NORTHERN PACIFIC

Telegram—Be Brief

Time Filed
9a-65 M.

MFC

Saint Paul, May 7, 1919

A R Cook
Tacoma Wash

E4 Penn Cars 276124 and 256849 ~~XXXXXX~~ passed Helena May sixth. Should be in Auburn ninth. A8

M F CLEMENTS

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Telegram—Be Brief

Time Filed M.

219 BY GI

Tacoma May 6 1919

M F Clements

Stpaul

Reinforcing Rods shipped from Glendive apl 28 not received Please Have traced and hurried advise E-4.

A R Cook

1030am 7th

Passed Helena May 6. should be in Auburn about 9th

Saint Paul, May 2, 1919.

Mr. A. R. Cook,

Prin. Asst. Engineer,

Tacoma, Washington.

Dear Sir:-

Referring to 3/8" reinforcing rods for Auburn.

The General Storekeeper advises that 3000 feet of 3/8" reinforcing rods were forwarded to Auburn from Glendive April 28th. These were shipped local freight. The rods for Auburn ordered on G.S.K. Requisition 4916 were also shipped April 25th from Steelton in Penn. Cars 276124 and 256849. Have asked Superintendent of Transportation to trace and hurry through to destination.

Yours truly,

Bridge Engineer.

Helena 6th

9th

Saint Paul, May 2, 1919.

Mr. P. H. McCauley,

Superintendent Transportation.

Will you please trace through to destination Penn. Cars 276124 and 356849 containing 3/8" reinforcing rods for Auburn, shipped April 25 from Steelton.

This material is urgently needed.

M. F. CLEMENTS.

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

M.

Telegram—Be Brief

NOR PAC MAY 3 1919 ST. PAUL

148 gi sr

Glendive May 2 1919 M.F.Clements

St. Paul.

A 3 in Milw. car 206357 Glendive way bill DH 125 car Carded

Billings A 22

J.S.S.

821pm

St.Paul,Minn.,April 30,1919.

L-984

Mr. F.M.Clements,

Dear Sir:

Referring to your letter April 26th in regard to reinforcing rods requisition 4916.

3,000 ft. of assorted 3/8" rods were forwarded from Glendive on April 28th. I am now advised that the rods for Auburn on above requisition were shipped from Steelton on April 25th in Penn. 276124 and 356849. Rods for Glendive were shipped on same date in N.Y.P.N. 1606 and B.& O. 146016. Those for Como were shipped on the same day in W.M 50140 and P.& L.E. 45198.

Yours truly,

O.C.Wakefield.

Per HMO

S-n

Form 1886

Telegram—Be Brief

Time Filed

M.

ERB

Saint Paul, May 1, 1919

J S Sewall
Storekeeper
Glendive, Montana

Advise car number 3/8 inch rods shipped to Auburn April 28th. A-3

M F CLEMENTS

Form 1386

UNITED STATES RAILROAD ADMINISTRATION
DIRECTOR GENERAL OF RAILROADS
NORTHERN PACIFIC RAILROAD

Time Filed
M.

Telegram—Be Brief

113 by f

Tacoma May 1-19 M F Clements

StPaul

A 1 please trace three eighths inch reinforcing rods shipped from Glendive through to Auburn R-1

A R Cook

JB

135 pm

Harrigan

Form 1386

NORTHERN PACIFIC

Telegram—Be Brief

Time Filed

M.

Saint Paul, May 1, 1919

A R Cook
Tacoma Wash

R-57 Three eighths inch rods shipped from Glendive 28th. A-1

M F CLEMENTS

Form 1336

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

M.

84 BYD **Telegram—Be Brief**

Tacoma Apl 30 1919 M F Clements

St Paul

A 19 Have three eighth inch rods been shipped as yet needed badly

R-57

A R Cook

1149 AM

Form 1386

Telegram—Be Brief

Time Filed

M.

RRB

M F Clements
Drummond, Montana

Saint Paul, April 26, 1919

Reinforcing rods for Auburn promised for shipment early next week. Have asked Wakefield to ship at once from Glendive 3000 feet 3/8 inch rods assorted lengths. A-21

R R BROCKWAY.

RRB

Saint Paul, April 26, 1919

Mr. O. C. Wakefield,

General Storekeeper.

Referring to your memorandum M-1634, reinforcing rods ordered on Requisition 4916 for Auburn.

As these rods are badly needed at Auburn, will you please arrange by wire to have Storekeeper at Glendive ship at once 3000 feet of 3/8" rods in assorted lengths to Auburn.

Yours truly,

M 1634

NOR. PAC. RY. CO.
OFFICE OF
APR 26 1919
BRIDGE
ST. PAUL

Mr. M. F. Clements:-

Referring to my memo of April 15th and conversation in regard to reinforcing rods reqn. 4916. The Corrugated Bar Co. advise that they have been making every effort to get these rods shipped but so far have ben unsuccessful. They, however, state positively that shipment will go forward early next week. I will let you know later if this is done.

O. C. W.

4-26-19

S-b

M1634

Form 1386

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

NORTHERN PACIFIC RAILROAD

Telegram—Be Brief

Time Filed M.

MFC

A R Cook
Tacoma Wash

Saint Paul, April 24, 1919

R-44 Reinforcing rods on General Storekeeper's requisition 4916 have not been shipped. Being rolled at New Duluth. Steel Company promised shipment last week. If rods are not shipped within two days will arrange with General Storekeeper to load rods from stock at Glendive. A-19

M F CLEMENTS

arrange w Clements [illegible]

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

M.

Telegram—Be Brief

APR 24 1919

163 byf

Tacoma April 24-19 M F Clements

StPaul

A 7 reinforcing rods on General storekeepers requisition 4916 not received as yet have traced and hurried todestination R 44

A R Cook

228 pm

Wakefield

Form 1386

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

NORTHERN PACIFIC RAILROAD

96-65

Time Filed

M.

Telegram—Be Brief

MFC

Saint Paul, April 16, 1919

A R Cook
Tacoma Wash

Reinforcing rods on General Storekeeper's requisition 4916 will go forward from Duluth this week. A-7

M F CLEMENTS.

M-916

NOR. PAC. RY. CO.
APR 16 1919

Mr.M.F.Clements,

Referring to your letter April 8th. Balance Reinforcing rods requisition 4916 will go forward from Duluth this week. Will advise later when done.

4/15/19 O.C.W.

S-n

MFC

Saint Paul, April 11, 1919.

Mr. A. R. Cook,

Prin. Asst. Engineer,

Tacoma, Washington.

Dear Sir:-

Referring to your letter of April 8 in regard to reinforcing rods to be furnished on General Storekeeper's Requisition 4916.

I have asked the Storekeeper to hurry the delivery of these rods and in case there is any delay in making shipment from the mills we can ship sufficient 3/8" rods from Glendive to keep the Auburn plant going.

Will you kindly keep me informed as to the stock of 3/8" rods so that I may arrange for shipment from Glendive if it is found necessary.

Yours truly,

Bridge Engineer.

Re General Storekeeper
requisition 4916

Tacoma, Washington, April 8th, 1919.

Mr. N. F. Clements,
Bridge Engineer,
St Paul, Minnesota.

Dear Sir:-

Referring to your letter of November 7th, 1918, furnishing me with copy of that portion of the General Storekeeper's requisition #4916, covering rods for the Auburn Concrete Plant, to use in the manufacture of reinforced concrete products. We have received the first six items covering the 1-1/8" rods and ~~the two~~ items of annealed steel wire; also 5700 pieces of plates 2¼"x1/8" 1' 3-3/4", to apply on last item of requisition .

Will you please arrange to have the balance of this requisition hurried all possible, as we are especially in need of the 3/8" round for use in the manufacture of the concrete pipe.

Yours truly,

A. R. Cook

W-e

Principal Assistant Engineer.

MFC

Saint Paul, April 8, 1919.

Mr. O. C. Wakefield,

General Storekeeper.

Your requisition 4916 made May 10, 1918 covering reinforcing rods for Como, Glendive and Auburn, has not been completely filled. I understand that the 1-1/8" rods furnished by the Great Northern, the annealed wire and the wire cloth furnished by the American Steel & Wire Company, have been received.

When may we expect shipment of the remaining reinforcing rods?

Yours truly,

MFC

Saint Paul, April 8, 1919.

Mr. H. E. Stevens,

Chief Engineer.

I hand you herewith a copy of that portion of Mr. Wakefield's Requisition 4916, dated May 10, 1918, covering reinforcing material to be shipped to the Auburn concrete plant.

The 1-1/8" rods were rolled by the Great Northern Railroad and were shipped in September. The annealed wire and wire cloth furnished by the American Steel & Wire Co., have been furnished. The reinforcing rods to be rolled from new billets were to be delivered February first but have not been received to date. I have asked Mr. Wakefield to give me the date of shipment.

Mr. Wakefield's requisition covers all the requirements for 1919 and Mr. Cook's Requisition 72 should be cancelled.

Yours truly,

Encl.

MFC

Saint Paul, May 14, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of May tenth in regard to the manufacture of pipe at the Auburn plant in 1919.

November 19, 1918 I furnished you with a list of pipe, showing the requirements for 1919 and an estimated amount for 1920. Mr. Cook's statement of April 30 has been prepared to show the amount of pipe, piles and slabs to be manufactured in 1919 to take care of the two years, 1919 and 1920. He states that the requirements for 1920 were furnished by the District Engineer and, as I understand it, are very rough estimates.

In preparing my statement I considered the 1920 requirements would be equal to those of 1919, which is 50 per cent greater than the estimate prepared by the District Engineer. All of the concrete products on Mr. Cook's list can be completed by September first. The pipe on my estimate can be completed by October first. The stock of reinforcing material is sufficient to work the plant the entire year, or at least until the first of December and I think it would be advisable, as long as the plant is in operation, to continue work until December first, so that it would not be necessary to rig up in 1920, as sufficient pipe would be on hand for that year and a start for the next year.

File is returned herewith.

Yours truly,

Encl.

NOR. PAC. RY.
OFFICE OF
MAY
12
1919
BRIDGE ENGINEER
ST. PAUL, MINN.

Saint Paul, May 10th, 1919.

Mr. M. F. Clements,

Bridge Engineer.

Herewith Mr. Cook's letter of the 1st and statement of proposed requirements for reinforced concrete pipe, piles and slabs for the years 1919 and 1920.

Will you please check this up against the statement you prepared and then advise me amount of material you recommend manufacturing at the Auburn Plant this season.

Also say if any additional steel or other material should be requisitioned.

HES-O
encl

MEMO OF CONCRETE SLABS AND PILES FOR 1919
WORK SHOWN ON FORM 134

Tacoma Division	Reqd. Concrete Piles	Shipped 1918 Concrete Piles	Surplus Concrete Piles
Bridge 105-1	40/20'	43/20'	3/20'
Bridge 84	60/25'	66/25'	6/25'
Bridge 81	53/30'	66/30'	13/30'

Pasco Division

Paha Bridge 76 1 Span concrete trestle 16'. 1917 work. Compt. #796 (17) ED 57 (17) Reqd. 2 pcs. single slabs. Reqn. 566 7Ø12Ø17 Shipped 9/18/17

Satus Br. 60 10 Span concrete trestle 1917 work. Compt. #2344 (17) ED 80 (17) 10 span single slabs. Reqn. 628 8/4/17 shipped 1917

Thrall Br. 123-2 1 Span concrete trestle 16' 1918 work Fed. Aud. #2469 (18) ED 67 (18) 2 pcs. single slab. Reqn. 671 9/11/18 shipped 11/13/18 and 1/14/18

Idaho Division

Richards Br. 50 W. approach 2 span concrete trestle 1040 D.P.G. 1918 work. Fed. Aud. #2172 (18) ED 84 (18). 4 pcs. single slabs 33 pcs. 30' concrete piles Reqn. 233 4/5/19
" 5 50 E. Appreach 22 concrete piles 30' long Ed 32-19 A F E not yet approved

Trout Creek Br. 55 E & W approach concrete trestle 1918 work ED 31 (19) not yet approved 420 lin. ft. concrete piles 14/30 x 4 single slabs.

STATEMENT OF ESTIMATED OUTPUT OF AUBURN CONCRETE PLANT FOR 1919

	24" Pipe 8' Lengths	36" Pipe 8' Lengths	15' Piles No. Pieces	20' Piles No. Pieces	25' Piles No. Pieces	30' Piles No. Pieces	Single Slabs No. Pieces	Double Slabs No. Pieces
Requirements for 1919 as per Form 134	472	144	0	0	0	69	8	0
Estimated requirements 1920 Pasco Idaho and Camas Prairie RR Divns.	200	60	0	65	0	30	64	0
Estimated requirements 1920 Seattle, Tacoma, Puget Sound Divns.	300	125	0	20	20	20	12	6
Total requirements 1919 and 1920	972	329	0	85	20	119	84	6
On hand Ellensburg D.S.K. Stock			24					
On hand 12/28/18 Auburn	212	188	47	10	2	35	29	10
Surplus at Br. 81, 84 and 105.1				3	6	13		
Sold to Govt. 1919 for work at American Lake		25						
Bal. available	212	163	71	13	8	48	29	10
To be made at Auburn during 1919 to cover 1919 and 1920 requirements	760	166	None	72	12	71	55	
Surplus in excess of 1919 and 192- requirements			71					10

Office of Principal Assistant Engineer
Tacoma, Washington.
April 30th, 1919.

STATEMENT OF ESTIMATED OUTPUT OF AUBURN CONCRETE PLANT FOR 1919

MATERIAL REQUIRED

REINFORCING BARS

Estimated 1919 output for Auburn Concrete Plant	Cement pr. Unit	Cement Total	Mesh pr. Unit	Mesh Total	#16 Wire pr. Unit	#16 Wire Total	1/4" pr. Unit	1/4" Total	3/8" pr. Unit	3/8" Total	1-1/8" pr. Unit	1-1/8" Total	3/4" pr. Unit	3/4" Total	1/2" pr. Unit	1/2" Total	1-1/4" pr. Unit	1-1/4" Total	Plates 21/8x1/8x1'3¾" pr. Unit	Plates Total	#11 Wire pr. Unit	#11 Wire Total	#12 Wire	500 sq.ft. per roll Malthine Paper pr. Unit	Malthine Paper Total
	#		sq.ft.	sq.ft.	#	#																			
760 pcs. 24" pipe	550#	418000	66 2/3	50666	.5	380	1.33#	1011	30#	22800															
166 pcs. 36" "	800#	131200	89 1/3	14651	.54	88	1.33#	218	43.62	7154															
71 pcs. 30' piles	800#	56800					20.26#	1438			390.1	27697							26	1846	1.16#	82			
12 pcs. 25' piles	666#	7992					17.37#	208			329.21	3950							22	264	1.16#	14			
72 pcs. 20' Piles	544#	39168					14.47#	1042			268.33	19320							18	1296	1.16#	84			
55Single Slabs	5000#	275000			3.58#								784.06	43123	260.44	14324	56.54	3110						153 sq.ft.	8415
Required for 1919 operation		928160#		65317 sq. ft.		468#		3917		29954		50967		43123		14324		3110		3406		180			8415
On hand Auburn 1/4/19		144300#		111900 sq. ft.		625#		3000		4630		58361		29822		8140				4570		150#	400#		401/2 rolls
Rods recd. on GSK 4916 on hand at Auburn 1/1/19 as per inventory		approx. weight										116057													
Rods for May delivery 1919 on GSK 4916		"	"					8016		44000				66293		24206		19717							
Reqn. #ARC 95 for Cement		2 cars																							
Recd. from Am.Brd.Co. PAE-T80 on GSK 4916																				5700					

Office of Principal Assistant Engineer
Tacoma, Washington,
April 30th, 1919.

9a-65

MFC

Saint Paul, May 7, 1919.

Mr. A. R. Cook,

Prin. Asst. Engineer,

Tacoma, Washington.

Dear Sir:-

Referring to your letter of April 29th to Mr. Stevens in regard to a negative of the plan for 48" re-inforced concrete culvert pipe which is now being made at Auburn.

The original plans furnished this company were negatives made by the C. B. & Q. Railroad. I am sending you a positive brown line print made from this negative and two blue line prints made from the original negative.

Yours truly,

Bridge Engineer.

Encl.

Re: Plan of 48" reinforced
concrete culvert pipe which
is being made at Auburn

Tacoma, Wn., April 29, 1919

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

Dear Sir:

If you have plan of the 48" reinforced concrete culvert pipe which is being made at Auburn, will you kindly send negative for use here?

Yours truly

A. R. Cook

Principal Assistant Engineer

W-R

Mr Clements - Can you furnish
HES 5/2

MFC

Saint Paul, March 31, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to our conversation in regard to charges at the Glendive and Auburn concrete plants.

On January 23 you wrote me requesting that I check over the entire matter and let you have recommendations for an arbitrary price for concrete pipe to be billed out in 1919 from both Auburn and Glendive plants. The subsequent correspondence attached to the file gives the details of how these prices have been fixed.

As I stated in my letter of March 4, the Glendive plant will not operate in 1919 and the material manufactured in 1918 has been charged to the store, the price being already fixed. After analyzing the past performance and assuming the cost of additional materials over those now on hand at Auburn, I think the pricesgiven in my letter of March 4 are reasonable. The following prices can be used at Auburn in charging out material for 1919:

24" Concrete pipe	$ 1.65 per lin.ft.
36" " "	2.20 " "
48" " "	3.84 " "
Piles all lengths	1.55 " "
Slabs 6½ x 16	125.00 per slab
" 7 x 16	135.00 " "

File of papers returned herewith.

Yours truly.

Encl.

9a-65

MFC

Saint Paul, March 25, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to Mr. Cook's pink message in regard to price on 36" reinforced concrete pipe to be sold to the United States Government at the Auburn plant.

My estimate for the price to be used in charging out 36" concrete pipe from Auburn in 1919 is $2.20. Using this as a basis, the price to be charged on cars at the Auburn concrete plant to the government is as follows:

Cost of manufacture	$2.20
Interest on plant investment	.13
Value of gravel in the pit	.21
Freight on materials to the plant	.26
	$2.80

This does not include any profit to the Northern Pacific for the manufacture of the pipe.

Yours truly,

Encl.

MFC

Saint Paul, March 4, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of February 27 in regard to an advance price on reinforced concrete products at the Auburn and Glendive concrete plants.

In the past, interest on investment has not been charged to the plant or products shipped away, except in the case of materials being used in joint territory. On that basis of accounting the investment at the plants is as follows:

<u>Glendive Plant</u>

First Cost and Additions	$27,916.00
Depreciation Deducted	24,720.00
Investment not charged off	3,196.00
Credit Value(approximate estimate)	6,000.00
Net Investment to be charged off	None

<u>Auburn Plant</u>

First Cost and Additions	16,955.00
Depreciation Deducted	13,773.00
Investment not charged off	3,182.00
Credit Value(approximate estimate)	2,000.00
Net Investment to be charged off	1,182.00

A & B will be retired in 1919 or six years.

If interest at six per cent be charged on the reduced investment each year the statement would be as follows:

<u>Glendive Plant</u>

First Cost and Additions	$27916.00
Total Interest to date	10248.00
Depreciation Deducted	24720.00
Investment not charged off	13444.00
Credit Value(approximate estimate)	6000.00
Net Investment to be charged off	7444.00

A & B retired in 1923 or 13 years.

Auburn Plant

First Cost and Additions	$16,955.00
Total Interest to date	4,228.00
Depreciation Deducted	13,773.00
Investment not charged off	7,410.00
Credit Value(Approximate estimate)	2,000.00
Net Investment to be charged off	5,410.00
A & B retired in 1922 or nine years.	

The price to be fixed for various products depends upon a fixed plant charge and to arrive at such a figure for Glendive I must first have a decision in regard to the interest charge.

Glendive plant will not operate in 1919 so that we have only to consider the Auburn plant for this season.

On the basis of past operation, the amount to be charged to cover repairs and depreciation on investment is as follows:

24" Pipe	$ .20	per	lin.	ft.
36" "	.25	"	"	"
48" "	.35	"	"	"
Piles all lengths	.18	"	"	"
Slabs 6½'x16'	16.00	"	slab	
Slabs 7 x16	18.00	"	"	

Reinforcing rods on hand at Auburn for 1919 will make 7200 lineal feet of 24" pipe and 3680 lineal feet of 36" pipe.

7200 @ 20¢	$1440.00
3680 @ 25¢	920.00
	2360.00
Estimated repairs	700.00
Amount available for charging off investment	1660.00
Amount of investment, (without interest)	1182.00
Amount of investment, (with interest)	5410.00

The prices given in my letter of January 30 are reasonable and should be used in 1919.

24" Concrete pipe	1.60	$1.65	per lin.ft.	
36" " "	2.10	2.20	"	"
48" " "		3.84	"	"
Piles all lengths		1.55	"	"
Slabs 6½ x 16		125.00	"	Slab
" 7 x 16		135.00	"	"

The Glendive stock has been charged to the store and will carry the book charges to individual bridges.

Yours truly,

Bridge Engineer.

H.E.S.

[illegible]ferring to your letter of Feb 27 in regard to an advance price on reinforced concrete products at the Auburn and Glendive concrete Plants

In the past interest on investment has not been charged to the plant or products shipped away except in the case materials being used in joint territory. On that basis of accounting the investment at the plants are as follows:-

<u>Glendive Plant</u>

First Cost and Additions	#27916.00
Depreciation deducted	24720.00
Investment not charged off.	3196.00
Credit value (approximate estimate)	6000.00
Net investment to be charged off	none.

<u>Auburn Plant</u>

First Cost and Additions	#16955.00
Depreciation deducted	13773.00
Investment not charged off	3182.00
Credit value (approximate estimate)	2000.00
Net investment to be charged off	1182.00

A+B will be retired in 1919 or six years

If interest at 6% be charged on the reduced investment each year the statement would be as follows:-

<u>Glendive Plant</u>

First Cost and Additions	27916.00
Total interest to date	10248.00
Depreciation deducted	24720.00
Investment not charged off	13444.00
Credit value (approximate estimate)	6000.00
Net investment to be charged off	7444.00

A+B retired in 1923 or 13 years.

<u>Auburn Plant</u>

First cost and Additions	16955.00
Total interest to date	4228.00
Depreciation deducted	13773.00
Investment not charged off.	7410.00
Credit value (approximate estimate)	2000.00
Net investment to be charged off	5410.00

A+B retired in 1922 or nine years.

The price to be fixed for various products depends upon a fixed plant charge and to arrive at such a figure for glendive I must first have a decision in regard to the interest charge.

Glendive Plant will not operate in 1919 so that we have only to consider the Auburn Plant for this season.

On the basis of past operation the amount to be charged to cover repairs and depreciation on investment is as follows

24" pipe	.20	per lin ft
36" "	.25	" "
48" "	.35	" "
Piles all lengths	.18	" "
Slabs 6½'x16'	16.00	" slab
" 7x16	18.00	" "

Reinforcing rods on hand at Auburn for 1919 will make 7200 lin ft of 24" pipe and 3680 lin ft of 36" pipe

7200 @ .20 =	1440
3680 @ .25 =	920
	2360
Estimated repairs =	700
Amount available for charging off investment	1660
Amount of investment (without interest)	1182
Amount of investment (with interest)	5410

The prices given in my letter of Jan 30th are reasonable and should be used in 1919.

24" Concrete pipe	1.65	per lin ft.
36" " "	2.20	" " "
48" " "	3.84	" " "
Piles all lengths	1.55	" " "
Slabs 6½x16	125.00	per slab
Slabs 7x16	135.00	" "

The Glendare stocks has been charged to the store and will carry the book charges to individual bridges

JMcC

3.10
.52

(Sheet #1)

Tacoma, Wash., January 31, 1919.

Report on Auburn Concrete Plant for 1918.

SUMMARY OF INVESTMENT ACCOUNT FOR 1918

Investment Acct. at end of season 1917 Dec. 31-1917		$8490.13
Labor and material for repairs and renewals charged to investment acct. during 1918. For details see sheets 15-16-17		873.30
		9363.43
Depreciation on manufactured product on hand 1/1/16	787.67	
Deduct depreciation on manufactured product sold during 1918 and charged to investments	591.45	
	196.22	
Depreciation at close of season 1918	6807.62	
Total Investment -	-	9363.43
Total depreciation for 1918	7003.84	7003.84
Balance in investment account 12/31/1918	-	2359.59

STATEMENT OF COST OF OPERATING AUBURN CONCRETE PLANT FOR 1918

Charges

Supplies and material on hand 1/1/18		5766.28
Manufactured product on hand 1/1/18		3580.28
Cost of Labor and Material for 1918		26784.41
Royalty on pipe .6512 lin ft 24" @ .05	325.60	
3200 " " 36" @ .05	160.00	485.60
Total Charge -	-	36616.57

Credits

Manufactured product shipped away during 1918 and charged out on books See sheet #3 for detail	19650.47	
Manufactured product on hand Dec. 31, 1918. See sheet #4 for detail	14978.76	
Empty cement sacks on which adjustment not yet made. See sheet #4	248.20	
Inventory of material and supplies on hand 12/31/1918. See sheets 5 and 6	8742.98	
Total Credits	43620.41	
Depreciation charged to Investment .2883032 of $24293.31 (cost of 1918 operation)		7003.84
	43620.41	43620.41

CREDITS TO AUBURN CONCRETE PLANT

Manufactured Product shipped away during year and billed out on books.

					Credit to Operation	Eredit to In.	Total Credit.
Pipe							
24"	668 pcs.	5344	lin ft.		8463.74	161.32	8625.06
36"	244 "	1952	"	"	3975.35	90.14	4065.49
48"	2 "	16	"	"	55.00	5.34	60.34
Piles							
30'	0 pcs.	0	lin ft.				
25'	66 "	1650	"	"	2475.00		2475.00
20'	63 "	1260	"	"	2016.00		2016.00
15'	9 "	135	"	"	118.17	24.99	143.16
Slabs							
Single	22 pcs.				2547.21	309.66	2856.87
Double	0 "						
					19650.47	591.45	20241.92

(Sheet #4)

Manufactured Product on hand Dec. 31, 1918

Pipe									
24"	212	pcs.	1696	lin ft	@ 1.60	2713.60		
36"	188	"	1504	"	" @ 2.10	3158.40		
48"	8	"	64	"	" @ 3.84	245.76	6117.76	
Piles								
30'	35	"	1050	"	" @ 1.55	1627.50		
25'	2	"	50	"	" @ 1.50	75.00		
20'	10	"	200	"	" @ 1.60	320.00		
15'	47	"	705	"	" @ 1.60	1128.00		
10'	42	"	420	"	" @ 1.20	504.00	3654.00	
Slabs								
Single	29				@ 135.00	3915.00		
Double	10				@ 125.00	1250.00	5165.00	14978.76

1241 empty cement sacks on which adjustment not yet made @ 20¢ per sk.	248.20	248.20

(Sheet #5)

STATEMENT OF COST OF AUBURN CONCRETE PLANT FOR 1918

Inventory of Material and Supplies on hand 12/31/1918.

Reinforcing rods	Length	Lin.ft.	Unit. wt. per foot.	Weight lbs.		
880 pcs ¾" sq.	6'-6"	5720				
120 " " "	13'-6"	1620				
237 " " "	15'-6"	3673.5				
97 " " "	16'-6"	1600.5				
28 " " "	17'-6"	490				
71 " " "	35'	2485				
		15589	1.913#	29822#	3.473 cwt	1035.72
138 " ½" "	35'	4830				
17 " " "	30'-6"	518'-6"				
86 " " "	27'-6"	2365				
259 " " "	6'-6"	1683-6"				
61 " " "	17'-6"	1067-6"				
123 " " "	3'-3"	399'-9"				
321 " " "	4'	1284				
		12148-3"	0.67#	8140#	3.617 cwt	294.42
907 " 3/8 "	7'-10"	7105				
128 " " "	13'-4 "	1706-8"				
203 " " "	10'-8 "	2165-4"				
6 " " "	17'-3 "	103-6"				
634 " " "	2'	1268'				
		12348-6"	0.375#	4630#	3.95 cwt	188.82
32 " 1¼" rd	6'-9"	216				
33 " " "	27'-2"	896-6"				
		1112.6"	4.173#	4642#	4.45 cwt	206.57
285 " 1 1/8 sq.	15'-4"	4370				
119 " " "	19'	2261				
168 " " "	20'	3360				
299 " " "	24'-4"	7275-8"				
		17266.8"	3.38 #	58361#	3.473 "	2026.88
14 " 5/8" rd	8'-2"	144-4"	1.04 #	119#	3.473 "	4.1
¼ " rd				3000#	2.346 "	70.3
4570# 2 1/8# x 1/8"x1'-3¼" plates for piling				5758#	2.703C pcs	123.5

Reinforcing rods recd on GSK 4916 for which no invoice has been recd and which are not yet charged out.

175 pcs,	1 1/8" rd	15'-4"	
485 "	1 1/8" "	24'-4"	
200 "	" " "	28'-10"	no charge -
90 "	" " "	30'-8"	
143 "	" " "	39'-8"	
285 "	" "	19'-10"	

3950.4

(Sheet #6)

		Brot forward	3950.45
Scrap reinforcing rods.			
80 pcs ¾" sq 7'6"	600		
31 " " " 5'6"	170.5		
	770.5 1.913# 1474#	$10.00 ton	7.37
12600 lin ft 44" wide Style 153 Mesh	42 rolls 46200 sq ft)		
16425 " " 48" " " " "	54½ " 65700 " ")		
	111900 " " @		
.03108 per sq. foot	-	- -	3477.85
1443 sks Olympic Cement	2.5957 per bbl.		936.40
625 # No 16 Annealed Wire	4.32 " 100#		27.00
400 # No 12 " "	3.98 " "		15.92
150 # No 11 " "	4.58 " "		6.87
10# 6-d Nails)			
15# 8-d ")			
90# 20-d ")			
20# 60-D ")	135# @ 4.17 per C #		5.63
4½ rolls of Mathine paper @ 1.40			6.30
20# Gear grease		.0656#	1.31
3# Canvas packing 3/8")			
2# Piston " ½ ")			
3# " " 3/4")			
5# 1/16" Rainbow Packing) 13#		.30	3.90
3# Lamp Black		.11	.33
80 Tons Roslyn Coal	@	2.90	232.00
114 Pcs. 4"x4" - 20' 3040 ft BM	@	20.00	60.80
50 Gal Car Oil	@	.2114 Gal.	10.57
3 " Coal Oil	@	.095 "	.28
Total value of material and supplies on hand 12/31/1918			8742.98

(Sheet #7)

SUMMARY OPERATION FOR 1918

PIPE

	24"	36"	Slabs	Piles	Total
Cement	2418.86	1728.91	1261.03	589.45	5998.25
Mesh	1503.30	1109.30			2612.60
Bars	1052.27	523.71	1618.27	1528.53	4722.78
Wire	34.89	15.69	8.89	10.93	70.40
Royalty	325.60	160.00			485.60
Labor	2195.16	1386.36	955.50	1318.83	5885.85
Sand and Gravel	528.30	389.42	378.70	176.91	1473.33
Mathine Paper			18.58		18.58
	8058.38	5313.39	4240.97	3624.65	21237.39
General	1071.41	760.30	940.55	283.66	3055.92
	9129.79	6073.69	5181.52	3908.31	24293.31

General expense includes cost of coal, oil, form lumber, time of plant superintendent, doing clerical work, cost of pumping water, handling coal and cinders and other general items that cannot be charged directly to each product. Cost of general items is prorated on basis of weight of product manufactured during 1918.

(Sheet #8)

Operation Cost Per Lin Ft 24" Pipe compared with cost for 1916 and 1917.

Product for 1918 - 814 pcs. 6512 lin ft.

	1918	1917	1916
Cement	.371	.300	.280
Sand and Gravel	.081	.064	
Mesh	.231	.223	.219
Bars	.161	.115	.097
# 16 Wire	.005	.004	.004
Labor	.337	.199	.192
Royalty	.050	.050	.050
General	.165	.127	.242
	1.401	1.082	1.084
Depreciation	.404	.238	.180
	1.805	1.320	1.264

Sold in 1918 for $1.60

~~1.40~~
~~.199~~
~~1.60~~
~~.0145~~
~~1.6145~~

Put charge

(SHEET #9)

Operation Cost per lin. ft. 36" pipe compared with cost for 1916 and 1917.

Product for 1918 - 400 pcs. 3200 lin. ft.

	1918	1917	1916
Cement	.540	.436	.409
Sand and Gravel	.122	.096	
Mesh	.347	.299	.295
Reinforcing Bars	.164	.162	.140
Annealed Wire	.005	.005	.004
Labor	.433	.230	.227
Royalty	.050	.050	.050
General	.238	.169	.322
	1.899	1.447	1.447
Depreciation	.548	.318	.240
	2.447	1.765	1.687

Sold in 1918 for 2.10

1.899
.201
2.100
Pit charge .0207
2.1207

(Sheet #10)

OPERATION COST PER LINEAL FOOT FOR PILES

Product	30'	25'	20'	15'
Pcs.	35	45	73	27
Feet	1050'	1125	1460	405

[illegible]	30' 1918	30' 1917	25' 1918	25' 1917	20' 1918	20' 1917	15' 1918	15' 1917
Cement	.144	.116	.144	.116	.149	.118	.144	.116
Sand and Gravel	.043	.034	.044	.035	.044	.035	.043	.034
Annealed Wire	.003	.0005	.003	.003	.003	.004	.004	.006
Labor	.233	.237	.324	.189	.372	.238	.413	.259
Reinforcing Rods	.373	.304	.377	.311	.384	.320	.375	.328
General	.071	.092	.068	.087	.070	.095	.076	.090
	.867	.784	.960	.741	1.022	.809	1.055	.841
Depreciation	.250	.172	.277	.163	.295	.178	.304	.185
	1.117	.956	1.237	.904	1.317	.987	1.359	1.026

Av cost .967

155

(Sheet #11)

OPERATION COST OF PILES FOR 1918

Exclusive of Depreciation.

	30' 35 pcs 1050 lin ft	25' 45 pcs 1125 lin ft	20' 73 pcs 1460 lin ft	15' 27 pcs 405 lin ft
Cement	151.28	162.08	217.74	58.35
Sand and Gravel	45.43	49.27	64.69	17.52
Annealed Wire	2.14	2.72	4.45	1.62
Labor	244.13	363.99	542.87	167.84
Reinforcing Bars	391.54	423.82	561.13	152.04
General	74.79	76.64	101.64	30.59
	909.31	1078.52	1492.52	427.96

(Sheet #12)

OPERATION COST PER SLAB COMPARED WITH 1917

Product for 1918 Single 37 pcs. Double 11 pcs.

	Single 1918	Single 1917	Double 1917	Double 1918
Cement	27.014	21.803	23.773	19.176
Sand and Gravel	8.113	6.402	7.139	5.634
Annealed Wire	.136	.265	.181	.256
Malthine Paper	.387	.553	.387	.553
Labor	19810	13.719	20.232	13.797
Reinforcing Bars	34.477	46.024	31.147	38.948
General	19.924	11.772	18.487	10.393
	109.911	100.538	101.346	887.757
Depreciation	316.87	211.118	29.218	19.527
	141. 598	122.656	130.564	108.284

109.911
25.689
135.600

Pit charge — ~~1.537~~
~~136.137~~

101.346
23.654
125.000
~~1.155~~
~~126.155~~

(Sheet #13)

TOTAL MATERIAL USED IN MANUFACTURED PRODUCT FOR 1918

AND AVERAGE UNIT COSTS FOR SAME

	Amt. used during 1918	Average price for 1918	Average price for 1917
Sand and Gravel	2028 cu yds	.73 pr cu yd	0.576 per c.y.
Cement	11102 sacks	.540 " sk	0.43 " sk.
Mesh	31682 sq. ft.	.032 " sq ft	0.0272 "sq ft.
Reinforcing Bars for pipe	38736 #	.0407"#	
Reinforcing " " piles	59656 #	.0256"#	.03252 pr #
Reinforcing " " slabs	49723 #	.0326"#	
Wire for pipe	967#	.0523"#	.0441 " #
" " piles	208#	" "	-
" " slabs	170#	" "	"
Malthine Paper 11.2 rolls	5600 sq.ft	.00331 pr sq ft .010 " lin "	.0108 pr lin ft

PRODUCTS MANUFACTURED AND ON HAND

	Pipe			Piles					Slabs	
	24"	36"	48"	30'	25'	20'	15'	10'	Sin.	Dou
On hand from last season	60	32	10	0	23	0	29	42	14	0
Total 1918 Product	814	400	-	35	45	73	27	0	37	11
Total shipped 1918	668	244	2	0	66	63	9	0	22	0
Broken and unfit for use										1
Surplus on hand	212	188	8	35	2	10	47	42	29	10
Unfilled orders on hand	0	0	0	0	0	0	0	0	0	0

COMPARISON OF LABOR COSTS FOR 1917 AND 1918

SEPTEMBER PAYROLL 1918

		Time	Rate	Amount
Plant Supt.	1 mo	1 mo	160.00	160.00
Engineer		208 hrs 26 days	5.27	137.02
2 Steel men		376 hrs 47 "	5.00	235.00
Form men		192 hrs 24 "	4.75	114.00
Pump man		240 hrs 30 "	4.50	135.00
6 Concrete moulders		1036 hrs 129½ "	4.50	582.75
Total Amount of September Payroll			-	1363.77

Same time computed on basis of wages paid during
last half of 1917.

		Time	Rate	Amount
Plant Supt.	1 mo	1 mo	121.00	121.00
Engineer		208 hrs 26 days	4.125	107.25
2 Steel Men		376 " 47 "	3.575	168.02
Form Man		192 " 24 "	3.575	85.80
Pump Man		240 " 30 "	3.30	99.00
6 Concrete Moulders		1036 " 129½ "	3.025	391.74
				972.81
Increase for 1918 over 1917				390.96

40.2%

AUBURN CONCRETE PLANT

Statement of Items for Repairs and Renewals charged to Investment.

<u>Material</u>

Spur gears		24.37
Foreign frt. chgs. on same.		.39
Grindstone		3.91
3/4" water hose 100 ft.		32.77
For adjustment on pipe billed but not shipped		37.39
½ doz. white wash brushes		5.54
2-3/4" hoze nozzle and 2 pails		2.58
1 chain, hook, 2 trowels		5.50
2-#210 mortar mixers		1.85
1 pc. smoke stack screen	10.13	
12-12" hacksaw blades	.76	
½ doz. 12" flat files	1.29	
Belt lacing	.07	
3 padlocks	.99	
1-12" monkey wrench	.88	
3-1" Ells	.26	
3-1" Tees	.24	
½ doz. 1" couplings	.43	
1/2 " ½" "	.23	
3-½" Ells	.17	
3-½" Tees	.24	
912 ft. lumber	17.33	
	33.02	
Store expense	3.30	36.32
Repairs on steam pump		40.82
Drayage		2.00
Jaws for bolt clippers		3.46
300 lin.ft. 3/4" wire cable		67.03
5# rainbow packing 1/16"	1.50	
320 ft. BM 1" Lumber	6.40	
10 sheet metal screens 1/16"x12'-4"	18.14	
20 lin.ft. 1½" black pipe	2.37	
30 " " 1" " "	1.65	
2 sledge handles	.25	
2 shovels	1.35	
	31.66	
Store Expense	3.16	34.82
		287.65

	Brought Forward	849.48
September	Repair water pipe line	10.63
	" engine	6.60
	" pump	5.27
October	" engine	1.32
Nov. & Dec.	No charges.	
	Total charges for repairs) and renewals during 1918)	$ 873.30

(Sheet #17)

Brought Forward		$ 287.65
6 sheets #22 black iron	7.04	
12-12" Hacksaw blades	.76	
	7.80	
	.78	8.58
Drayage		2.00
10 pcs. sheet metal screen	17.12	
640 ft. BM Lumber	13.74	
2 doz. 3/4" bolts-3½" long	.45	
4 " 3/4" hex.nuts.	1.00	
	32.31	
Store expense	3.23	35.54
24 pcs. sheet iron 1/8"x 2'x8' } 1920# AS&MA 3269		166.85
6 kegs spikes	22.56	
Labor of boiler maker	3.42	25.98
Labor opr.Dept.loading ties		14.88

Labor Charges from Payroll

April	Repairs screens	62.35
	Repair 24" template	5.40
	" 36" "	5.40
	" water pipe line	21.82
	" toilet	4.75
	" mixer	17.95
	" bunker	9.26
	" slab forms	3.30
May	" pile storage ground	29.83
	" screens	19.40
	" steam line to mixer	3.45
	" engine	5.70
	" pump	3.80
	" mixer engine	.85
June	" Water pipe line	1.70
	" screens	7.95
	" grindstone stand	1.70
	" slab forms	3.30
	" pump	0.96
	" engine	2.86
	" bunkers	1.70
July	" screens	20.51
	" engine	3.33
	" " (back pay)	.16
	" pump	4.77
	" bunkers	1.70
	" pile platform	2.45
August	" engine	3.29
	" pump	1.33
	" concrete bucket	8.79
	sharpening tools	1.98
September	Repair screens	46.27
	" water pipe line	
		849.48
	Forward	[illegible]

Cost of manufacturing pipe, piles and slabs considerably increased over cost in previous years on account of general increase in cost of both labor and material.

No 48" pipe was made during 1918, and forms for 48" pipe are practically worn out and useless.

Chargesto investment 873.30 consist of ordinary repairs and renewals, 300 ft of ¼" wire cable, 100 ft. of ¾" water hose and a few tools and miscellaneous items as per list attached.

Plant as a whole is in a fair state of repair.

Form 1386

UNITED STATES RAILROAD ADMINISTRATION

DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILROAD

Time Filed

M.

Telegram—Be Brief

NOR. PAC. OFFICE BRIDGE ENGINEER ST. PAUL, MINN. MAR 10 1919

132 byf

Tacoma Mch 8-19 M F Clements

StPaul

A 6 Inventory Auburn Concrete plant . Sheet five rods as listed are correct most of the square rods are deformed bars

E-67

A R Cook

233 pm

Form 1386

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

NORTHERN PACIFIC RAILROAD

Telegram—Be Brief

Time Filed

M.

RRB

Saint Paul, March 7, 1919

A R Cook
Tacoma Washington

Your inventory Auburn concrete plant, Sheet 5. Are not all rods except first four items round. A-6

M F CLEMENTS

9a-65

Tacoma Division. Feb. 27th, 1919.

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

Dear Sir:-

As per our conversation today I think you should arrange to start up the Auburn concrete plant as soon as weather conditions permit and run out the balance of the pipe required for 1919, and make up the estimated requirements for 1920. We will then decide whether it will be advisable to continue the plant operation until the stock of rods is worked up.

Yours truly,

E. Stevens,

Chief Engineer.

HES-O

Cy M F Clements

9a-65

Tacoma Division. Feb. 27th, 1919.

Mr. M. F. Clements,

Bridge Engineer.

Please refer to your letter of January 30th regarding price of concrete plant material and Mr. Yager's reply of February 11th.

It is my understanding that you discussed this matter with Mr. Cook and secured from him a copy of the annual report of the Auburn Plant operation which will necessitate some revisions in your figures. Will you kindly work this up and go over it with me on my return.

HES-O

MFC

Saint Paul, February 18, 1919.

Mr. A. R. Cook,

Principal Assistant Engineer,

Tacoma, Washington.

Dear Sir:-

Referring to your report on the operation of the Auburn concrete plant for 1918.

On Sheet No. 1 you state that the total depreciation is $7003.84, part of which is made up of depreciation charged on product that was manufactured in 1917 and charged out in 1918. It is my understanding that the item of $787.67 is depreciation which has already been applied to product manufactured before January 1, 1918 and has been taken care of in former reports, so that the actual depreciation on product manufactured in 1918 is $6807.62. I do not know how you arrive at this figure.

On Sheet No. 2 you state that the depreciation charged to Investment is 28 per cent plus of $24293.31, the operation cost.

On Sheet No. 8 you give the total length of 24" pipe manufactured and the cost per foot of manufacture. You apply a depreciation of 28 per cent plus, making the total cost per foot $1.38, but the pipe was actually sold for $1.60 per foot so that the actual amount of depreciation is 19.9 cents per foot. In like manner the actual depreciation on

36" pipe is 20.1 cents per foot against 54.8 cents shown on your statement. If you will sum up the total amount of depreciation which is actually earned, you will find that the total is $5483.00 and not $6807 shown on your statement.

Will you kindly explain the discrepancy of these figures.

Yours truly,

Bridge Engineer.

Saint Paul, February 11th, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Replying to yours of the first relative to simplifying and standardizing accounting methods for the operation of concrete plants.

I have read over Mr. Clements' letters, and recalling several conversation which I had with him on this subject, I agree in general with his conclusions although differing in some of the details.

The necessity for fixing a price for plant output at the beginning of the season makes the percentage method on operating costs for charging off depreciation unsatisfactory. The amount of money to be charged off is after all the essential consideration. Under Mr. Clements' method this can be definitely determined beforehand if the amount of product to be made is definitely known. The prediction of the same data in the percentage method requires a knowledge of the amount of product to be made as well as the cost for labor and material.

I assume that Mr. Clements' unit figures for depreciation are based on some of the average performance of the past years at the two plants, with perhaps some consideration of the probable life of the original plant. In the ultimate result there is no particular difference in his method and that followed in the last two years at Glendive. A fluctuation in the output, either above or below the average, or a discontinuance for several seasons will disturb for the time being the depreciation account; however, it is not necessary that these units be the same every year. These units appear to be about 40% or 50% of the unit charges for depreciation on product made in 1918.

Mr. Clements makes the statment that the first cost of the plant remains constant and that the plant charge per unit should also be made constant. I cannot quite agree with this for the reason that the first cost may be increased by additions to the plant, and, further, the depreciated investment is the item with which we are currently interested and that is the item with which we must concern ourselves when we check the financial status of our plant in the light of varying outputs that affect the total depreciation through a predetermined unit.

Running repairs should obviously be absorbed in the current operation costs, whereas unusual repairs in the nature of renewals should find their way into the investment account and be proportionately absorbed so as to bring about the desired investment account condition at the probable period of plant abandonment.

At Glendive the original cost of the plant was charged to Additions and Betterments with the intention of crediting this investment by the annual depreciation charged off against the product. Additions and Betterments have not been credited with the appropriate depreciation for the last few years. I think we should check this up and get all the investment out of Additions and Betterments as soon as possible.

I think it is fortunate that we have nearly absorbed the entire original investment in the Glendive plant for the reason that we will soon face heavy renewal charges to the unloading trestle, casting platform, derrick, etc.

You will recall that we deliberately made the depreciation 30% of the operating cost in the years 1917 and 1918 in order to have the investment practically written off by this year. During some of the earlier years of the Glendive plant operation the fixed depreciation percentage was deducted in error from the depreciated investment instead of charging off a uniform increment, which would have retired the investment completely at the predetermined interval.

The situation with respect to sand and gravel has changed since this plant was first constructed.

With the probable construction of a gravel washing plant at Darling it would undoubtedly work out better to move the plant to that location. We could utilize the west bound empty car movement to fully as good advantage as with the sand and gravel shipments from Minneapolis and avoid back haul of finished products on the Eastern District. With this contingency in view I think it is fortunate that we are about charged off in our Glendive accounts.

I cannot agree with the statement that interest on the depreciated investment should be added in the manner indicated, for the reason that it is not proper to charge interest on the investment of the product going into strictly operating expense work. It is proper, however, to charge this interest on bills for product to be used on Additions and Betterments, joint account work and for bills entirely against outside parties. This has been our previous practice. The credit for this interest item must be made to Income Account and not to Plant Investment.

Mr. Clements has predicted operating costs per unit for labor and material which go to make up a part of the predetermined price. It is fair to assume that there will be some variation from this figure at the close of the season. I think it would make it clearer to state that this difference should be credited to the depreciation account, which is the only one through which this slack can be taken up.

I might suggest that another item be added to Mr. Clements' statement of essential book items to be kept and that is an account to cover general charges such as the time of plant superintendent, unloading material, etc., these charges to be distributed among the various products on the basis of total cost.

I think we should use Mr. Clements' figures for the time being and then later on adjust them should we find that the depreciation credit does not fit the depreciated investment or probable requirements for future equipment renewals.

Yours truly,

Engr. Mtce. of Way.

99-65

MFC

Saint Paul, January 30, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of January 23 in regard to billing out products from the Auburn Concrete Plant.

In order to work out a definite system for the adjustment of a plant charge for both Glendive and Auburn concrete plants to be used in fixing a price on concrete products, I have analyzed the costs from the first construction of the plants to the present date.

I find that five different methods have been used for determining depreciation, which have resulted in an equal number of unit costs for plant charge. The method now in use is to use a percentage of the cost of operation which would be satisfactory if costs of labor and material remained constant and equivalent to the unit costs during the construction of the plant. The abnormal years of 1917 and 1918 have resulted in a high depreciation when using a constant percentage. The first cost of the plant remains constant and the plant charge per unit should also remain constant.

At the Auburn plant Mr. Perkins established 22 per cent of the operating cost for charging off depreciation, less the cost of repairs for the current year. In 1918 prices were fixed at the beginning of the year which resulted in a charge for depreciation of 17 per cent, which was a lower percentage but, on account of the higher cost of labor and material, resulted in a higher plant charge.

As a result of the study of past performance, I would suggest that each plant keep in their books a record (1) of first cost with all additions to the plant, (2) the depreciated investment which should also receive the addition of interest at 6 per cent and the cost of repairs and be reduced by the plant charge on manufactured products, (3) the depreciation which is the plant charge, (4) the cost of manufacture and (5) the repairs. In the annual reports I find an indiscriminate use of the words "Investment Account" with no distinction between first cost and the depreciated investment.

At the present time we have charged off at Glendive the first cost (not including interest) as a sinking fund $25,425.00 out of $27,916.00, leaving $2,491.00 as depreciated investment. The credit value today is in excess of $5,000.00 but with interest added to the investment, we will still have a sum to charge off. At the Auburn plant the amount charged off is $12,754.00 out of $16,955.00, leaving $4,201.00 in the investment account.

After analyzing the plant cost over nine years at Glendive and applying the same ratio of increase in annual repairs to Auburn, I have established fixed prices of plant cost which should be used at the two plants. The repairs to the plant each year to be added to the depreciated investment account which, with interest and a portion of the first cost, will be absorbed by the fixed plant charge.

Fixed Plant Charges for Products to be Manufactured

Glendive Concrete Plant:

24" Concrete pipe	22¢ per lin. ft.
36" " "	30¢ " "
48" " "	40¢ " "
Piles all lengths	20¢ " "
Slabs 6½ x 16	$18.00 per slab or 1/2 span
Slabs 7 x 16	20.00 " " " 1/2 "
Chimney Part No. 1	30¢ per piece
Chimney Part No. 2	27¢ " "
Chimney Part No. 3	5¢ " "

Auburn Concrete Plant:

24" Concrete pipe	20¢ per lin. ft.
36" " "	25¢ " "
48" " "	35¢ " "
Piles all lengths	18¢ " "
Slabs 6½ x 16	$16.00 per slab 1/2 span
" 7 x 16	18.00 " " 1/2 "

Taking into consideration the manufactured stock and rods on hand at new prices at Auburn, the following prices should be used in 1919:

Auburn Prices:

24" Concrete pipe	$ 1.65 per lin.ft.
36" " "	2.20 " "
48" " "	3.84 " "
Piles all lengths	1.55 " "
Slabs 6½ x 16	125.00 " slab
Slabs 7 x 16	135.00 " "

If new piles and slabs are manufactured in 1919 the new prices would be as follows:

Piles all lengths	$ 1.25 per lin.ft.
Slabs 6½ x 16	120.00 " slab
Slabs 7 x 16	130.00 " "

At Glendive the present stock is charged to the Glendive store and must be charged out at the stock prices.

The usual adjustment of freight charges to be added.

This plant charge should continue until the sinking fund of original investment and interest is absorbed, after which time it be applied to joint bills only and a new plant charge for Northern Pacific work established to take care of repairs and interest only.

The bills prepared by Mr. Cook for 1918 are O. K. and should be passed.

File returned herewith.

Yours truly,

Encl.

Saint Paul, January 23rd, 1919.

NOR. PAC. RY. CO.
JAN 24 1919
BRIDGE ENGINEER
ST. PAUL, MINN.

Mr. M. F. Clements,

Bridge Engineer.

Herewith entire file regarding billing out of products from the Auburn Concrete Plant.

You will note from the figures that the arbitrary price we fixed last spring for billing out this pipe, although resulting in a gross profit of over $5000.00 shows a loss when depreciation is included. Personally, I think our depreciation is a little high. I wish you would check over this entire matter and let me have your recommendations for a_n arbitrary price for the pipe we bill out in 1919 from both the Auburn and Glendive Plants.

I presume we will have to accept the billing for the 1918 portion of the Auburn product in accordance with the arbitrary fixed last spring, but our operation should show up better if our depreciation was put on a more reasonable basis.

It is going to be important to determine a reasonable price, as under the new system we must have the bill accompany the goods and it will be necessary to determine the price on January first for the balance of the entire year.

HES-O
encl

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

NOR. PAC. RY. CO.
JAN 30 1919
BRIDGE ENGINEER
ST. PAUL, MINN.

St. Paul, Minn., January 30th-1919

JB

Mr. M. F. Clements.,
Bldg.,

Dear Sir:

The carload rate on reinforcing rods Pittsburgh, pa. tp St. Paul is 49½¢ per 100 pounds and on woven wire conrete reinforcment from De-Kalb, Ill. to St. Paul is 22½¢, steel wire less carloads Wakegan, Ill. to St. Paul 31½¢ per 100 pounds.

Yours truly,

A. Blakeley

~~GENERAL FREIGHT AGENT.~~
CMA

CMA:RW

RRB

Saint Paul, January 28, 1919

Mr. Henry Blakeley,

General Freight Agent.

Please furnish freight rates on the following material:

Reinforcing rods,	Pittsburg to St. Paul,	Car load lots.
Wire mesh,	Dekalb, Ill. "	" " "
Steel Wire,	Waukegan, Ill. "	Small amounts.

Would like this as soon as possible.

M. F. CLEMENTS.

MFC

Saint Paul, January 13, 1919.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of November 20 in regard to the amount of reinforced concrete pipe and rods on hand at the Glendive and Auburn concrete plants.

In your letter you stated that we should take up at the proper time the matter of opening the two plants for the construction of pipe in the year 1919. In the attached list, a copy of which was sent you with my letter of November 19, you will note that there is sufficient pipe at Glendive to take care of the 1919 requirements and a slightly greater amount which would take care of requirements for 1920. Under the circumstances I do not think it advisable to operate the Glendive concrete plant in 1919.

The statements furnished by Mr. Cook January 9, prepared from the Form 134 as approved, do not vary a great deal from my statement. The changes are due to some slight changes in the Form 134. Mr. Cook will be short 266 pieces of 24" concrete pipe to fill the requirements for 1918. I think it would be advisable, therefore, to open the concrete plant at Auburn and use up all of the reinforcing rods in stock. This will meet the requirements for 1918 and possibly 1919.

One copy of Mr. Cook's statement of January 6 is returned herewith. I have retained one copy for my file.

Yours truly,

NOR. PAC. RY. CO.
— OFFICE OF —
NOV 21 1918
BRIDGE ENGR.
ST. PAUL, MINN.

Saint Paul, November 20, 1918.

Mr. M. F. Clements,

Bridge Engineer.

Your letter of the 19th with statement of pipe on hand at Glendive and Auburn, and amount of pipe which can be made from the rods now on hand.

Mr. Prest advises that we will not be called upon to furnish pipe for any other road.

At the proper time, therefore, I want to take up with you and Mr. Yager the question of opening up our plants. In view of the stock on hand at Glendive and our small requirements for this year we may not find it necessary to open our plant in 1919.

HES-O

Cy L.Y.

look up rods & slabs

MFC

Saint Paul, November 19, 1918.

Mr. H. E. Stevens,

Chief Engineer.

Referring to your letter of November eighth in regard to concrete pipe on hand at Auburn and Glendive and the amount which can be manufactured in 1919 to take care of the Northern Pacific and possibly one other railroad.

I attach a tabulated statement of pipe on hand November first, pipe required for 1919, 1920, rods ordered for 1919 from which pipe can be made, and the amount which can be sold to some outside company for both Glendive and Auburn concrete plants.

The Auburn plant can be operated twelve months out of the year and the requirements for 1920 can be eliminated, which would provide sufficient pipe at that point for sale to an outside company without further requisition being made for rods.

Yours truly,

Encl.

N O R T H E R N   P A C I F I C   R A I L R O A D .

Statement of Concrete Pipe on hand and required for 1919.

GLENDIVE CONCRETE PLANT

	24"		36"		48"	
On hand Nov.1, 1918	4856	lin.ft.	2112	lin.ft.		
Required for 1919	2032	"	164	"		
	2824	"	1948	"		
Required for 1920	2500	"	500	"		
	324	"	1448	"		
Rods ordered for 1919	2400	"	800	"		
Available for sale to outside companies	2724	"	2248	"		

AUBURN CONCRETE PLANT

	24"		36"		48"	
On hand Nov. 1, 1918	1792	"	1504	"	72	lin.ft.
Required for 1919	3868	"	1000	"	64	"
	2076	"	504	"	8	"
Required for 1920	3500	"	1000	"		
To be made in 1919	5576	"	496	"		
Surplus in 1919					8	"
Rods ordered for 1919	7200	"	3680	"		
Available for sale to outside company	1624	"	3184	"		
If requirements for 1920 be eliminated we can sell to outside companies	5124	"	4184	"		

Nov 19, 1918

Nov. 19, 1918

Summary R. C. P.

Division	24" Pipe	36" Pipe	48"
Lake Superior	288 ✓		
Saint Paul	56 ✓	32 ✓	
Dakota	48 ✓		
Yellowstone	120 ✓		
Montana	1102 ✓	64 ✓	
Rocky Mtn.	576 ✓	192 ✓	
	2190	288	
Idaho	292 ✓		
Pasco	884 ✓	288 ✓	
Cascade	~~1176~~	~~240~~	
Seattle	1196 ✓	288 ✓	64 ✓
Tacoma	~~1288~~ ~~664~~	~~496~~ ~~288~~	
Puget Sound	258 ✓		
	3868	1000	64

Statement of Concrete pipe on hand and required for 1919

Glendive Concrete Plant

	24"	36"	48"
On hand Nov 1-18	4856 lin ft	2112 lin ft	
Req for 1919	2196	288	
	2666	1924	
Req for 1920	2500	500	
	324	1448	
Rods ordered for 1919	2400	800	
Available for sale to outside companies.	2724	2248	

Auburn Concrete plant

	24"	36"	48"
On hand Nov 1-18	1792	1504	72
Req for 1919	3868	1000	64
	2076	504	8
Req for 1920	3500	1000	
To be made in 1919	5576		
Surplus in 1919		496	8
Rods ordered for 1919	7200	3680	
Available for sale to outside company	1624	3184	
If requirements for 1920 be eliminated we can sell to outside companies	5124	4184	

Division	24" Pipe	36" Pipe	48"
Lake Superior	56 feet ✓ 56 ✓ 96 ✓ 32 ✓ ~~32~~ 16 16 ~~120~~ 16 ~~392~~ "~~240~~ 48	~~8 feet~~ 8 ~~8~~"	✓
Saint Paul	24 ✓ 32 ✓ 56	32 ✓	
Dakota	~~8~~ 24 ✓ 24 ✓ ~~8~~ 48 ~~64~~ ~~56~~		✓
Yellowstone	48 40 ✓ 24 ✓ 24 ✓ 24 ✓ 120		✓
Montana	~~40~~ ~~84~~ ~~24~~ × 32 ✓ × 40 ✓ ~~32~~ × 48 ✓ ~~24~~ ~~32~~ ~~24~~ × 24 ✓ ~~40~~ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ ~~64~~ × 24 ✓ ~~32~~ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ × 24 ✓ × 48 ✓ × 24 ✓ × 48 ✓ 912	~~112~~ × 24 ✓ × 32 ✓ ~~32~~ × 24 ✓ × 48 ✓ × 48 ✓ × 40 ✓ ~~146~~ ~~920~~ × 40 ✓ ~~40~~ × 84 ✓ × 24 ✓ × 24 ✓ × 32 ✓ × 32 ✓ × 24 ✓ ~~24~~ ~~32~~ ~~24~~ × 40 ✓ ~~1776~~ 586 1102	24 ✓ × 40 ✓ × ~~40~~ 24 ~~24~~ ~~24~~ ~~24~~ ~~40~~ ~~32~~ ~~292~~ ~~224~~ ~~20~~ 176 64	mtc ✓

Division	24" Pipe	36" Pipe	
Rocky Mountain	40 ✓ 32 ✓ 32 ✓ ~~24~~ 24 ✓ ~~48~~ 32 ✓ 24 ✓ 32 ✓ 80 ✓ 24 ✓ 24 ✓ 24 ✓ 24 ✓ 24 ✓ 24 ✓ 32 ✓ 32 ✓ 24 ✓ ~~24~~ ~~24~~ 576 48 ✓	~~32~~ 64 ✓ ~~4~~ 32 ✓ 32 ✓ 24 ✓ 40 192	✓ mre
	~~696~~ ~~672~~	~~164~~ ~~132~~	
Idaho	48 ✓ ~~8~~ 24 ✓ ~~56~~ 24 ✓ ~~32~~ 24 ✓ 32 ✓ 292 40 ✓ 40 ✓ 40 ✓ 24 ✓		✓ mre
	~~392~~		
Pasco	24 ✓ - 56 ✓ - 24 ✓ - 48 ✓ - 48 ✓ - 24 ✓ - 24 ✓ - 40 ✓ - 40 ✓ - 24 ✓ - 24 ✓ - 64 ✓ - 24 ✓ 24 ✓ 32 ✓ 72 ✓ - 40 ✓ 24 ✓ 56 ✓ - 40 ✓ ~~40~~ 48 ✓ 24 ✓ 24 ✓ 16 ✓ 24 ✓ ~~24~~ ~~24~~	24 ✓ - 32 ✓ - 24 ✓ - ~~64~~ 112 ✓ - 24 ✓ - 40 ✓ 32 ✓ 288	✓
	~~976~~ 10 888	352	

Division	24" Pipe			36" pipe	
Camas Prairie	80			96	
	72			56	
	80			40	
	80			48	
	72				
	120				
	64				
	96				
	112				
	56				
	80				
	48				
	40				
	104				
	1104			240	
					48
Seattle Div	64	32		40	64
	48	32		64	
	48	24		40	
	40	24		32	
	32	24		80	
	24	40		32	
	24	24		288	
	32	24			
	64	24			
	64	24			
	40	24			
	56	24			
	32	24			
	24	24			
	40	24			
	24	24			
	24	32			
	24	48			
		704			
	704 6	1196			
Tacoma	56	40	16	32	
	56	32	48	32	
	56	16	64	40	
	72	24	32	32	
	40	16	24	40	
	56	16	1104	32	
	40	48	1288	32	
	40	24		24	
	48	24		32	
	40	32		40	
	48	32		40	
	40	32		48	
	40	24		40	
	24	40		32	
	32	16			
		688			
	688	1104		496	

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

Idaho Division

Sheet #1

Statement of reinforced concrete culvert pipe authorized in Form 134-1918, for which pipe is not yet ordered.

	BUDGET ITEM	Sheet # Form 134	24" pipe lin.ft.	36" pipe lin. ft.
Main Line 1st subdivision				
M.P. 46+433	157	1	48	
Total 1st subdivision			48	
P. & L. Branch				
M.P. 31+3030		5	24	
Total P. & L. Branch			24	
Washington Central Branch				
M.P. 28+1612	161		24	
M.P. 29+2260	161		32	
M.P. 52+2516			40	
M.P. 60+3840			40	
M.P. 61+951			40	
M.P. 66+243	161		24	
M.P.104+4481	161		24	
Total Washington Central Branch			224	

Pasco Division Sheet #2.

STATEMENT OF REINFORCED CONCRETE CULVERT PIPE
AUTHORIZED IN FORM 134-1918, for which pipe is
not yet ordered.

Main Line 1st Subdivision	Budget Item	SHeet # Form 134	24" pipe lin. ft.	36" pipe lin. ft.
M.P. 67+3600	162	1	24	
M.P. 87+4290	162	1	56	
M.P. 95+3867	162	1	24	
M.P. 104+1030	162	2		24
M.P. 105+3180	162	2	48	
M.P. 105+4330	162	2		32
Total main line 1st subdivision			152	56
Main Line 2nd subdivision				
M.P. 34+914	163	3	48	
M.P. 40+1110	163	3	24	
M.P. 110+4980	163	3		24
M.P. 112+1380	163	3	24	
M.P. 119+3135	163	3	40	
Total main line 2nd subdivision			136	24
Dayton Branch				
M.P. 74+405		6		112
M.P. 77+984	164	6	64	
M.P. 80+2557		7	24	
M.P. 81+600	164	7	56	
M.P. 95+1304		7	32	
Total Dayton Branch			176	112
Athena Branch				
M.P. 4+5180	166	9	72	
Total Athena Branch			72	
Pleasant View Branch				
West leg of wye Eureka	167	10	40	
M.P. 10+1665	167			24
Total Pleasant View Branch			40	24
Connell Northern Branch				
M.P. 3+4406	168	12	24	
Total&Connell Northern Branch			24	

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, Director General of Railroads
NORTHERN PACIFIC RAILROAD

PASCO DIVISION Sheet #3.

Statement of reinforced concrete culvert pipe authorized on form 134-1918, for which pipe is not yet ordered.

	Budget Item	Sheet # form 134	24" pipe lin. ft.	36" pipe lin. ft.
Gibbon to Parker Line				
M.P. 45+500	169	14	56	
M.P. 67+500	170	14	40	
M.P. 71+1973	170	14	40	
M.P. 74+3925	170	14	48	
M.P. 77+2000	170	15		40
M.P. 77+3282	170	15	24	
Total Gibbon to Parker Line			208	40
Cowiche Branch				
M.P. 7+3027	171	18	24	
M.P. 10+785	171		16	
Total Cowiche Branch			40	
Simcoe Branch				
M.P. 1+306			32	
M.P. 1+2979				32
M.P. 1+4940	172			32
M.P. 2+1170	172		24	
M.P. 6+3633	172		24	
M/P. 6+3974	172		24	
Total Simcoe Branch			104	64

Camas Prairie R. R. Sheet 4

Statement of reinforced concrete culvert pipe authorized on form 134-1918 for which pipe is not yet ordered.

	Sheet # form 134	24" pipe lin. ft.	36" pipe lin.ft.
Joseph to Grangeville			
M.P. 14+4038	2	80	
M.P. 15+2181	2	72	
M.P. 15+5125	2	80	
M.P. 16+5000	2	80	
M.P. 17+4424	2	72	
M.P. 17+4638	2	120	
M.P. 17+5060	2	64	
M.P. 18+432	2	96	
M.P. 18x1385	2	112	
M.P. 25+3492	4		96
M.P. 30+3492	4	56	
M.P. 33+1626	4	80	
M.P. 35+418	5	48	
M.P. 39+3566	5		56
M.P. 45+2740	5		40
M.P. 49+5013	6		48
M.P. 53+1516	6	40	
M.P. 66+2799	6	104	
Total Camas Prairie R. R.		1104	240

Seattle Division Sheet #5

Statement of reinforced concrete culvert pipe authorized on form 134-1918 for which pipe isnotyet ordered.

Budget Item		Sheet # Form 134	24" pipe lin. ft.	36" pipe lin. ft.	48" pipe lin. ft.
Main Line Ellensburg to East Auburn					
M.P. 49+945	186	1	64		
M.P. 55+4620	186	2	48		
M.P. 57+5220	186	2	48		
M.P. 63+1320	186	2		40	
M.P. 76+4950	186	3	40		
Total Main Line 1st District			200	40	
Main Line Woodinville to Sumas					
M.P. 55+2461	187	7	24		
M.P. 56+1642	187	7	32		
M.P. 59+3685	187	7	64		
M.P. 78+3769	187	7		64	
M.P. 96+3356	187	8		40	
Total Main Line District (2nd)			120	104	
Snoqualmie Branch Woodinville to Sallal					
M.P. 5+2355	188	11		80	
Total Snoqualmie Branch				80	
Lake Wash. Belt. Line, Black River to Woodinville					
M.P. 7+2713	189	14	24		
M.P. 8+2633	189	14	24		
M.P. 16+3040	189	14	24		
M.P. 22+2740	189	14	24		
Total Lake Wash. Belt Line			96		
Darrington Branch, Arlington to Darrington.					
M.P. 13+690	190	17	24		
Total Darrington Branch			24		
Bellingham Branch Wickersham to Bellingham					
M.P. 1+2135	191	18	24		
M.P. 2+2755	191	18	24		
M.P. 2+4627	191	18	24		
M.P. 6+5165	191	19	24		
M.P. 9+273	191	19	24		
M.P. 13+4370	191	20	40		
M.P. 14+2016	191	20	24		
M.P. 16+3893	191	20	24		
M.P. 18+2238	191	20	24		
Total Bellingham Line			232		
Roslyn Branch, Cle Elum to Lakedale					
M.P. 0+5080	192	21		40	
M.P. 5+2508	192	21			64
Total Roslyn Branch				40	64

Tacoma Division   Sheet #6

Statement of reinforced concrete culvert pipe authorized on form 134-1918 for which pipes not yet ordered.

Budget Item		Sheet # form 134	24" pipe lin. ft.	36" pipe lin. ft.
McCarver St. to Vancouver-Main Line				
M.P. 24+5080	202	2	40	
M.P. 74+3527	203	5	56	
M.P. 75+2885	203	5	40	
M.P. 78+4061	203	5	40	
M.P. 78+4538	203	5	48	
M.P. 79+05		5		48
M.P. 79+394	203	5	40	
M.P. 89+3381	203	6	48	
M.P. 90+5200	203	6	40	
Total Main Line			352	48
Palmer Jct. to Meeker-Buckley Line				
M.P. 31+4180	204	13	24	
Total Buckley Line			24	
Green River Branch, Kanaskat to Kerriston				
M.P. 1+4246	205	13	32	
Total Green River Branch			32	
Wilkeson & Fairfax Branch, Cascade Jct. to Fairfax				
M.P. 4+5186	206	16	24	
Bridge 7	206	16		32
Total Wilkeson & Fairfax Branches			24	32

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, Director General of Railroads
NORTHERN PACIFIC RAILROAD

Tacoma Division   Sheet #7.

Statement of reinforced concrete culvert pipe authorized on form 134-1918, for which pipe not yet ordered.

	Budget Item	Sheet # form 134	24" pipe lin. ft.	36" pipe lin. ft.
Grays Harbor Branch, St. Clair to Moclips				
Co. Road Xing near Br. 8, Olympia	209	20	16	
M.P. 10+3130		21		24
M.P. 36+1138	210	23	24	
M.P. 38+2080	210	23	24	
M.P. 54+5030	210	25		32
M.P. 78+4947	210	29		40
M.P. 79+1482	210	29		32
M.P. 98+4580	210	31		32
Total Grays Harbor Branch			64	160
Mendota Branch, Wabash to Mendota				
Bridge 0-3	212	37		40
Total Mendota Branch				40
South Bend Branch, Chehalis to South Bend				
M.P. 8+435	213	38	16	
M.P. 11+1758	213	39	16	
M.P. 47+1555	213	41		48
M.P. 51+Highway Xing	213	41	48	
Total South Bend Branch			80	48
Yacolt Branch, Vancouver Jct. to Yacolt				
M.P. 15+556	214	42	64	
Total Yacolt Branch			64	

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, Director General of Railroads
NORTHERN PACIFIC RAILROAD

Puget Sound Division

Sheet #8

Statement of reinforced concrete culvert pipe authorized on form 134-1918 for which pipes not yet ordered.

	Sheet # form 134	24" pipe lin. ft.	36" pipe lin.ft.	48# pipe lin. ft.
Budget Item				
Seattle Terminals				
Bridge D	218	3	48	
Total Seattle Terminals			48	
Tacoma Terminals				
Culvert N. end Sperry Flour Mill	218	10	208	
Deduct 96 lin. ft. shipped 11/18/18			96	
Total Tacoma Terminal not yet ordered			114	

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, Director General of Railroads
NORTHERN PACIFIC RAILROAD

Western Division Sheet 9.

Statement of reinforced concrete culvert pipe authorized on form 134-1918 for which pipes not yet ordered.

Summary	24" pipe lin. ft.	36" pipe lin.ft.	48" pip lin. ft
Tacoma Division			
Main Line, McCarver St. to Vancouver	352	48	
Buckley Line, Palmer Jct. to Meeker	24		
Green River Branch, Kanaskat to Kerriston	32		
Wilkeson & Fairfax Branches	24	32	
Grays Harbor Branch, St. Clair to Moclips	64	160	
Mendota Branch, Wabash to Mendota		40	
South Bend Branch, Chehalis to South Bend	80	48	
Yacolt Branch, Vancouver Jct. to Yacolt	64		
Total Tacoma Division	640	328	
Seattle Division			
Main Line, Ellensburg to East Auburn	200	40	
Main Line, Woodinville to Sumas	120	104	
Snoqualmie Branch Woodinville to Sallal		80	
Lake Wash. Belt Line, Black River to Woodinville	96		
Darrington Branch, Arlington to Darrington	24		
Bellingham Branch, Wickersham to Bellingham	232		
Roslyn Branch, Cle Elum to Lakedale		40	64
Total Seattle Division	672	264	64
Puget Sound Division			
Seattle Terminals	48		
Tacoma Terminals	112		
Total Puget Sound Division	160		
Pasco Division			
Main Line, 1st Subdivision	152	56	
Main Line, 2nd Subdivision	136	24	
Dayton Branch	176	112	
Athena Branch	72		
Pleasant View Branch	40	24	
Connell Northern Branch	24		
Gibbon to Parker Line	208	40	
Cowiche Branch	40		
Simcoe Branch	104	64	
Total Pasco Division	952	320	
Idaho Division			
Main Line, 1st Subdivision	48		
P&L Branch	24		
Washington Central Branch	224		
Total Idaho Division	296		
Camas Prairie Railroad	1104	240	

UNITED STATES RAILROAD ADMINISTRATION
W. G. McADOO, Director General of Railroads
NORTHERN PACIFIC RAILROAD

Western Divisions Sheet #10

Statement of reinforded concrete culvert pipe
on Form 134-1918.

RECAPITULATION

	24" pipe lin. ft.	36" pipe lin. ft.	48" pipe lin. ft.
Idaho Division	296		
Pasco Division	952	320	
Camas Prairie	1104	240	
Seattle Division	672 ~~634~~	264	64
Tacoma Division	640	328	
Puget Sound Division	160		
Total Western Divisions lin. ft.	3824 ~~3776~~	1152	
" " " No. 8' lengths	~~472~~ 478	144	

	24" pipe No. 8 ft. lengths	36" pipe No. 8 ft. lengths	48" pipe No. 8 ft. lengths
On hand and available 12/28/18 at Auburn	212	188	9
Requirements from 134-1918 No. 8' lengths	~~472~~ 478	144	8
No. pcs. pipe to be manufactured	~~260~~ 266		
Surplus after deducting requirements		44	1#

#Note-1 pc. 48" pipe ordered JFC Reqn. #900 but not yet shipped out.

Office of Principal Assistant Engineer,
Tacoma, Washington, January 4, 1919.

e.

4916

9-1255

ga 65 SEPT.

AMERICAN BRIDGE CO.

MINNEAPOLIS, MINN.

NOR... OF... SEP 24 1918 ... ST

DIVISION STOREKEEPER, AUBURN, WASH.

5700 PCS. PLATES 2¼" X 1/8" X 1'3¾", AS DETAILED ON SHEET
TWO OF OUR BRIDGE ENGINEER'S DETAILS FOR CONCRETE PILES.
A.S. FOR T.M. SPECIFICATION A-7-16.
... ALL FOB MPLS. PER YOUR QUO. SEPT. 17TH.

99-65

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

9a-65

Form 4296 UNITED STATES RAILROAD ADMINISTRATION 2-16-18 3M RP

W. G. McADOO, DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILWAY COMPANY.

NORTHERN PACIFIC RAILWAY

OFFICE OF ENGINEER OF TESTS.

1

NOR. PAC. RY. CO. OFFICE OF NOV 2 1918 BRIDGE ST. PAUL, MINN.

REPORT NO. 13592

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.51597
Shipped to Tacoma, Wn. Sent in by A.R.Cook.
Specification No. E-108 Amount Represented
Test Request No. 76, 9/16/18. 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. 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 277 lbs. sq. in.
262 lbs. sq. in. Average 263 lbs. sq. in.
251 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 360 lbs. sq. in.
343 lbs. sq. in. Average 341 lbs. sq. in.
321 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)

M F Clemmell

H. G. BURNHAM.

Engineer of Tests.

Form 4296 2-16-18 3M RP

UNITED STATES RAILROAD ADMINISTRATION

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS

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 From Car, Initials and No. G.N.340151
Shipped to Tacoma, Wn. Sent in by A.R.Cook
Specification No. E-108 Amount Represented
Test Request No. 76, 9/16/18. 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. 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 266 lbs. sq. in.
270 lbs. sq. in. Average 270 lbs. sq. in.
274 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 359 lbs. sq. in.
345 lbs. sq. in. Average 361 lbs. sq. in.
380 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)
HES: (5)

H. G. Burnham

H. G. BURNHAM.

Engineer of Tests

Form 4296 UNITED STATES RAILROAD ADMINISTRATION 2-16-18 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

NORTHERN PACIFIC RAILWAY

OFFICE OF ENGINEER OF TESTS.

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 — From Car, Initials and No. G.N.54001
Shipped to Tacoma, Wn. — Sent in by A.R.Cook,
Specification No. E-108 — Amount Represented
Test Request No. 77, 9/18/18. — 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. 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 220 lbs. sq. in.
222 lbs. sq. in. Average 227 lbs. sq. in.
239 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 301 lbs. sq. in.
311 lbs. sq. in. Average 312 lbs. sq. in.
325 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)

cc: HES (5)

MF

H. G. BURNHAM,
Engineer of Tests.

Form 4296 UNITED STATES RAILROAD ADMINISTRATION 2-16-18 3M RP

W. G. McADOO, DIRECTOR GENERAL OF RAILROADS

NORTHERN PACIFIC RAILWAY COMPANY.

NORTHERN PACIFIC RAILWAY

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.
248 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)
HES (5)

M F C

H. G. BURNHAM,
Engineer of Tests.

Form 4296

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

2-16-18 3M RP

9a-65

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

NOR. PAC. OFFICE SEP 24 1918 BRIDGE ENGINEER ST. PAUL MINN.

REPORT NO. 13408

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

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

CEMENT.

Sample Olympic

From Car, Initials and No. (#34803 ~~& 2589~~ P.A.R. ~~C.& E.I.~~

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 "	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.

14-B

cc: HES (5).

H. G. BURNHAM,
Engineer of Tests.

Form 4296 2-16-18 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

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

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.

Form 4296 2-16-18 3M RP 5/29

GA-65

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 — From Car, Initials and No. N. P. 42406
Shipped to Auburn, Wn. — Sent in by Ass't. Engr., Tacoma
Specification No. E-108 — Amount Represented Not shown
Test Request No. 69, 4/18/18. — S. A. No. --

FINENESS — Passing No. 100 Sieve ___ %
" " 200 " 79.80 %

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 428 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.

Form 4296 2-16-18 3M RP

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

FINENESS
Passing No. 100 Sieve %
" " 200 " 79.95 %

SETTING
Initial Set 3 hrs. 40 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 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.

Form 4296 2-16-18 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 12774

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

To A. L. Holingren, Resident Engineer, Thorp, Wn.

CEMENT.

Sample Spokane Cement.
From Car, Initials and No. G.N.210465
Shipped to Thorp, Wn.
Sent in by Res. Engr., Thorp, Wn.
Specification No. E-108
Amount Represented 150 Bbls.
Test Request No. ATH. Ltr. 4/21/18.
S. A. No. --

FINENESS
Passing No. 100 Sieve %
" " 200 " 79.95 %

SETTING
Initial Set 1 hrs. 28 min.
Final " 5 hrs. 38 min.

SOUNDNESS
Air Pat -- days -- hrs.
Cold Water -- days -- hrs.
Hot Water 1 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 284 lbs. sq. in.
285 lbs. sq. in. Average 285 lbs. sq. in.
286 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 357 lbs. sq. in.
369 lbs. sq. in. Average 372 lbs. sq. in.
391 lbs. sq. in.

GENERAL REMARKS:

Water used for Neats 23.5 per cent.
Water used for Sand 9.9 per cent.
Water used for Pats 23.5 per cent.

The above Cement:
From Irving, Wn.
To be used at Bridge #91.3, Naches River, Pasco Div.
Meets specification requirements.

14-H
cc: HES. (5)

H. G. BURNHAM,

Engineer of Tests

Form 1386

Telegram—Be Brief

261 BY FO

Time Filed M.

57/118

Tacoma May 17th 1918 M F Clements

Stpaul

Solidify 14 reinforcing Rods for Auburn concrete plant 1919 requireme-ments if Reqn has not yet been made Please change Delivery to read " L M Perkins Auburn " Instead of Division storekeeper W 28

L M Perkins

645pm

9a-65

RRB

Saint Paul, May 18, 1918.

Mr. O. C. Wakefield:

Referring to requisition for reinforcing rods for 1919 for the Auburn Concrete Plant. Will you please delivery to read "L. M. Perkins, Auburn, Washington," instead of Division Storekeeper.

M. F. CLEMENTS.

99-65

MFC

Saint Paul, March 27, 1918.

Mr. L. M. Perkins,

Engineer Maintenance of Way,

Tacoma, Washington.

Dear Sir:-

I hand you herewith two prints of Drawing 151005 covering special slabs which it is necessary to build this season to take care of orders on slabs for side tracks. A plan was sent out last year showing slabs 7 feet and 7 feet 6 inches which were required for 1917. The design of a 6 foot slab has been added to the original tracing.

This is for use at concrete plants.

Yours truly,

Bridge Engineer.

Encl.

9a-65

MFC

Saint Paul, March 18, 1918.

Mr. L. M. Perkins,

Engineer Maintenance of Way,

Tacoma, Wash.

Dear Sir:-

I hand you herewith blue print showing reinforcing material on hand at Auburn for the manufacture of concrete products in the year 1918. It is necessary to use lengths other than those shown on our standard plans and the table on these prints furnishes the list of rods to be used in the manufacture of various products.

Yours truly,

Bridge Engineer.

Encl.

AMB-a 9a-65

Mr. M. F. Clements:

Please note the attached. Kindly revise your arrangements for sending reinforcing to Auburn.

A. M. BURT.

St.Paul, Minn.,
January 15th, 1918.

Saint Paul, January 15th, 1918.

Mr. L. M. Perkins,
Engineer of Mtce. of Way,
Tacoma, Washington.

Dear Sir:

Referring to your letter of December 21st in regard to 48" concrete pipe.

It has been decided that we would not get any new 48" forms this year, as very little pipe is figured for in connection with Form 134 work and we can either make purchases or possibly rig out one of the forms at Glendive. We will, therefore, not send any reinforcing for 48" pipe to Auburn.

Yours truly,

Chief Eng'r. Mtce. of Way.

Cy - M.F.C.

9a-65

Auburn Concrete Plant.
Product for years 1914-1915-1916-1917

	24" Pipe L. ft.	36" Pipe L. ft.	48" Pipe L. ft.	Piles L. ft.	Slabs 7x16 No.	Slabs $6\frac{1}{2}$x16 No.
1914	2240	2576		3435		
1915	4240	1088	284			
1916	6608	2680	168			
1917 (to Dec. 8/17)	6432	2320	312	3365	73	21
Total 4 yrs	19520	8664	764	6800	73	21
Av. per year	4880	2166	191	1700	18	5

No. of piles	30'	25'	20'	15'	10'
1914	27	50	50	25	
1917	25	36	10	73	42

Office Clk [illegible]

12/28/17

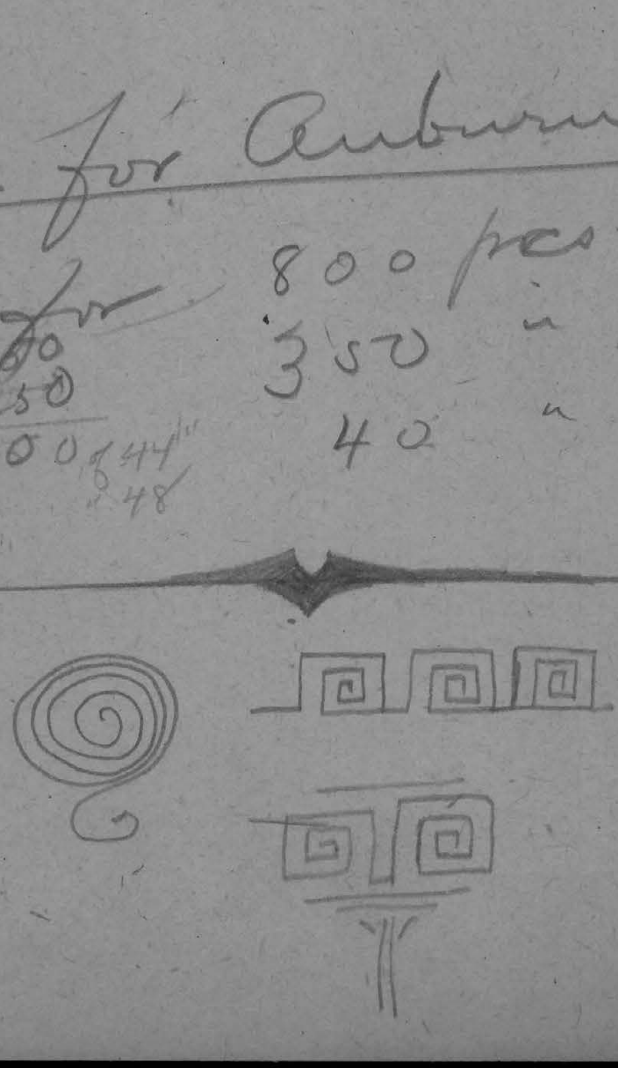
8	4864	8/1712
	608	214
	40	68
	648	282
	~~800~~	~~—~~
		70
	810	352

Provide for Auburn

mesh for	800 pcs	24	819
	350 "	36	240
	40 "	48	15

8700
a.s.&w.co. 4250
style 153 - 13,000 @ 44"
" " 48

350#



9a-65

Form 827 11-10-13 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

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. E-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 307 lbs. sq. in.
290 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 396 lbs. sq. in
435 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)

H. G. BURNHAM.

Engineer of Tests.

Form 827 11-10-13 3M RP

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

From Car, Initials and No. N.P. 48756

Shipped to Auburn, Wn.

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

Specification No. E-108

Amount Represented Not shown

Test Request No. 62, 10/17/17.

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)

H. G. BURNHAM

Engineer of Tests.

Form 827 9-65 8-29-14 3M RP

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. E-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)

M. G. BURNHAM

Engineer of Tests.

Form 827 8-29-14 3M RP

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-102
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.

Copy [illegible]
[illegible]

14-H

cc: HES (5)

H. G. BURNHAM.

Engineer of Tests.

Form 827 8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

9a-65

REPORT NO. 11004

St. Paul, Minn., Sept. 21, 1917

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.95158
Sent in by Engr.M.of W., Tacoma, Wn.
Amount Represented Not shown
S. A. No. --

FINENESS Passing No. 100 Sieve 98.0 %
" " 200 " 79.0 %

SETTING Initial Set 2 hrs. 35 min.
Final " 4 hrs. 00 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.

235 lbs. sq. in.
lbs. sq. in. Average 271 lbs. sq. in.
307 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

507 lbs. sq. in.
lbs. sq. in. Average 527 lbs. sq. in.
547 lbs. sq. in.

Sand= 54.5 % of Neat

Sand 274 lbs. sq. in.
lbs. sq. in. Average 287 lbs. sq. in.
300 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

600 lbs. sq. in.
lbs. sq. in. Average 600 lbs. sq. in.
600 lbs. sq. in.

Sand= 60.3 % of Neat.

Sand 361 lbs. sq. in.
lbs. sq. in Average 362 lbs. sq. in
363 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)

M J C

H. G. BURNHAM
Engineer of Tests.

Form 827 8-29-14 3M RP

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.
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.
lbs. sq. in.
665 lbs. sq. in.
Average 581 lbs. sq. in.

Sand= 58.0 % of Neat

Sand 358 lbs. sq. in.
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.
lbs. sq. in.
605 lbs. sq. in.
Average 595 lbs. sq. in.

Sand= 62.4 % of Neat.

Sand lbs. sq. in.
380 lbs. sq. in.
lbs. sq. in.
Average 371 lbs. sq. in

GENERAL REMARKS: 362 XXX

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, ets.
Meets specification requirements.

14-H
cc: HES (5)

H. G. BURNHAM.
Engineer of Tests.

Form 227 8-20-14 3M RP

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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.

~~XXXXX2~~ lbs. sq. in.
236 lbs. sq. in. Average 237 lbs. sq. in.
237 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

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

Sand= 49.3 % of Neat

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

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

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

Sand= 56.6 % of Neat.

Sand 395 lbs. sq. in.
lbs. sq. in. Average 387 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 usedfor Concrete pipe,piles & slabs,Auburn.
Meets specification requirements.

14-H
cc: HES (5)

H. G. BURNHAM.

Engineer of Tests.

Form 827 8-29-14 3M -RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10557

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

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. --

FINENESS 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.
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.
lbs. sq. in. Average 541 lbs. sq. in.
492 lbs. sq. in.

Sand= 63.4 % of Neat

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

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

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

Sand= 60.3 % of Neat.

Sand 335 lbs. sq. in.
lbs. sq. in. Average 371 lbs. sq. in
406 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 pipe and slabs
Meets specification requirements.

14-H

cc: HES (5)

H. C. BURNHAM.
Engineer of Tests.

Form 827 8-29-14 3M

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10556

St. Paul, Minn., July 25, 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. 43, 6/6/17.

From Car, Initials and No. N.P.98125
Sent in by Engr. M. of W., Tacoma.
Amount Represented Not shown
S. A. No. --

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 -- days 5 hrs. OK.

TENSILE STRENGTH

24 HOURS

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

315 lbs. sq. in.
lbs. sq. in. Average 318 lbs. sq. in.
320 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

557 lbs. sq. in.
lbs. sq. in. Average 586 lbs. sq. in.
615 lbs. sq. in.

Sand= 42.8 % of Neat

Sand 276 lbs. sq. in.
lbs. sq. in. Average 251 lbs. sq. in.
225 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

623 lbs. sq. in.
lbs. sq. in. Average 609 lbs. sq. in.
595 lbs. sq. in.

Sand= 63.5 % of Neat.

Sand 363 lbs. sq. in.
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)

H. G. BURNHAM.
Engineer of Tests.

Form 827

8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10327

St. Paul, Minn., June 29, 1917.19

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

CEMENT.

Sample Olympic Cement
Shipped to A uburn, Wn.
Specification No. A.S.T.M.
Test Request No. 32, 3/29/17.

From Car, Initials and No. N.P. 43537
Sent in by Engr.M.of W., Tacoma, Wn.
Amount Represented Not shown
S. A. No. --

FINENESS
Passing No. 100 Sieve 98.4 %
" " 200 " 79.6 %

SETTING
Initial Set 2 hrs. 3 min.
Final " 4 hrs. 28 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.

178 lbs. sq. in.
lbs. sq. in. } Average 190 lbs. sq. in.
192 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

481 lbs. sq. in.
lbs. sq. in. } Average 502 lbs. sq. in.
523 lbs. sq. in.

Sand= 48.6 % of Neat

Sand 225 lbs. sq. in.
lbs. sq. in. } Average 243 lbs. sq. in.
260 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

619 lbs. sq. in.
lbs. sq. in. } Average 623 lbs. sq. in.
626 lbs. sq. in.

Sand= 57.1 % of Neat.

Sand 317 lbs. sq. in.
lbs. sq. in. } Average 356 lbs. sq. in
394 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 Bellingham, Washington
To be used for manufacturing concrete pipe at Auburn, Wn.
Meets specificatio n requirements.

14-H
cc: HES. (5)

H. G. BURNHAM,
Engineer of Tests.

Form 827 8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10326

St. Paul, Minn., June 29, 1917. 19

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

CEMENT.

Sample Olympic Cement
From Car, Initials and No. N.P. 39988
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. 32, 3/29/17.
S. A. No. --

FINENESS
Passing No. 100 Sieve 99.2 %
" " 200 " 83.0 %

SETTING
Initial Set -- hrs. 51 min.
Final " 2 hrs. 51 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.

185 lbs. sq. in.
lbs. sq. in. Average 204 lbs. sq. in.
222 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

520 lbs. sq. in.
lbs. sq. in. Average 555 lbs. sq. in.
590 lbs. sq. in.

Sand= 43.6 % of Neat

Sand 248 lbs. sq. in.
lbs. sq. in. Average 242 lbs. sq. in.
235 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

672 lbs. sq. in.
lbs. sq. in. Average 664 lbs. sq. in.
655 lbs. sq. in.

Sand= 58.7 % of Neat.

Sand 386 lbs. sq. in.
lbs. sq. in. Average 388 lbs. sq. in
390 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 Bellingham, Washington
To be used for manufacturing concrete pipe at Auburn, Wn.
Meets specification requirements.

14-H
cc:HES. (5)

H. GURNHAM,
Engineer of Tests.

Form 827 8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10328

St. Paul, Minn., June 29, 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. 35, 4/23/17.

From Car, Initials and No. N. P. 33441
Sent in by Engr. M. of W., Tacoma, Wn.
Amount Represented Not shown
S. A. No. --

FINENESS
Passing No. 100 Sieve 99.2 %
" " 200 " 83.0 %

SETTING
Initial Set 3 hrs. 3 min.
Final " 6 hrs. 3 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.

176 lbs. sq. in.
lbs. sq. in.
211 lbs. sq. in.
Average 194 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

496 lbs. sq. in.
lbs. sq. in.
524 lbs. sq. in.
Average 510 lbs. sq. in.

Sand= 44.7 % of Neat

Sand 225 lbs. sq. in.
lbs. sq. in.
230 lbs. sq. in.
Average 227 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

615 lbs. sq. in.
lbs. sq. in.
595 lbs. sq. in.
Average 605 lbs. sq. in.

Sand= 58.3 % of Neat.

Sand 336 lbs. sq. in.
lbs. sq. in.
370 lbs. sq. in.
Average 353 lbs. sq. in

GENERAL REMARKS:

Water used for Neats 23.8 per cent.
Water used for Sand 9.9 per cent.
Water used for Pats 23.8 per cent.

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

14-H
cc: HES. (5)

H. G. BURNHAM.

Engineer of Tests.

Form 827 8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10329

St. Paul, Minn., June 29, 1917. 19

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

CEMENT.

Sample Olympic Cement
From Car, Initials and No. N.P. 21715
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. 35, 4/23/17.
S. A. No. --

FINENESS Passing No. 100 Sieve 98.0 %
" " 200 " 78.0 %

SETTING Initial Set 3 hrs. 23 min.
Final " 6 hrs. 28 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.

185 lbs. sq. in.
lbs. sq. in. Average 182 lbs. sq. in.
178 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

525 lbs. sq. in.
lbs. sq. in. Average 503 lbs. sq. in.
480 lbs. sq. in.

Sand= 47.1 % of Neat

Sand 199 lbs. sq. in.
lbs. sq. in. Average 237 lbs. sq. in.
275 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

630 lbs. sq. in.
lbs. sq. in. Average 610 lbs. sq. in.
590 lbs. sq. in.

Sand= 59.4 % of Neat.

Sand 360 lbs. sq. in.
lbs. sq. in. Average 362 lbs. sq. in
363 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 Bellingham, Washington
To beuused for concrete pipe, piles & slabs, Auburn, Wn.
Meets specification requirements.

14-H
cc: HES. (5)

H. G. BURNHAM.

Engineer of Tests.

Form 827

8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10331

St. Paul, Minn., June 29, 1917.

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

CEMENT.

Sample: Olympic Cement
From Car, Initials and No.: N. P. 98598
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.: 38, 5/14/17.
S. A. No.: --

FINENESS
Passing No. 100 Sieve 97.4 %
" " 200 " 80.4 %

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

367 lbs. sq. in.
lbs. sq. in. } Average 339 lbs. sq. in.
310 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

590 lbs. sq. in.
lbs. sq. in. } Average 598 lbs. sq. in.
605 lbs. sq. in.

Sand= 45.4% of Neat

Sand 251 lbs. sq. in.
lbs. sq. in. } Average 271 lbs. sq. in.
290 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

578 lbs. sq. in.
lbs. sq. in. } Average 606 lbs. sq. in.
633 lbs. sq. in.

Sand= 62.4 % of Neat.

Sand 391 lbs. sq. in.
lbs. sq. in. } Average 378 lbs. sq. in
365 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 for concrete pipe, piles & slabs, Auburn, Wn.
Meets specification requirements.

14-H
cc: HES. (5)

H. G. BURNHAM,
Engineer of Tests.

Form 827 8-29-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 10330

St. Paul, Minn., June 22, 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. 38, 5/14/17.

From Car, Initials and No. N.P. 95904
Sent in by Engr. M. of W., Tacoma, Wn.
Amount Represented Not shown
S. A. No. --

FINENESS Passing No. 100 Sieve 98.0 %
" " 200 " 80.0 %

SETTING Initial Set 2 hrs. 20 min.
Final " 5 hrs. 10 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.

305 lbs. sq. in.
lbs. sq. in. Average 308 lbs. sq. in.
310 lbs. sq. in.

7 DAYS

Neat 24 Hrs. in air 6 Days in water.

560 lbs. sq. in.
lbs. sq. in. Average 569 lbs. sq. in.
579 lbs. sq. in.

Sand= 53.8 % of Neat

Sand 303 lbs. sq. in.
lbs. sq. in. Average 306 lbs. sq. in.
308 lbs. sq. in.

28 DAYS

Neat 24 Hrs. in air 27 Days in water.

596 lbs. sq. in.
lbs. sq. in. Average 603 lbs. sq. in.
610 lbs. sq. in.

Sand= 64.3 % of Neat.

Sand 385 lbs. sq. in.
lbs. sq. in. Average 388 lbs. sq. in
390 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 for concrete pipe, piles & slabs, Auburn, Wn.
Meets specification requirements.

14-H
cc: HES. (5)

H. G. BURNHAM.

Engineer of Tests.

~~Form 827.~~ 10-30-14 3M RP

Form 4296

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

Sh 65

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

7 DAYS

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

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

Sand= 43.2 % of Neat

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

28 DAYS

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

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

Sand= 61.5 % of Neat.

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

H G Burnham

Engineer of Tests.

~~Form 827~~ Form 4296

10-30-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

5965

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
Shipped to Auburn, Wash.
Specification No. A.S.T.M.
Test Request No. LMP 23

From Car, Initials and No. N.P.21907
Sent in by L. M. Perkins
Amount Represented ---
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.
lbs. sq. in. Average 212 lbs. sq. in.
203 lbs. sq. in.

7 DAYS

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

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

Sand= 44.8 % of Neat

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

28 DAYS

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

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

Sand= 55.8 % of Neat.

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

[signature]

Engineer of Tests.

~~Form 827~~
Form 4296

10-30-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

54

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
Shipped to Auburn, Wash.
Specification No. A.S.T.M.
Test Request No. LMP 22

From Car, Initials and No. N.P.216179
Sent in by L. M. Perkins
Amount Represented ---
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.
lbs. sq. in. Average 179 lbs. sq. in.
181 lbs. sq. in.

7 DAYS

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

698 lbs. sq. in.
lbs. sq. in. Average 670 lbs. sq. in.
641 lbs. sq. in.

Sand= 40.6 % of Neat

Sand 255 lbs. sq. in.
lbs. sq. in. Average 272 lbs. sq. in.
289 lbs. sq. in.

28 DAYS

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

744 lbs. sq. in.
lbs. sq. in. Average 753 lbs. sq. in.
761 lbs. sq. in.

Sand= 48.1 % of Neat.

Sand 355 lbs. sq. in.
lbs. sq. in. Average 362 lbs. sq. in.
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

Jn 7c

H. G. Brankam

Engineer of Tests.

~~Form 827.~~ 10-30-14 3M RP

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

Shipped to Auburn, Wash.

Specification No. A.S.T.M.

Test Request No. LMP 21

From Car, Initials and No. N.P.25385

Sent in by L. M. Perkins

Amount Represented ---

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

7 DAYS

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

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

Sand= 43.3 % of Neat

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

28 DAYS

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

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

Sand= 47.1 % of Neat.

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

H. G. Burnham
Engineer of Tests.

~~Form 927~~ 10-30-14 3M RP

Form 4296

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

846

REPORT NO. 6766

St. Paul, Minn., Sept. 21, 1916

To L. M. Perkins , cc W. L. D.(5)

CEMENT.

Sample Olympic Cement

From Car, Initials and No. N. P. 44936

Shipped to Auburn, Wash (Concrete plant)

Sent in by L. M. Perkins

Specification No. A. S. T. M.

Amount Represented Amount not shown

Test Request No. #18- 8/28/16

G. S. K. No.

FINENESS Passing No. 100 Sieve 97.8 %

" " 200 " 80.1 %

SETTING Initial Set 2 hrs. 10 min.

Final " 4 hrs. 55 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.

313 lbs. sq. in.
lbs. sq. in.
305 lbs. sq. in.
Average 309 lbs. sq. in.

7 DAYS

Neat 24 hrs in air 6 days in water.

535 lbs. sq. in.
lbs. sq. in.
541 lbs. sq. in.
Average 538 lbs. sq. in.

Sand= 68.2 % of Neat

Sand 373 lbs. sq. in.
lbs. sq. in.
361 lbs. sq. in.
Average 367 lbs. sq. in.

28 DAYS

Neat 24 hrs in air 27 in water.

730 lbs. sq. in.
lbs. sq. in.
705 lbs. sq. in.
Average 718 lbs. sq. in.

Sand= 52.4 % of Neat.

Sand 385 lbs. sq. in.
lbs. sq. in.
376 lbs. sq. in.
Average 376 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.

Above cement: Olympic
From [illegible] Portland Cement Co.
To be used for, not shown
Meets specification requirements.

H G Burnham

Engineer of Tests.

~~Form 227~~
Form 4296

10-30-14 3M RP

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

20-65

REPORT NO. 6763

St. Paul, Minn., Sept. 20, 1916 19

To L. M. Perkins cc WLD (5)

CEMENT.

Sample Olympic brand
Shipped to Auburn, Wash. (Concrete plant)
Specification No. A. S. T. M.
Test Request No. LMP15, 7/27/16

From Car, Initials and No. N. P. 34226
Sent in by L. M. Perkins
Amount Represented Not shown
G. S. K. No. - - -

FINENESS Passing No. 100 Sieve 96.5 %
" " 200 " 76.4 %

SETTING Initial Set 2 hrs. 40 min.
Final " 4 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

BRIDGE ENGINEER ... NOR. PAC. RY. CO

TENSILE STRENGTH

24 HOURS

Neat 24 hrs. in air ------ in water.

297 lbs. sq. in.
lbs. sq. in. Average 289 lbs. sq. in.
280 lbs. sq. in.

7 DAYS

Neat 24 hrs. in air 6 days in water.

649 lbs. sq. in.
lbs. sq. in. Average 640 lbs. sq. in.
631 lbs. sq. in.

Sand= 47.0 % of Neat

Sand 324 lbs. sq. in.
lbs. sq. in. Average 301 lbs. sq. in.
277 lbs. sq. in.

28 DAYS

Neat 24 hrs in air 27 days in water.

730 lbs. sq. in.
lbs. sq. in. Average 717 lbs. sq. in.
703 lbs. sq. in.

Sand= 46.9 % of Neat.

Sand 355 lbs. sq. in.
lbs. sq. in. Average 336 lbs. sq. in.
316 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.

Above cement:
From Universal Portland Cement Co.
To be used for, ~~xxxxxxxxxxx~~ Not shown,
meets specification requirements.

14-B

H E Stevens

A G Burnham W

Engineer of Tests.

NOR. PAC. RY. CO.
OFFICE OF
SEP
21
BRIDGE ENGINEER
ST. PAUL, MINN.

~~Form 827~~ 10-30-14 3M RP

Form 4296

NORTHERN PACIFIC RAILWAY COMPANY.

OFFICE OF ENGINEER OF TESTS.

Sa 65

REPORT NO. 6765

St. Paul, Minn., Sept. 20, 1916

To L. M. Perkins, cc WLD (5)

CEMENT.

Sample Olympic Cement Auburn, Wash. (Concrete plant)

From Car, Initials and No. N. P. 48703

Shipped to A. S. T. M.

Sent in by L. M. Perkins

Specification No. 17

Amount Represented Not shown

Test Request No.

G. S. K. No.

FINENESS Passing No. 100 Sieve 96.0 %

" " 200 " 79.8 %

SETTING Initial Set 1 hrs. 50 min.

Final " 4 hrs. 45 min.

SOUNDNESS Air Pat 28 days -- hrs. O K

Cold Water 28 days -- hrs. O K

Hot Water days hrs. O K

TENSILE STRENGTH

24 HOURS

Neat 24 hours in air - - - in water.

353 lbs. sq. in.
341 lbs. sq. in.
lbs. sq. in.
Average 347 lbs. sq. in.

7 DAYS

Neat 24 hrs in air 6 days in water.

655 lbs. sq. in.
631 lbs. sq. in.
lbs. sq. in.
Average 643 lbs. sq. in.

Sand= 44.0 % of Neat

Sand 297 lbs. sq. in.
269 lbs. sq. in.
lbs. sq. in.
Average 283 lbs. sq. in.

28 DAYS

Neat 24 hrs in air 27 days in water.

679 lbs. sq. in.
681 lbs. sq. in.
lbs. sq. in.
Average 680 lbs. sq. in.

Sand= 58.9 % of Neat.

Sand 425 lbs. sq. in.
lbs. sq. in.
376 lbs. sq. in.
Average 401 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.

Above cement:

From Olympic Portland Cement Co.
To be used for, -not shown.
Meets specification requirements.

14-B

H G Burnham W

Engineer of Tests.

Saint Paul, April 21, 1916. 3965

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

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 57,200 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 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

TEST, LOADING OF 24" AUBURN CONCRETE PIPE

	STEAMED	UNSTEAMED
	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.

AMB-k

ZA 7-6-9
65

Saint Paul, November 12th, 1915

NOR PAC. RY. CO.
OFFICE OF
NOV
13
1915
BRIDGE ENGINEER
ST. PAUL MINN.

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir: -

I expect to go west Tuesday morning, following the attached itinerary and arriving at the coast Thursday, November twenty-fifth. Will stay on the coast several days and will have Mr. Perkins arrange for test of concrete pipe at Auburn at that time. I would be very pleased to have your company on any part of the trip that suits your convenience.

Yours truly,

A. M. Burt

Chief Eng'r. of M. of W.

encl.

Nov.16	Lv St.Paul	No. 9 @	8:30AM	Ar Fargo		5:42PM
Nov.17	Lv Fargo	No. 3 @	5:47AM	Ar Glendive		5:45PM
Nov.18	G L E N D I V E					
Nov.19	Lv Glendive	No.187@	6:45AM	Ar Billings		2:30PM
Nov.19	Lv Billings	No. 42@	8:15PM	Ar Butte	(20th)	4:55AM
Nov.20	Lv Butte	No.257@	6:40PM	Ar Garrison		8:30PM
Nov.20	Lv Garrison	No.290@	9:00PM	Ar Helena		10:55PM
Nov.21						
Nov.22	Lv Missoula	No.263@	11:35AM	Ar Wallace		5:30PM

Saint Paul, October 29, 1915.

GA 36-9

Mr. A. M. Burt,

Chief Engineer Maintenance of Way.

Dear Sir:

Your letter of the 28th about tests ofconcrete pipe:

I should be very glad indeed to witness these tests but cannot say at the present time if there will be any other necessity for my going West at that time.

Yours truly,

Bridge Engineer.

HES

AMB-k

Saint Paul, October 28th, 1915

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir: -

Please note the attached.

I expect to go to the coast about the middle of November, and we might, at that time, make a test of the pipe. If you are planning to go to Spokane about that time would it not be possible for you to go over to Auburn with me?

Yours truly,

AMBurt

Chief Eng'r. of M. of W.

encl.

AMB-k

GA65

On Line, At Tacoma, Wash.

August 14th, 1915

Mr. H. E. Stevens,

Bridge Engineer,

St. Paul, Minn.

Dear Sir: -

Mr. Perkins advises me that they have made eight pieces of pipe without steaming at the Auburn concrete plant. I think you will be interested in Mr. McGilvrey's report covering this, extra copy of which I am attaching hereto. When the pipe has seasoned we can make some tests and figure out just what is necessary in the way of additional forms.

Yours truly,

A. M. Burt

Chief Eng'r. of M. of W.

encl.

WLD
Jan 19

C O P Y

Auburn, Wash., August 2, 1915.

Mr. L. M. Perkins,

Engineer of M. 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 23d 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 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 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.

GA65

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

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,

enc

Bridge Engineer.

SW65

St. Paul, Minn., March 30, 1915.

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir:

Referring to C.E.M.ofW requisition 1126 and your letter Feby. 18th. to Mr. Cribbs, in connection with reinforcing rods for the Auburn plant. We were unable to furnish those which were ordered from Como in accordance with your letter, as Division Storekeeper advised that they had been used by the B. & B. Dept. Requisition was then placed with Glendive and Division Storekeeper at that point states that all the rods that he has on hand are plain and wants to know if it will be proper to furnish these bars from stock of 28'4" plain bars.

Will you please advise.

Yours truly,

CWakefield

W-d General Storekeeper.

L C M attach to file

L C M advise him it will [illegible]

[illegible] 3/31

3265

Saint Paul, March -31- 1915. HES-M

Mr. O. C. Wakefield:

Referring to your letter of the 30th re CEMofW requisition 1126, reinforcing rods for Auburn plant. It will not be satisfactory to furnish these in plain bars of 28'4" from Glendive stock - deformed bars must be provided.

H. E. Stevens.

GA 65

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

Mr. A. M. Burt,

Chief Engr Mtnce 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

GA65

St. Paul, Minnesota. July 2, 1914.

WLD-O

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

HAC-h

GA65

Saint Paul, June 26,1914.

Mr. H. E. Stevens,
Bridge Engineer.

Mr. A. Gibson,
Engineer Maintenance of Way.

Mr. O. C. Wakefield,
Supply Agent.

Gentlemen:

Mr. Perkins advises that he expects to close the Auburn Concrete Plant about July 10th.

Requirements for product of this plant not already taken care of should be covered by orders promptly.

Yours truly,

A W Burt

Chief Eng'r of M. of W.

GA 65

St. Paul, Minn. April 24, 1914. HES-O

Mr. L. M. Perkins,

Engineer Maintenance of Way.,

Tacoma, Wash.

Dear Sir:-

At Mr. Burt's request I am handing you herewith two additional sets of the plans for 48 inch concrete pipe as manufactured at the Glendive Plant.

Yours truly,

Bridge Engineer.

Cy AMB

GA 65

St. Paul Minn. April 8, 1914. HES-O

Mr. J. C. Breedlove,

Assistant Engineer, Tacoma.

Dear Sir:-

As requested in your letter of the 27th I am handing you herewith three blueprints and one negative of tracing of reinforced concrete piles as manufactured at the Auburn Plant.

Yours truly,

Bridge Engineer.

St. Paul, Minnesota. April 7, 1914.

HES-O

Mr. A. M. Burt,

Chief Engineer Maintenance of Way.

Dear Sir:-

Your memo on the attached letter from Mr. Perkins requesting plans for 48" concrete pipe.

Sometime ago we sent Mr. Perkins a set of plans of 24", 36" and 48" concrete pipe as manufactured at Glendive. This, however, is not exactly the same as the pipe manufactured at Auburn, the Auburn pipe being made in a round cast iron form. At Mr. Perkins' request I have had the matter up with Mr. Breedlove but up to date we have not obtained from him any of the detail plans used at Auburn. This matter has been handled entirely by Mr. Breedlove, and if he cannot furnish the plans to Mr. Perkins then they are not in existence.

Yours truly,

Bridge Engineer.

St. Paul, Minnesota. March 31, 1914. HES-0

Mr. J. C. Breedlove,

Assistant Engineer,

Tacoma, Wash.

Dear Sir:-

I beg to acknowledge receipt of tracing of reinforced concrete piles as manufactured at the Auburn Plant.

It is my understanding that the sheet iron ring at the top of the pile was not used regularly, and furthermore that the driving at the Nisqually Bridge with the improved type of follower seemed to indicate that the ring was unnecessary provided piles were properly seasoned. Kindly advise if this is correct.

Regarding the pipe, I think there must be some tracings or other records in your office showing how this pipe was actually made. It is not the same as the Glendive pipe, the latter being slightly elliptical in shape whereas the Auburn pipe is round and the reinforcing is forced into an elliptical shape. Will you kindly look the matter up again and see if the original tracings cannot be located? We have nothing here.

Yours truly,

Bridge Engineer.

6-E-2

Tacoma, March 27, 1914.

NOR. PAC. RY. CO. OFFICE OF MAR 31 1914 BRIDGE ENGINEER ST. PAUL, MINN.

Mr. H. E. Stevens,

Bridge Engineer,

St. Paul.

Dear Sir:

Yours of the 16th: I hand you herewith tracing showing details of reinforced concrete piles. Will you please have negative made and sent to me?

We do not have any details of manufacture of pipe, as the same general operation is followed as that used in detail shown for manufacture at Glendive.

Yours truly,

JCB-A

Enc. sep. cover

[signature]
Assistant Engineer

St. Paul, Minn. March 16, 1914. HES-O

Mr. J. C. Breedlove,

Assistant Engineer,

Tacoma, Wash.

Dear Sir:-

Some time ago you sent in plans showing the piles and pipe as manufactured at the Auburn Plant. Will you kindly furnish us with either negatives or tracings of this material for our permanent records.

Yours truly,

Bridge Engineer.

FROM OFFICE OF
ENGINEER OF MAINTENANCE
TACOMA, WASH.

Tacoma, Washington, March 20, 1914.

Mr. H. E. Stevens,

Bridge Engineer,

Saint Paul, Minnesota.

Dear Sir:-

Referring further to yours of March 16th regarding plans for 24" and 36" pipe.

I took this up with Mr. Breedlove and found that he did not have a detail plan of the pipe as actually made at Auburn. I am, therefore, arranging to get one showing the work as actually done.

Yours truly,

Engineer of Maintenance of Way.

LMP-w

St. Paul, Minnesota. March 16, 1914.

HES-O

Mr. L. M. Perkins,

Engineer Maintenance of Way,

Tacoma, Wash.

Dear Sir:-

Your favor of the 10th regarding plans for 24" and 36" concrete pipe.

Your letter did not state that you wished the pipe as manufactured by the Auburn Plant, and I find my office sent you the plans used at the Glendive Plant. We have no plans of the Auburn pipe, but I think you can obtain these from Mr. Breedlove,

Yours truly,

Bridge Engineer.

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

Tacoma, Washington, March 10, 1914.

NOR. PAC. RY. CO.
— OFFICE OF —
MAR 13 1914
BRIDGE ENGINEER
ST. PAUL, MINN.

Mr. H. E. Stevens,

Bridge Engineer,

Saint Paul, Minnesota.

Dear Sir:-

Referring to yours of March 6th transmitting detail plans of 24" and 36" reinforced concrete pipe.

These do not seem to agree with the pipe as manufactured at Auburn, which is round instead of oval. Did you make detail plan for that, or have you tracing so that prints can be furnished covering?

Can you also let me have detail plan covering piling?

Yours truly,

[signature]

Engineer of Maintenance of Way.

LMP-w

GRO
Let me see plans
Sen N

St. Paul, Minn. March 6, 1914. RRB-O

Mr. L. M. Perkins,

Engineer Maintenance of Way,

Tacoma, Washington.

Dear Sir:-

As requested in your letter of the 20th ult. to Mr. Burt, I am sending you herewith one print each of details for 24" and 36" reinforced concrete pipe.

Yours truly,

Bridge Engineer.

Cy A.M.B.

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

Tacoma, Washington, February 20, 1914.

Mr. A. M. Burt,

Chief Engineer of Maintenance of Way,

Saint Paul, Minnesota.

OFFICE OF
ASST. ENGR. M. of W.
FEB 21
NOR. PAC. RY.
ST. PAUL

Dear Sir:-

Will you please send me copies of detail plans for 36"& 24" reinforced concrete pipe? I find we have no plans of these in our office. We would prefer to have a negative, as occasion arises from time to time to make copies.

Yours truly,

[signature]

Engineer of Maintenance of Way.

LMP-w

Mr. Stevens
AMBu
2/21/14

RRB
Order me set of prints
KT 2/25

GA65

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.

6-E-2

Tacoma, January 21, 1914.

Mr. W. L. Darling,

Chief Engineer,

St. Paul.

COPY

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,

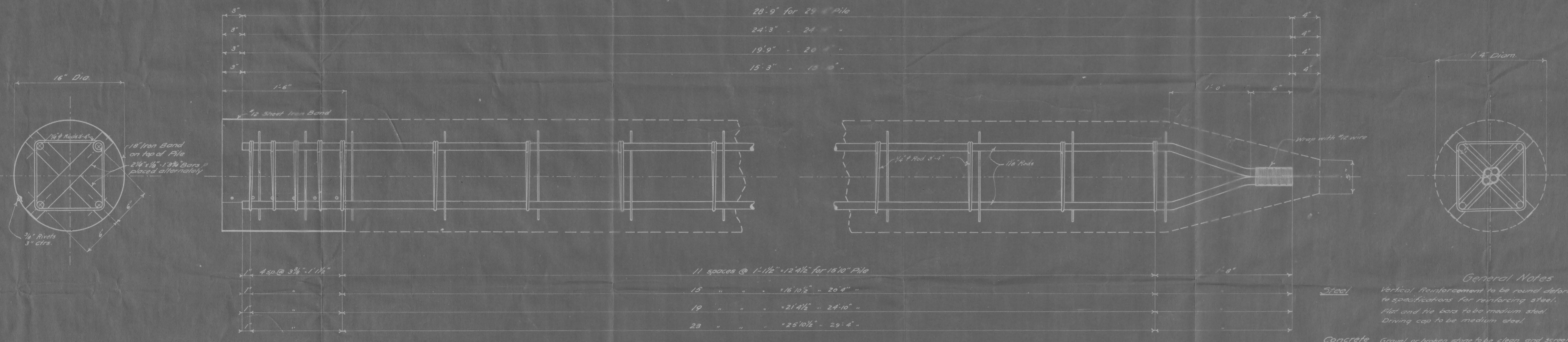
(Signed) J. C. Breedlove

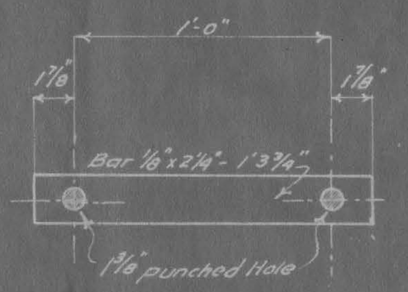
Assistant Engineer.

JCB-A

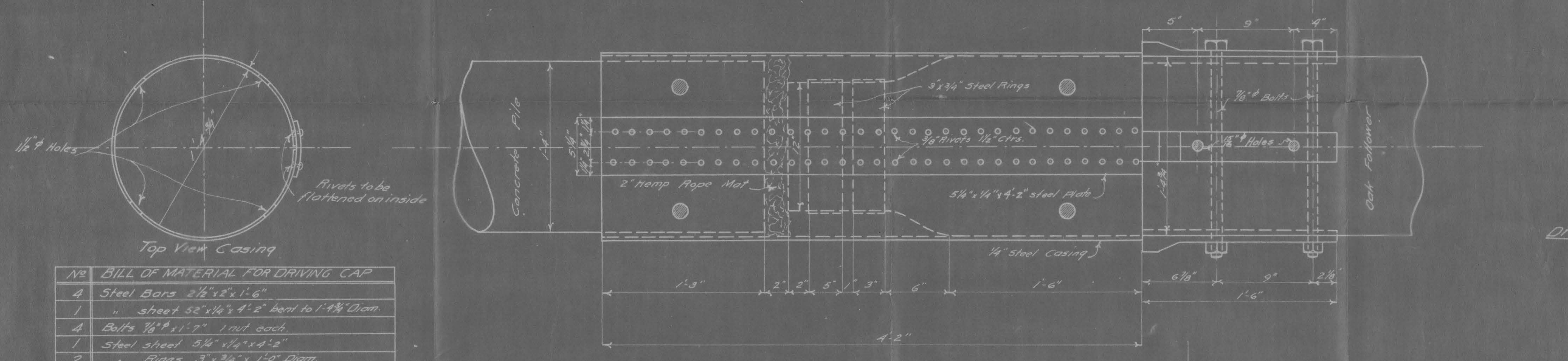
Copy to Mr. Stevens with B/P ✓

attach to [illegible]

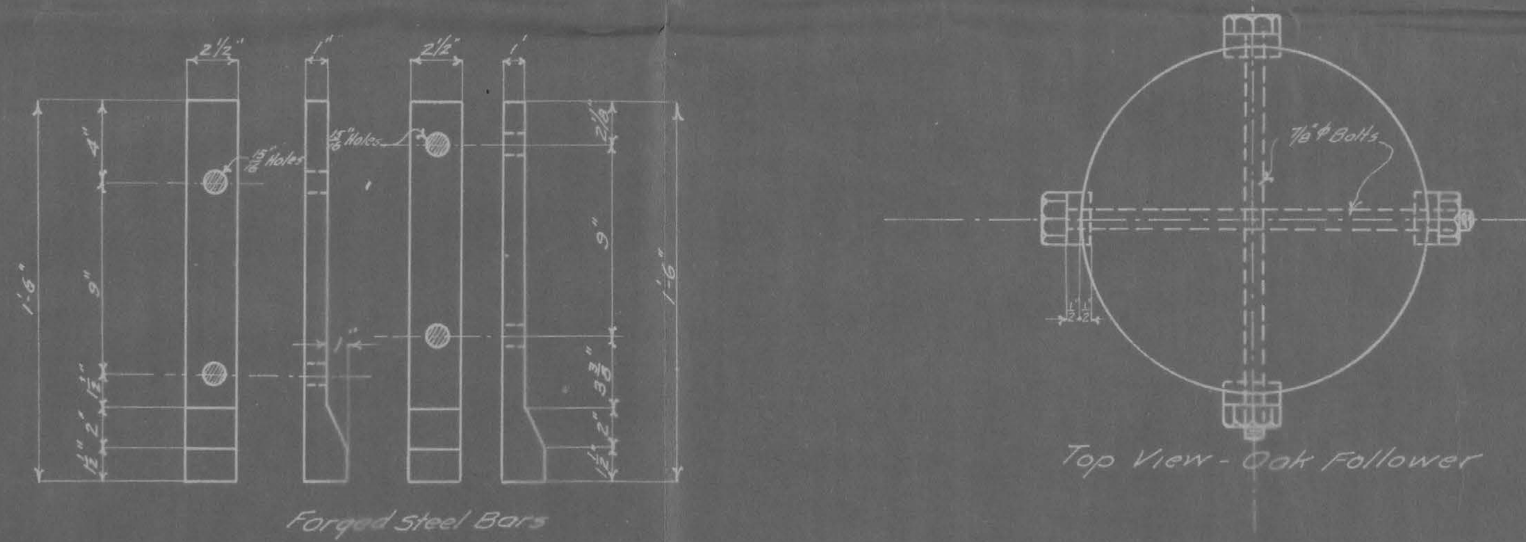




DRIVING CAP



№	BILL OF MATERIAL FOR DRIVING CAP
4	Steel Bars 2½"x2"x1'-6"
1	" sheet 52"x¼"x4'-2" bent to 1'-4¾" Diam.
4	Bolts ⅞"φ x1'-7" 1 nut each.
1	Steel sheet 5¼"x¼"x4'-2"
2	" Rings 3"x¾"x1'-0" Diam.



Material Required for One Pile

No. Pcs.	Size	Length	Remarks
29'-4" Pile			
4	1⅛" φ	28'10"	Bent as shown
28	¼" φ	3'4"	" " "
26	2¼" x ⅛"	1'3¾"	Two Holes for 1⅛" 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	1⅛" φ	24'4"	Bent as shown
24	¼" φ	3'-4"	" " "
22	2¼" x ⅛"	1'3¾"	Two Holes for 1⅛" 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	1⅛" φ	19'10"	Bent as shown
20	¼" φ	3'4"	" " "
18	⅛" x 2¼"	1'3¾"	Two Holes for 1⅛" 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	1⅛"	15'4"	Bent as shown
16	¼"	3'4"	" " "
14	⅛" x 2¼"	1'3¾"	Two Holes for 1⅛" 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

Steel — Vertical Reinforcement to be round deformed bars conforming to specifications for reinforcing steel.
Flat and tie bars to be medium steel.
Driving cap to be medium steel.

Concrete Materials — 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.

Mixture — Aggregates shall be carefully tested to secure proper proportions for maximum density of concrete.
These proportions shall be as near one-two-four as possible.
Mixture must be poured sloppy and shall be spaded in the moulds with a straight bladed shovel until perfect contact 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 in 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 laying on its base and kept 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.

Driving — 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 fitted with jet and a combination of jetting 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.

N. P. RY.

Tacoma Division – Tacoma Tenino Line

DETAILS OF REINFORCED CONCRETE PILES

Scale: 1½" = 1'

Office of Assistant Engineer, Steilacoom Wash. January 17th 1914

GA65

Saint Paul, Minn. January 8, 1914. HES-O

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.

GH65

6-E-2

Tacoma, January 3, 1914.

Mr. W. L. Darling,

Chief Engineer,

St. Paul.

COPY

Dear Sir:

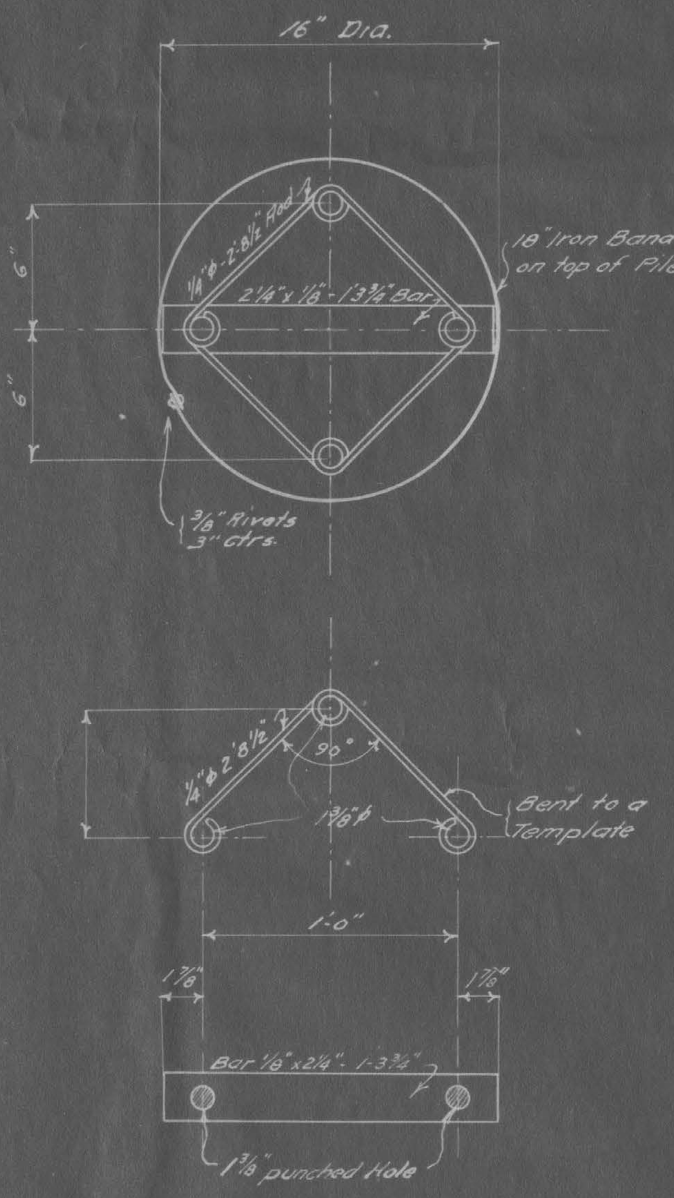
I do not find that plans have ever been made showing the circular reinforced concrete piles which we are making at Auburn, the general plans of these piles having been the octagonal shape as per plans dated Office of Bridge Engineer, April 28th, 1909. That plan has been used in making up the attached 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?

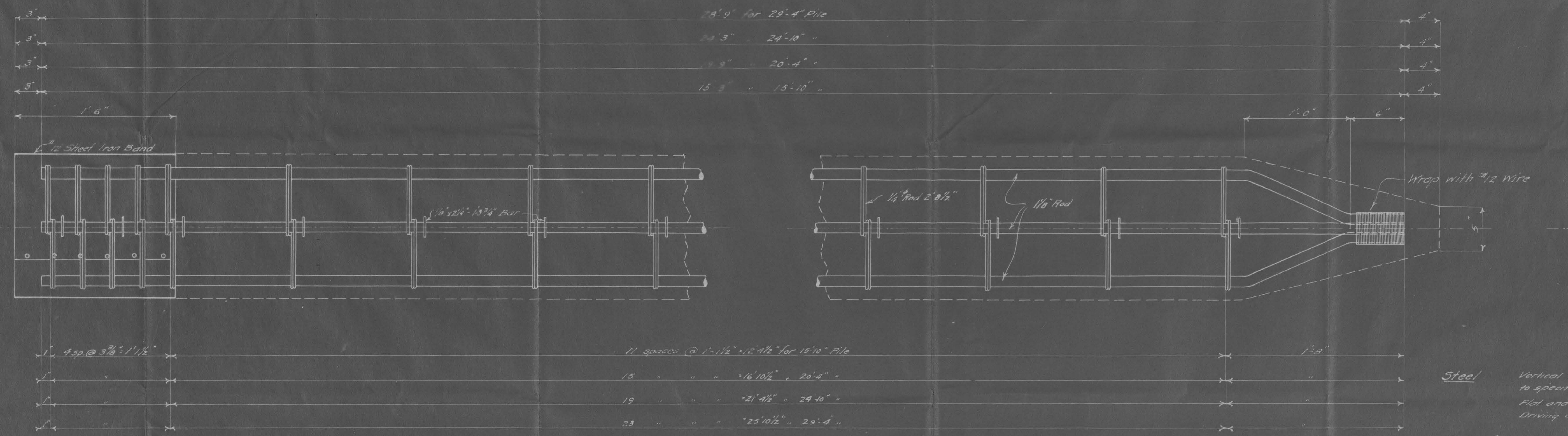
Yours truly,

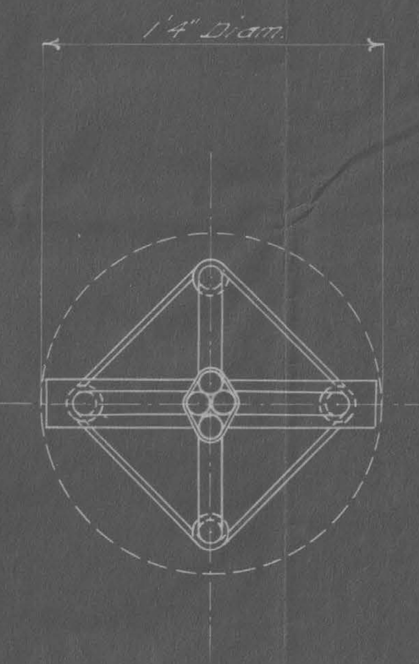
(Signed) J. C. Breedlove

Assistant Engineer.

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







General Notes

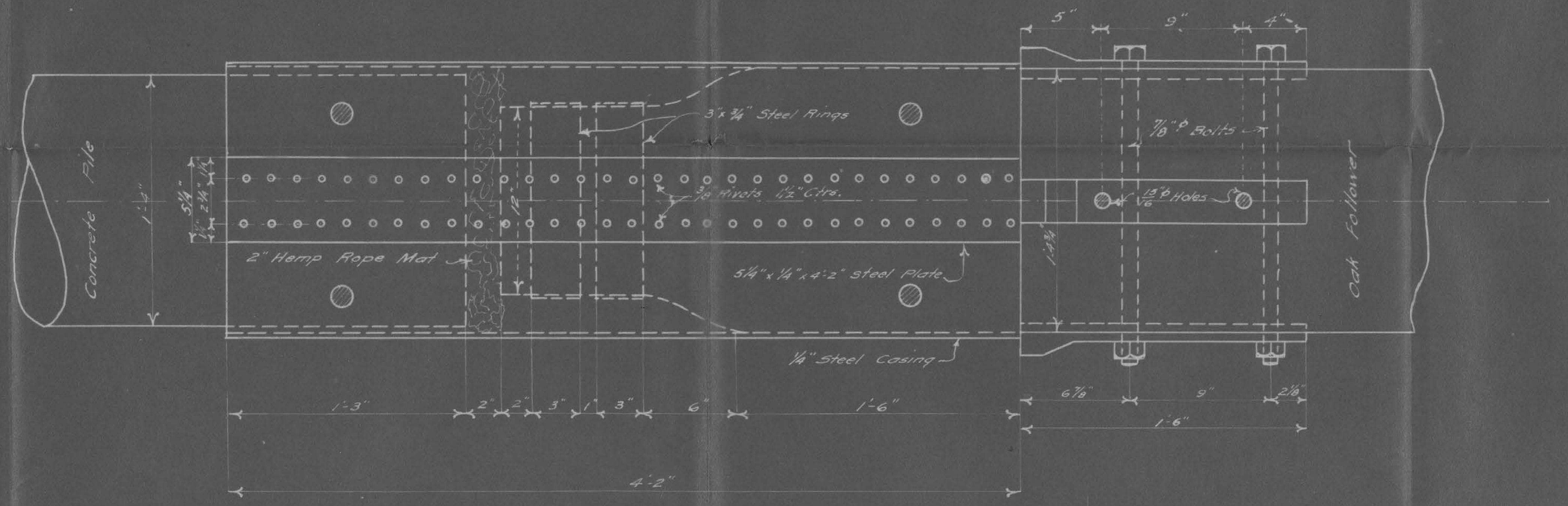
Steel — Vertical Reinforcement to be round deformed bars conforming to specifications for reinforcing steel.
Flat and tie bars to be medium steel.
Driving cap to be medium steel.

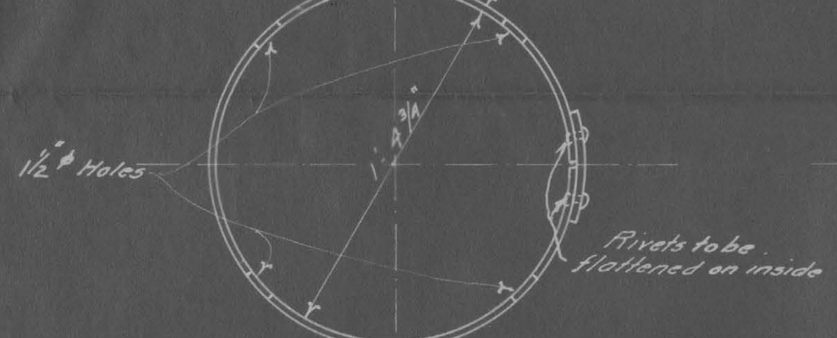
Concrete Materials — Gravel or broken stone to be clean and screened from all flat chips or dust.
Stone shall not be larger than one inch in any direction.
Sand shall be clean, coarse and sharp and entirely free from clay or dirt.
Cement shall be of an approved brand and no cement shall be used until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

Mixture — Aggregates shall be carefully tested to secure proper proportions for maximum density of concrete.
These proportions shall be as near one-two-four as possible.
Mixture must be poured sloppy and shall be spaced in the moulds with a straight bladed shovel until perfect contact 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 in 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 laying on its base and kept 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.

Driving — 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 fitted with jet, and a combination of jetting 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 CAP





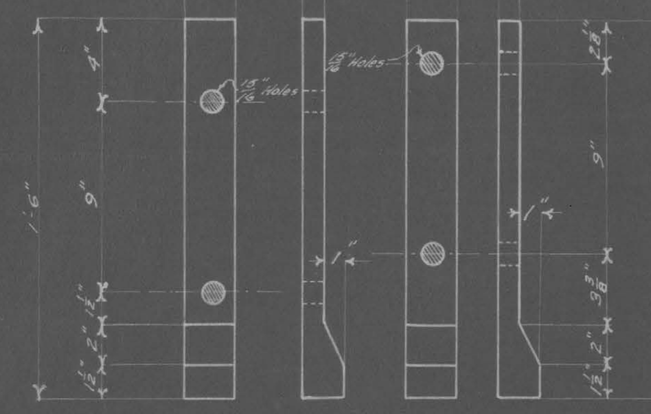
Top View Casing

No	BILL OF MATERIAL FOR DRIVING CAP
4	Steel Bars 2 1/2" x 2" x 1'-6"
1	" sheet 52" x 1/4" x 4'-2" bent to 1'-4 3/4" Diam
4	Bolts 7/8" ϕ x 1'-7" 1 nut each
1	Steel sheat 5 1/4" x 1/4" x 4'-2"
2	" Rings 3" x 3/4" x 1'-0" Diam.

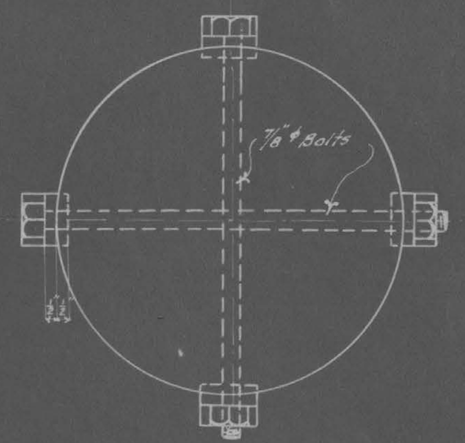
Material Required for One Pile

No. Pcs.	Size	Length	Remarks
29'-4" Pile			
4	1 1/8" ϕ	28'10"	Bent as shown
56	1/4" ϕ	2'8 1/2"	" " "
26	2 1/4" x 1/8"	1'3 3/4"	Two Holes for 1 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 1/8" ϕ	24'4"	Bent as shown
48	1/4 ϕ	2'8 1/2"	" " "
22	2 1/4" x 1/8"	1'3 3/4"	Two Holes for 1 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 1/8" ϕ	19'-10"	Bent as shown
40	1/4" ϕ	2'8 1/2"	" " "
18	1/8" x 2 1/4"	1'3 3/4"	Two Holes for 1 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 1/8"	15'4"	Bent as shown
32	1/4"	2'8 1/2"	" " "
14	1/8" x 2 1/4"	1'3 3/4"	Two Holes for 1 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 "



Forged Steel Bars



Top View-Oak Follower

N. P. RY.

Tacoma Division – Tacoma Tenino Line

DETAILS OF REINFORCED CONCRETE PILES

Scale: 1 1/2" = 1'

Office of Assistant Engineer, Steilacoom Wash., December 31st 1913

GA65

Saint Paul, November 26, 1913. HES-O

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,

Bridge Engineer.

Saint paul, Minn. November 26, 1913.

HES-0

Mr. L. M. Perkins,

Engineer Maintenance of Way,

Tacoma, Wash.

Dear Sir:-

I have your letter of the 14th regarding check of the machinery left over from the old Willapa, Hoquiam and Aberdeen howe truss draw spans.

We have made up our designs on the basis of using this old machinery as far as possible. If, however, it is so badly worn and broken up as to be of small value, we will probably make ~~such~~ some changes in the design and order most of the parts new. It seems to me, however, that some of this old stuff can be used, and we will indicate on the drawings such parts as we think should be secured from the old stock; on receipt of the drawings please have an inspection made and if you find it not practicable to use the parts as marked on the drawings we will make requisition for new.

Your letter gives no information about the drum, racks and wheels of these old draws. We figured on using these parts also. Kindly advise as to condition.

We are not doing anything further on completing the machinery designs at present, account of the uncertainty as to government permits for all three bridges. Please keep us posted as to status of the permits.

Yours truly,

Bridge Engineer.

GA65

COPY

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,

J. C. BREEDLOVE

Assistant Engineer.

GA 65

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

Ga65

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 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.

C

St. Paul, Minnesota. June 26, 1912. HES

OFFICE OF
CHIEF ENGR. M. of W.
JUN
27
NOR. PAC. RY.
ST. PAUL, MINN.

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

With the return of the attached file will you kindly advise if prices given by Mr. Bell for the cost of labor on slabs, piles, and pipe at the Glendive concrete plant for the season of 1911 are correct. I did not receive a tabulated statement of the cost of operation of the Glendive plant last year. Mr. Breedlove advised Mr. Darling that they were manufacturing pipe at the Auburn plant at 60% of the cost of manufacturing same at the Glendive plant: I questioned the accuracy of these figures, hence the discussion.

Mr. Breedlove has worked out a theory as to how my figures for the cost of operation for 1910 were obtained. This theory is very interesting, and also very incorrect. My figures were taken from Mr. Clement's final report, and as I understand it his final figures have not been changed.

Yours truly,

Bridge Engineer.

O

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.

No. Pcs.	Kind.	Cu. Yds. Concrete
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:

No. Pcs.	Kind	Manu-facture	Plant Expense	Roy-alty	Total	Cost
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.

No.	Kind	1909-10 Unit Price	1911 Unit Price	1909-10 Cost	1911 Cost
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

6-E-1

Tacoma, July 10, 1912.

Mr. H. E. Stevens,

Bridge Engineer,

St. Paul.

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,

Jno Broadstone

Assistant Engineer.

JCB-A

Copy to Mr. Darling.

St. Paul, Minnesota. July 10, 1912. HBS

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.

C

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,

Chief Engineer

WLD-D

Copy to Mr. Stevens.

6-E-1

COPY.

Tacoma, July 3, 1912.

Mr. W. L. Darling,

Chief Engineer,

St. Paul,

Dear Sir:-

Answering yours of May 28th and June 6th, I hand you herewith statement showing cost of plant at Auburn concrete pipe plant, cost of company material, cost of cement and total cost of plant to May 31st.

June 1st there was yet to be made about 5600 lineal feet of 24-inch pipe and 4350 lineal feet of 36-inch pipe.. Based on past performance, the total cost of the entire output will be approximately as follows:

Total cost of plant and material	$18317.68
Labor for 5600 feet of 24-inch pipe @ 50¢	2800.00
" " 4350 " " 36-inch " " 75¢	3272.50
Estimated cost of repairs	600.00
March, April and May Pay Rolls for pipe,	1764.58
Total	$26754.76
Less value of plant at end of our work, figuring 20% depreciation	8580.00
Total Cost	$18174.76

This total cost is for 8000 lineal feet of 24-inch pipe and 4500 feet of 36-inch pipe, or $132 per foot for the 24-inch pipe and $1.78 for the 36-inch pipe.

Yours truly,

(signed) J. C. Breedlove

Assistant Engineer

JCB-A

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.

COPY.

Statement showing cost of concrete pipe plant

at Auburn to May 31st, 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 expense		219.28	$10725.47
Cost of Reinforcing Material			
Material		3036.91	
Freight		1418.62	
Foreign Freight		216.12	4671.65
Cost of Cement			
Material	2058.06		
Less value of sacks returned	630.00	1428.06	
Transportation		1493.50	2921.56
Total cost to May 31st			$18317.68

****

St. Paul, Minnesota. June 26, 1912. HES

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

With the return of the attached file will you kindly advise if prices given by Mr. Bell for the cost of labor on slabs, piles, and pipe at the Glendive concrete plant for the season of 1911 are correct. I did not receive a tabulated statement of the cost of operation of the Glendive plant last year. Mr. Breedlove advised Mr. Darling that they were manufacturing pipe at the Auburn plant at 60% of the cost of manufacturing same at the Glendive plant: I questioned the accuracy of these figures, hence the discussion.

Mr. Breedlove has worked out a theory as to how my figures for the cost of operation for 1910 were obtained. This theory is very interesting, and also very incorrect. My figures were taken from Mr. Clement's final report, and as I understand it his final figures have not been changed.

Yours truly,

Bridge Engineer.

C

FORM 1386

TELEGRAM.

Da 65

St. Paul, Minnesota. June 15, 1912. HES

J. C. Breedlove
Tacoma Wash.

Think you will find round pile objectionable account of difficulty in making and handling form and pouring piles Have had no complaint about difficulty in handling complete octagonal pile

H E Stevens 11 a.m.

FORM 1306

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.

351 by sc sn

Tacoma June 14th--12

H.E.Stevens

StPaul

What if any objections are there to using round forms for reinforced concrete piling.

J.C.Breedlove.

756 PM.

St. Paul, Minnesota. May 28, 1912. HES

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

I am returning you herewith AFE covering proposed extension to the concrete plant at Auburn, received with your letter of the 24th.

I had nothing whatever to do with the design of pipe forms which they propose to use at that plant, but I recently looked same over at the request of Mr. Darling and my conclusion was that the form was expensive and would produce an inferior grade of pipe. In this conclusion Mr. Darling did not concur. It seems, therefore, that the conditions are entirely different at Auburn than anything with which we have heretofore dealt, and I should not care to pass upon the proposed plant layout, beyond saying that in my opinion it is inadequate and that the estimates are worse. I would suggest that you refer the matter to Mr. Clements.

Yours truly,

O

Bridge Engineer.

WCS-r

Saint Paul, May 24, 1912.

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir:-

Attached please find an AFE prepared by Mr. Perkins for the purpose of extending the present concrete pipe plant to provide facilities for the manufacture of concrete piles and slabs at Auburn.

Before taking any further action, I will be glad if you will inspect the proposed plan of the layout and give me the benefit of your criticism of the proposed arrangement; this as I understand that you have lately designed a new type of form for the pipe which the Construction Department are making and that this form is radically different from the one we are using at Glendive.

Yours truly,

W C Smith

St. Paul, Minnesota. May 27, 1912. HES

Mr. W. L. Darling,

Chief Engineer.

Dear Sir:-

Your favor of the 19th regarding concrete pipe and forms at the Auburn plant.

I note you consider that an improvement has been made, and this being the case I do not see that anything is to be gained by discussing the matter further, especially since it is now too late to change the type of forms.

The facts appear to be rather self-evident, and nothing in Mr. Breedlove's letter of the 18th changes them in any way. For your information, however, I wish to advise that when the plant at Glendive is properly operated the concrete is always well spaded in the forms, that we have had no trouble with reinforcement springing out of shape, and that the output of the plant is not dependent upon the length of time required to take down and set up the forms but upon the length of time which good judgment dictates should elapse before forms are removed-----needless to say that that is more than 12 hours.

Furthermore, the style of pipe they are making at Auburn has been tried out and discarded by other roads while the elliptical style with structural steel forms is being made at many different plants with uniformly satisfactory results.

Yours truly,

O

Bridge Engineer.

3677

At Tacoma, May 19, 1912.

Mr. H. E. Stevens,

Bridge Engineer,

St. Paul.

Dear Sir:

Please note the attached letter from Mr. Breedlove, dated the 18th instant, relative to concrete pipe being made at the Auburn plant.

It seems to me that Mr. Breedlove and Mr. Bell have made a very good improvement, and I cannot understand your criticism. Won't you please advise further.

Yours truly,

[illegible signature]

Chief Engineer

WLD-D

Enc

R E S

Pls attach file showing original plan approved

[illegible initials]

5/23

St. Paul, Minnesota. May 7, 1912. HES

Mr. W. L. Darling,

Chief Engineer.

Dear Sir:-

Your memo on the attached file and requisition covering 8,000 lineal feet of ¼-inch round rods for use at the Auburn concrete pipe plant.

I have looked up on your file the plan of cast ~~steel~~ iron forms which are being used at the Auburn plant, and it is my opinion that the difficulty which they are experiencing in making the pipe, and which the ¼-inch rods are supposed to remedy, is caused by the design of form and pipe which is being used. These designs are radically different from anything we have heretofore u sed, and embody features which in the original design were carefully considered and eliminated. Thepipe is being made round and the reinforcing ring elliptical, instead of making the pipe elliptical and the reinforcing round. When a sheet of expanded metal or reinforcing mesh is bent it tends naturally to take circular form, and if forced into an elliptical shape by means of artificial supports as they have been trying to do on the pipe already manufactured it will spring back into circular form as soon as the supports are withdrawn. This no doubt causes the trouble they are having at Auburn, and which we did not experience at Glendive.

The trouble at Auburn is further aggravated by the fact that the design of forms is such that the concrete cannot be effectively tamped or spaded in place. This is a vital defect and I doubt if they will be able to get really good pipe with the forms they are using.

Another contributing cause to the trouble is the fact that the core form as now designed cannot be collapsed: This means that the core form must be withdrawn before the concrete is thoroughly set, and will doubtless result in considerable breakage and poor work.

Assuming, however, that all these difficulties are overcome, and that a first class article of finished pipe could be secured, the design is still objectionable for the reason that the top must be plainly marked and the entire line of pipe carefully laid with respect to the top marking. After fill is made there is no way of checking up to ascertain if the interior sections of pipe are laid as marked, and the first indication of errors would be the failure of the section, necessitating the heavy expense of digging out the fill in order to remedy. With the elliptical form of pipe it is impossible to lay any section wrong, and the mere inspection of the end section will be sufficient to show whether or not the pipe has been properly laid.

The round pipe does not evade the patents covering the elliptical pipe, as these patents cover the carrying of a single line of reinforcement from the intrados to the extrados of an arch. We will have to pay a royalty of five cents per lineal foot on the pipe manufactured at the Auburn plant the same as we do at Glendive.

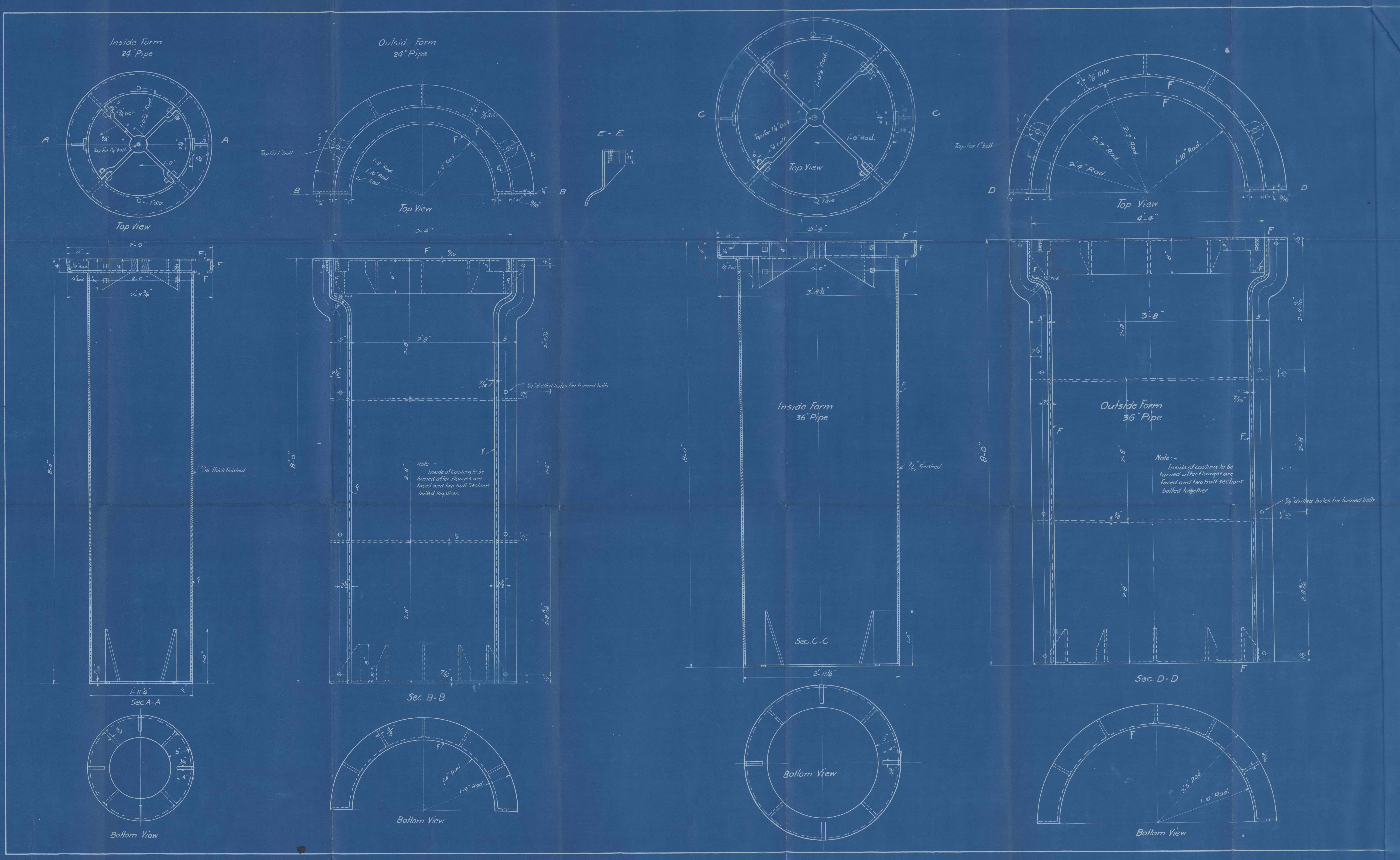
The design of forms shown are very expensive to make and are weak structurally after they are made. The interior surface of the outer casing has to be bored out for its entire length after casing is completed and the two halves bolted together, and the ~~case~~ core form has to be turned for its full length. It would be interesting to find out what these forms cost and compare same with the cost of a structural steel form which is being manufactured and has been on the market for some little time: This structural steel form is made elliptical in shape, has a collapsible center, and overcomes all objections to the cast iron forms which have been made for Auburn.

I would suggest that you pass the requisition for the round reinforcing steel and let them experiment with it, as it may help some.

Yours truly,

Bridge Engineer.

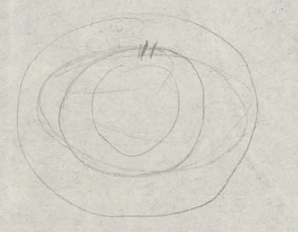
O



N. P. RY.
Tacoma Division
Tacoma - Tenino Line
Plan Showing
Proposed Forms for 24 & 36 inch
Reinforced Concrete Pipes
Scale 1 1/2" = 1'

Office of Assistant Engineer Tacoma, Wash., Feb. 3 1912

Jwb



MODJESKI & ANGIER
MONADNOCK BLOCK
CHICAGO, ILL.

RALPH MODJESKI, M. AM. SOC. C. E.
W. E. ANGIER, M. AM. SOC. C. E.
J. C. REEVES, MANAGER

March6th,
1912.

NORTHERN PACIFIC RY. CO.
OFFICE OF
MAR 7 1912
BRIDGE ENGINEER
ST. PAUL, MINN.

Mr. H. E. Stevens,
Bridge Engineer,
Northern Pacific Ry.,
St. Paul, Minn.

Dear Sir:-

We have your favor of the 5th inst., with Purchasing Agent's order No. 2-1020, placed with the Corrugated Bar Co., covering the following items:

ROUND JOHNSON CORRUGATED BARS AS FOLLOWS:

4200	3/8" x 23'6"
900	3/8" x 22'0"
1000	3/8" x 14'0"
600	3/8" x 14'9"
40	3/8" x 17'3"

We note that material is to be shipped to Mr. J. C. Breedlove, at Auburn, Wash. We will arrange to look after the inspection of this material when ready.

Yours truly,

Modjeski & Angier

Mgr JCReeves

JCR/ER

Material for Tacoma-Tenino Line

March 5, 1912. HES

Messrs Modjeski & Angier,

Monadnock Bldg., Chicago.

Gentlemen:-

Purchasing Agent's order No. 2-1020, placed with the Corrugated Bar Co., covers the following items:

ROUND JOHNSON CORRUGATED BARS AS FOLLOWS:

4200	3/8" x 23'6"
900	3/8" x 22'0"
1000	3/8" x 14'0"
600	3/8" x 14'9"
40	3/8" x 17'3"

Material to be shipped to J. C. Breedlove at Auburn, Wash. Will you kindly make mill inspection in accordance with our specification, two copies of which are enclosed. I understand this material will be ordered at Indiana Harbor.

Yours truly,

O

Bridge Engineer.

Req'n 1037½

NORTHERN PACIFIC RAILWAY COMPANY

PURCHASING AGENT'S OFFICE.

Order No. 2-1020
(Put Order No. on Your Bill)

ST. PAUL, MINN. FEB. 24/12

THE CORRUGATED BAR CO.

C/O T. F. MC.CORMICK, CITY.

Please ship by Freight via C. B. & Q. Ry. to Chicago, and N. P. Ry. from St. Paul.

Consigned to **NORTHERN PACIFIC RAILWAY CO.**

Care of J. C. BREEDLOVE, AUBURN, WASH.

ROUND JOHNSON CORRUGATED BARS AS FOLLOWS:

4200	3/8"	X 23'6"
900	3/8"	X 22'0"
1000	3/8"	X 14'0"
600	3/8"	X 14'9"
40	3/8"	X 17'3"

TO SPECIFICATION DATED FEB. 12,1912.

$1.30 CWT. BASE FOB INDIANA HARBOR.

COPY.

COPY.

ON FACE OF YOUR BILLS SHOW CASH DISCOUNTS.
NO CHARGE FOR PACKAGE OR CARTAGE WILL BE ALLOWED.
Please acknowledge receipt of order, and notify me immediately if you cannot fill promptly.
MAKE INVOICES in TRIPLICATE for EACH and every SHIPMENT, showing DATES and NUMBERS OF ORDERS on which they apply and names of persons and stations to which goods were shipped, and send promptly to my address with shipping receipt.
A STATEMENT showing date and amount of ALL UNPAID BILLS should be sent to me as soon as possible after end of each month.

12-08 5M K

Yours truly,

PURCHASING AGENT.

St. Paul, Minnesota. March 2, 1912. HES

Mr. F. G. Prest,

Purchasing Agent.

Dear Sir:-

Your favor of the 2nd inst. regarding order for Corrugated Bars on SA requisition 1037½.

We wish to make an inspection of these bars. Will you kindly furnish me with a copy of the order for transmittal to the Inspector, also advise the manufacturers that inspection will be made by Modjeski & Angier, of Chicago.

Yours truly,

O

Bridge Engineer.

St.Paul, March 2,1912.

IN REPLY REFER TO
DESK 1

Mr. H. E. Stevens,

Bridge Engineer.

Dear Sir:-

The reinforced concrete bars covered by SA requisition 1037½, E D 27, for Auburn, Wash. have been purchased from the Corrugated Bar Company.

I understand this material will berolled by the Inland Steel Company the first of next week.

If you care to inspect, please let me know immediately and I will wire manufacturers accordingly.

Yours truly,

RJE-D.

Purchasing Agent.

St. Paul, Minn. February 26, 1912. HES

Mr. L. M. Perkins,

Engineer of Maintenance of Way,

Tacoma, Wash.

Dear Sir:-

Your favor of the 21st regarding continuous reinforced concrete pipe.

I have never investigated this pipe analytically, but have no doubt that it is of sufficient strength to stand our loading. It is also a very good design of pipe, and the prices they quote are, I believe, less than the pipe will cost us which we propose to make at Auburn. The expense of laying their pipe is perhaps a little greater than laying ours, account of the necessity of grouting the joints in the field.

Yours truly,

Bridge Engineer.

O

Form 299 TW

Northern Pacific Railway Company

Tacoma, Washington, February 21, 1912.

Mr. H. E. Stevens,

Bridge Engineer,

St. Paul, Minnesota.

Dear Sir:-

I am handing you herewith catalogue of Continuous Reinforced Concrete Pipe.

The construction of our new plant for pipe making at Auburn has stirred these people up somewhat, and they have beenvery anxious to quote us a figure for their pipe in place of our starting a plant ourselves.

Can you advise me if you have ever investigated the pipe in question to see if it meets our requirements as to strength, and if so, what the results are? They quote an approximate price of $1.10 for 24" and $2.10 for 36", this without any transportation being granted them on reinforcement of cement, and based on deliveries at Tacoma.

The dimensions of the pipe are shown on the last page of this catalogue.

Yours truly,

Engineer of Maintenance of Way.

LMP-w
encl.