



Northern Pacific Railway Company.
Engineering Department Records.

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Form 1757

7-12-11 5M RP

N. P. RY. CO.

Chief Engineer

OFFICE OF

FILE NO.

3777

SUBJECT:

Healy Plunbing & Heating Co.,

Contract for Heating and plumb
facilities at Auburn Wash.



3777

Mr. W. L. Darling.

Complying with your request of 9/30-13 I have looked over the extra bills of Healy Heating and Plumbing Company for work done at Auburn, Washington and checked up as far as items can be identified.

The money has been expended as stated below:

1) The lump sum bids for the different classes of work	\$ 23206 ⁰⁰
2) Work on sewer system as per unit prices	" 4710 ⁰⁰
3) work on wooden pipe line [5 miles long] as per unit prices	" 3800 ⁸⁸
4) Waterpiping in shop grounds - unit price work -	" 1214 ⁶⁴
5) Cost of miscellaneous changes and additions	" 1590 ⁴⁸
6) Work on flume, dams and reservoir etc	" 4852 ³⁶
Total	\$ 39374 ³⁶

Items 1, 2 and 3 are O.K. conforming with specifications and bids. The lengths of pipe lines covered under items 2 and 3 check very closely with the original plans.

In item 3 is included \$55⁸⁸ for unloading pipes which is called for in specifications to be done by the Ry. Co.

Item 4 amounting to \$1214⁶⁴ covers cost of changes and additions in waterpiping made after contract was let. The work has been paid for on basis of unit prices as per contract and the extra charges are O.K.

Item 5 (\$1590⁴⁸) covers cost of all changes and additions in roundhouse, boilerhouse, blacksmith

shop and water tank made after the contract was let. I have not data enough at hand to make a complete check on these items, but the amount expended seems very reasonable. The changes were called for by the Mechanical Department.

Item 6 amounting to \$4852³⁶ was expended for, building flume, reservoir and dam. This work was not covered by the contract for plumbing and piping. I have no plans nor other data by which to check up this work.

Yours truly
O. Palaas

10/1 - 13.

Mr. Polaco

Also check the extra
files against the Specification
and see if ok, on box
10/9/30

Bills checked 10/1.1913

OAK No. 443

HEALY PLUMBING AND HEATING COMPANY,

E. M. W. - T - 1983

C. E. M. of W

8634

St. Paul, Minnesota.

September 17, 1913.

In full payment for all labor and material and for use of tools, outfit and equipment for steam plant, heating plant, piping, fire protection, plumbing drainage, water pipe line, etc., for roundhouse, and other facilities, located at Auburn, Washington, from July 1912, to and including April 1913, in accordance with Estimate No. 11 and Supplementary Final, under terms of contract dated June 17, 1912.

ESTIMATE NO. 11, AND SUPPLEMENTARY FINAL.

Boiler Plant, etc.,	100% of \$	3596.00,	\$	3596.00
Steam Heating Plant,	100% of	669.00,		669.00
Setting Pumps, etc.,	100% of	11398.00,		11398.00
Install Oil Tanks, etc.,	100% of	361.00,		361.00
Plumbing Fixtures,	100% of	757.00,		757.00
Water System (Fire)	100% of	6271.00,		6271.00
For Heating Lavatory,	100% of	154.00,		154.00
Placing 10" Water Pipe,	25739 Lin. Ft. at	.13 Ft.		3346.07
20" Vitrified Pipe,	1131 "	1.31,		1481.61
18" " "	1154 "	.92		1061.68
12" " "	83 "	.79		65.57
10" " "	82.4 "	.78		64.27
8" " "	351.3 "	.67		235.37
6" " "	1015.2 "	.63		1017.58
4" " "	423.8 "	.61		258.52
3" " "	60 "	.59		35.40
Brick Catch Basins,	10	49.00,		490.00
Cast Iron Water Pipe, 14"	77.6 "	2.795		216.89
" " " 12"	315.6 "	2.136		669.54
" " " 10"	71.7 "	1.83		131.21
" " " 8"	93 "	1.505		139.97
Amount carried forward,				\$ 32419.68

GAK No. 443

Sheet 2

HEALY PLUMBING AND HEATING COMPANY,

St. Paul, Minnesota.

E. M. W. - T-^m

1983(2)

		Amount brought forward,		\$ 32419.68
Cast Iron Water Pipe,	6"	84.2 Lin. Ft.	1.20	101.04
"	"	4"	140.5 Lin. Ft.	140.50
"	"	3"	18.3 "	17.57
Supports for Pipe Line,		2501 H	25.00	62.53
Hangers for Pipe Line,		3364 lbs.	.10	336.40
Extra work per force account bills,				6498.72
				<u>\$ 39374.36</u>

LESS PREVIOUS PAYMENTS.

2/31/12 GAK 187, Est. No.	1, LMP No. 1176,	\$3102.03	
8/31/12 " 207	2, " 1373,	2912.21	
9/30/12 " 213	3, " 1566,	9698.72	
10/31/12 " 245	4, " 1747,	3431.61	
11/30/12 " 255	5, " 1929,	4609.22	
12/31/12 " 264	6, " 2099,	4066.73	
1/31/13 " 302,	7, " 138,	2905.07	
2/28/13 " 312,	8, " 366,	1981.40	
3/31/13 " 346	9, " 628,	124.49	
5/16/13 "	10, " 937,	6467.21	39268.69
			<u>\$ 105.67</u>

AMOUNT OF THIS VOUCHER,-----\$ 105.67

CHARGE:

Additions and Betterments,
 Puget Sound Division,
 F-326 (1911) Auburn, terminals, etc.,
 Shops, Enginehouses and Turntables,

SHOPS, ENGINEHOUSES AND TURNABLES, \$ 105.67

WORK COMPLETED APRIL 23, 1913.

PAYMENT DUE OCTOBER 17, 1913.

Engineer of Maintenance of Way.

3777
Saint Paul, June 30, 1913. WLD-D

Mr. W. C. Smith,

Chief Engineer of Maintenance of Way.

Dear Sir:

Replying to your letter of the 27th instant:

I think all the men transported in connection with Healy's contract to Auburn and who stopped at Parkwater to work, on the way back, should have transportation furnished to St. Paul or points from which they were originally shipped.

Yours truly,

Chief Engineer

HAC-o

Saint Paul, June 27, 1913.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:

I hand you herewith Mr. Perkins' letter of the 24th in regard to return transportation for Healy's men from Parkwater, who were originally passed to Auburn, and, on the completion of the Auburn work, transferred to Parkwater. ✓

Mr. Healy also mentioned this matter to me, stating that there are only a few men to be returned from Parkwater.

Will you kindly instruct.

Yours truly,

H. C. Smith

E. M. W. - T-4

Healy Plumbing & Heating Company.

Saint Paul, Minn.

1913.

May 16. In payment for labor and material and for use of tools, outfit and equipment for steam plant, heating plant, piping, fire protection, plumbing, drainage, water pipe line, etc., for roundhouse and other facilities, located at Auburn, Wash., from July, 1912, to April, 1913, in accordance with Estimate No. 10 and Final, under terms of contract dated June 17, 1912.

ESTIMATE 10 & FINAL.

Boiler Plant, etc.,	100% completed	3596.00	3596.00
Steam Heating Plant,	100% "	669.00	669.00
Setting Pumps, etc.	100% "	11398.00	11398.00
Install Oil Tanks, etc.,	100% "	361.00	361.00
Plumbing Fixtures,	100% "	757.00	757.00
Water System (Fire)	100% "	6271.00	6271.00
For Heating Lavatory,	100% "	154.00	154.00
Placing 10" Water Pipe, 25739	lin. ft. @	.13	3346.07
20" Vitrified pipe 1131	lin. ft. @	1.31	1481.61
15" Do. 1154	lin. ft. @	.92	1061.68
12" Do. 83	lin. ft. @	.79	65.57
10" Do. 82.4	lin. ft. @	.78	64.27
8" Do. 351.3	lin. ft. @	.67	235.37
6" Do. 1615.2	lin. ft. @	.63	1017.58
4" Do. 423.8	lin. ft. @	.61	258.52
3" Do. 60	lin. ft. @	.59	35.40
Brick Catch Basins 10	"	49.00	490.00
Cast Iron Water Pipe			
14" 77.6	per ft. @	2.79½	216.89
12" 313.6	" @	2.13½	669.54
10" 81.7	" @	1.83	131.21
8" 93	" @	1.50½	139.97
6" 84.2	" @	1.20	101.04
4" 140.5	" @	1.00	140.50
3" 18.3	" @	.96	17.57
	Carried Forward		32476.71

E. M. W. - T-4

931-2

7487

Carried Forward

32476.71

Supports for Pipe Line,	2501 M S	25.00	62.53
Hangers for Pipe Line,	3364 lbs.	.10	336.40
Extra work per force account,			<u>6393.05</u>
			39268.69

LESS PREVIOUS PAYMENTS.

<u>Date</u>	<u>Est. No.</u>	<u>CAK No.</u>	<u>LMP No.</u>	<u>Amount</u>	
7/31/12	1	187		3102.03	
8/31/12	2	207	1178	2912.21	
9/30/12	3	213	1373	9698.72	
10/31/12	4	245	1566	3431.61	
11/30/12	5	255	1747	4609.22	
12/31/12	6	264	1929	4066.73	
1/31/13	7	302	2099	2905.07	
2/28/13	8	312	138	1951.40	
3/31/13	9	346	366	<u>124.49</u>	
			628		<u>32801.48</u>

AMOUNT OF THIS VOUCHER

\$6467.21

Work completed April 23, 1913,

Payment due May 23, 1913.

Healy Plumbing and Heating Company,

E. M. W. - T-4

937 (3)

C. E. W. of W.

7487

Saint Paul, Minnesota.

CHARGE:

Additions and Betterments,

Puget Sound Division,

File 326 (11) Auburn: Terminals, etc.,

Shops, Enginehouses and Turntables,

Shops, Enginehouses and Turntables

2000.53

Shop Machinery and Tools,

Shop Machinery and Tools

113.98

Water and Fuel Stations,

Water Stations

683.84

Fuel Stations

16.26

2822.61

Open Accounts,

Healy Plumbing and Heating Company,

a/c Contract

3644.60

\$6467.21

3277
St. Paul, August 10th, 1912..

New

Mr. W. C. Smith,

Chief Engineer Maintenance of Way.

Dear Sir:-

I hand you herewith for delivery to the contractor,
executed contract dated June 17th, 1912 with the Healy Plumbing
& Heating Company for plumbing, etc. at Auburn, Wash.

Yours truly,

COPY.
Chief Engineer.

REG R

Enc 1.

St. Paul, August 10th, 1912..

Mr. R. H. Relf,

Assistant Secretary.

Dear Sir:-

I hand you herewith executed contract dated June 17th, 1912 with the Healy Plumbing & Heating Company for plumbing etc., in the engine facilities at Auburn, Wash., together with letter of August 7th, from the President authorizing me to execute. Bond was sent you August 1st.

Approximate amount of contract is \$31500.00.

Yours truly,

COPY.

Chief Engineer.

REG R

Encl.

St. Paul, August 7th, 1912..

COPY

Mr. W. L. Darling,

Chief Engineer.

Replying to your letter of August 5th: I return contract with the Healy Plumbing & Heating Company for plumbing etc in the engine terminal facilities at Auburn. This letter, when file with the Assistant Secretary, ill authorize you to execute the contract for the Northern pacific.

(Signed) Howard Elliott,

President.

Saint Paul, June 22, 1912.

Mr. J. G. Woodworth, Traffic Manager,
Mr. H. A. Gray, Comptroller,
Mr. G. J. Mayer, Auditor Disbursements,
Mr. Wm. Richards, Auditor Freight Receipts,
Mr. Geo. Sherriff, Auditor Passenger Receipts,
Mr. W. S. Taylor, Auditor Agencies,
Mr. E. O. Parks, Auditor, Supplies & Mech. Accounts,
Mr. O. C. Wakefield, Supply Agent.

Dear Sir:-

Contract has been awarded to Healy Plumbing and Heating Company of Saint Paul, Minnesota, under date of June 17, 1912, for furnishing certain labor and material for installation of steam plant, heating plant, piping, fire protection, plumbing, drainage system, water pipe line, etc., for round house and other facilities for engine terminals at Auburn, Wash., The contract contains the following clause in regard to transportation:

"The Company will furnish free transportation over its own lines, subject to the review and instructions of its Chief Engineer as to the necessity for and proper use of same, for men, tools, outfit, equipment and material to the site of the work and for return to original point of shipment, or to any other point on the lines of the Railway Company to which the tariff rate does not exceed that to point of origin. If such return shipments are made to point to which the tariff is higher than to point of origin, the contractor shall pay such excess of rate only. The Company will charge full tariff rates for transportation of boarding and commissary supplies. Nothing herein contained shall be construed to relieve the contractor from payment of demurrage charges under Car Service Association rules."

Shipments on account of this contract will be consigned to the Northern Pacific Railway Company, c/o G. A. Kenrick, Assistant Engineer, for Healy Plumbing and Heating Company, Auburn, Wash.

Transportation on account of this contract will be charged to the improvement at tariff rates account A.F.E. Comptroller's No. 356, of 1912.

Yours truly,

Copy W.L. Darling,
L.M. Perkins,
G.A. Kenrick,
J.E. Craver.
C-H.

W. C. Smith

X .1
Saint Paul, August 5, 1912.

Mr. Howard Elliott,
President.

Dear Sir:

I hand you herewith for execution or authority for me to execute, contract with the Healy Plumbing and Heating Company for the heating, plumbing etc. of the engine terminal facilities at Auburn, Washington, authorized by your letter of June 10, 1912.

Bond in the sum of \$15,000, with the American Bonding Company as surety, has been furnished.

Yours truly,

WLD-D

Chief Engineer

Enc

SAINT PAUL, AUGUST 2, 1912
RECEIVED
OFFICE OF
ENGINEERING
AUG 3 1912
SAINT PAUL, MINN.

Saint Paul, August 2, 1912.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

I am handing you herewith for execution by the Railway Company, contract dated June 17, 1912 with the Healy Plumbing and Heating Company for installation of steam plant, heating plant, etc., for engine terminals at Auburn. A certified copy of the bond was sent to you with my letter of July 31st. Copy of the contract is attached hereto for your files.

Yours truly,

W. L. Smith

Encl.

C-H.

*authorized by Mr. Elliott's letter
June 12th*

Saint Paul, August 1, 1912.

Mr. R. H. Relf,

Assistant Secretary.

Dear Sir:

I hand you herewith bond given by the Healy Plumbing & Heating Company with the American Bonding Company as surety, for \$15,000, in connection with contract dated June 17th, for installation of steam plant at Auburn, to which is attached letter from the Treasurer dated July 26th approving the surety.

Yours truly,

reg-d

Chief Engineer

enc

(COPY

Saint Paul, Minnesota, July.26, 1912.

Mr. W. C. Smith,
Chief Eng'r Mtce of Way,
Building.

Dear Sir:

I return herewith surety bond given by the
Healy Plumbing & Heating Company of Saint Paul with
the American Bonding Company of Baltimore for \$15000.00
in connection with contract dated June 17th, as the
sureties are entirely satisfactory.

Yours truly,

C. A. CLARK

Treasurer

FROM
CHIEF ENGINEER OF MAINTENANCE OF WAY,
NORTHEEN PACIFIC RAILWAY COMPANY,
ST. PAUL, MINN.

Saint Paul, July 31, 1912.

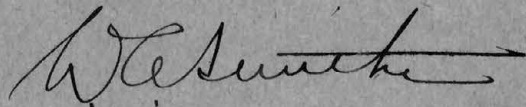
Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Herewith for filing with the Assistant Secretary, certified copy of bond given by Healy Plumbing and Heating Company with the American Bonding Company as surety in the sum of \$15,000.00 in connection with contract for installation of steam plant, etc., Auburn, Wash.

This bond has been approved as to form by Legal Department and the Treasurer's letter of approval of surety, 26th instant, is attached.

Yours truly,



Encl.

C-H.

Saint Paul, June 17, 1912.

Mr. Howard Elliott,

P r e s i d e n t .

Dear Sir:

Referring to your letter of the 10th instant,
authorizing award of contract to the Healy Plumbing &
Heating Company:

The best we were able to do with them was
to get their bid on piping reduced \$200.00.

Yours truly,

WLD-D

Chief Engineer

Saint Paul, June 17, 1912.

Mr. W. C. Smith,

Chief Engineer of Maintenance of Way.

Dear Sir:

Referring to your letter of the 12th instant, relative to the contract for heating and plumbing at Auburn:

I think Mr. Healy should be awarded the contract on the basis of his prices, with a \$200 reduction in piping. His total bid is very low, but as you say he is a responsible man and in addition has bond to cover. I think we should be sure that the piping has not been overestimated, as that is the item on which the contract is awarded.

Yours truly,

WLD-D

Chief Engineer

OFFICE OF
CHIEF ENGINEER
JUN 16 1912
NOR. PAC. R.
ST. PAUL, MINN.

Saint Paul, June 12, 1912.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Replying to your notation of the 10th on Mr. Elliott's letter of the same date, and returning papers relative to award of contract for steam heating, plumbing, piping, etc., for the layout at Auburn:

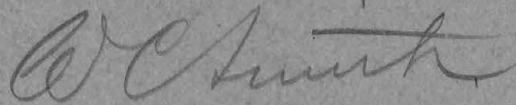
I have had Mr. Healy down this morning, and the best that he will do is to cut \$200 more off from his bid. This to come off from any of the items that we may elect. I will say in this connection, that I had him down before I sent you my letter of the 6th transmitting the bids, and persuaded him to cut \$500 off from his bid for piping.

On account of the quantities involved in some of the items being indeterminate until the actual work is done on the ground, I do not think it advisable to let the contract on a round sum basis, as the quantities may work out so that the amount of work will be less than the schedule price, and then again we may wish to add some piping which might make it more. Mr. Healy agreed, however, to having his prices readjusted if we so decided; that is, he would raise his unit price for the water piping but cut an equal amount off from some other item, etc.

Mr..W..L..D..#2.

You understand, of course, that we are going to have the work covered by a surety bond and that there seems to be no chance of our losing out.

Yours truly,

A handwritten signature in cursive script, appearing to read "W.C. Smith". The signature is written in dark ink and is positioned to the right of the typed phrase "Yours truly,".

*W.C. & Healy what you can
do with Mr. Healy. D 6/10*
Saint Paul, June 10, 1912.

Mr. W. L. Darling, Chief Engineer.

I have your letter of June sixth with statement of bids for steam heating and plumbing, including boiler plant, breeching and stack, etc., for the buildings at Auburn.

I am willing to accept your judgment in this and award the contract to the Healy Plumbing and Heating Company. I desire, however, to call your attention to the fact, that on a great many items they are higher than some other bidders and that their bid becomes the lowest because of the wooden water pipe. Is there any danger of our getting caught on this and of having to put the wooden piping in ourselves on force account and thereby lose money?

Healy is some \$400. higher on breeching and stack; he is higher on steam heating plant; he is \$3600. higher than the lowest bidder on piping; his unit prices for tile drain pipe are in

Mr. W. L. Darling - 2

many cases higher.

Can you not go back at him and insist on a reduction in some of the heavy items and say you will give him the contract at some round sum - like \$30,000.00?

Yours truly,

Howard Elliott

President.

(Dict.)

X
Saint Paul, June 6, 1912.

Mr. Howard Elliott,

P r e s i d e n t .

Dear Sir:

I hand you herewith schedule of bids received for steam heating and plumbing, including boiler plant, breeching and stack, etc. for the buildings at Auburn. The estimated cost is \$31,715.

Would recommend award of contract to the lowest bidder, the Healy Plumbing & Heating Company, of St. Paul, at \$31,437.90.

Your attention is called to the great discrepancy in the bids for wood water piping. The Railway Company is to furnish the material, of which there is about five lineal miles, so that the contractors' prices are for labor only. The Healy people have walked over the work, and their attention has been called to the fact that they have a very low bid, but they insist that although their price for laying the pipe is small, yet some profit can be made on the balance of the work, so that on the whole they are satisfied to undertake it at that price. They are good men, have done good work for the Great Northern and are now doing the same kind of work at Pasco.

Yours truly,

WLD-D

Chief Engineer

Enc

Saint Paul, June 6, 1912.

Mr. W. L. Darling,
Chief Engineer.

Dear Sir:-

Comptroller's No.326 of 1911, among other things, covers a boiler plant, breeching and stack, steam heating plant for the offices, piping in buildings, etc., with other sewer and water piping; and supplementary to this Comptroller's number there was put through another AFE covering \$15,823.00 for gravity water supply at Auburn.

The progress on the building work is now such that the plumbing and piping contractor, etc., can begin work at an early date. Consequently, specifications, plans, etc., have been prepared by this and the Mechanical Department covering this work. Bids were requested and have been secured in accordance with the attached schedule.

The Railway Company's estimate covering the portion of the work to be done by contract on the two AFE's amounts to \$31,715. The lowest bidder for the work is the firm of Healy Plumbing & Heating Company, of St. Paul, who hold a contract for similar work at Pasco. They also did the work for us at Northtown Junction, and have been doing this kind of work on the Great Northern for several years.

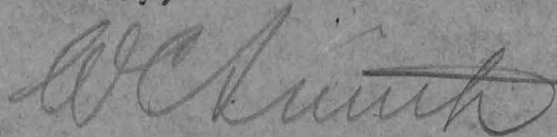
I recommend award of contract to them on the basis of unit prices, which for the estimated quantities amount to

OFFICE OF
CHIEF ENGINEER
JUN 6
1912
NOR. PAC.
ST. PAUL, MINN.

Mr..W..L..D..#2.

\$31,437.90. These figures are based on free transportation,
the same as was the estimate.

Yours truly,

A handwritten signature in cursive script, appearing to read "W.C. Smith", with a long horizontal flourish extending to the right.

bids opened June 1912

Date. Agreement made the Seventeenth day of June A. D. 1912
between the NORTHERN PACIFIC RAILWAY COMPANY hereinafter called the "Company" and

Parties. Healy Plumbing and Heating Company of Saint Paul, Minnesota, a
corporation of the State of Minnesota.

hereinafter called the "Contractor."

The Contractor agrees to furnish all labor, services and material for, and construct, complete and finish in the most thorough workmanlike and substantial manner in every respect to the satisfaction of the Chief Engineer of the Company, within the time hereinafter specified, and according to the specifications hereto annexed and made part of this contract, and plans prepared there-

for, the steam plant, heating plant, piping, fire protection, plumbing, drainage system, water pipe line, etc., for roundhouse and other facilities for engine terminal located at Auburn, Washington.

Work

Definition of terms.

Where the word "Engineer" occurs in this contract or specifications attached hereto it refers to the Engineer of the Company in charge for the time being of the work of construction; and "Chief Engineer" means the Chief Engineer of the Company from time to time.

Date of completion.

The work is to be commenced immediately and completed on or before the first (1st)

day of October A. D. 1912.

Sub-contracts.

The work shall be performed under the personal supervision of the Contractor and neither this contract or any interest therein shall be assigned, nor said work or any part thereof sub-contracted without the written consent of the Chief Engineer to every such assignment or sub-contract.

Complying with instructions.

The Contractor will in all things conform to the instructions of the Engineer and his duly appointed assistants.

Remedy faulty work.

All imperfect or insufficient work or material shall be remedied immediately when pointed out, and shall be made good and sufficient to the satisfaction of the Engineer, and omission by the Engineer to disapprove of or reject insufficient or imperfect work or material at the time of any monthly or other estimate shall not be deemed an acceptance of such work or material; and the Engineer shall have the power at all times to have defective work or material taken out and rebuilt or replaced at the expense of the Contractor.

No liquors.

Disorderly
workmen.

Extra work and
bills therefor.

Work when
and where
directed.

Arbitration.

Prices for
work.

The Contractor will not bring or permit to be brought anywhere on or near the work spirituous or other intoxicating liquors; and if any foreman, laborer or other employe of the contractor or of any sub-contractor, shall in the opinion of the Engineer be intemperate, disorderly, incompetent, wilfully negligent or dishonest in performance of his duties, he shall on request of the Engineer forthwith be discharged; the Contractor will not employ nor permit to remain about the work any person who from said work or from any other part of the Company's railroad may have been discharged for any of the causes mentioned in this paragraph.

No extra work or material is to be allowed or paid for, excepting that done or furnished in performance of a previous order in writing of the Engineer, and all claims for extra work or material must be presented to the Engineer for allowance at the close of the month in which the work shall have been done or material furnished, otherwise all claim therefor shall be deemed waived.

The Contractor will carry on the work in such a manner and at such times and at such points as the Engineer from time to time shall direct, but the Contractor shall have full control of his employes engaged upon the work and be solely responsible for all personal injuries caused in any manner by carrying on any work under this contract.

To prevent disputes and misunderstandings between the parties and to provide for the speedy settlement of such as may occur in relation to the provisions of this agreement, or the true intent and meaning hereof, or the manner of performance by either party, the Chief Engineer of the Company is made the umpire to decide all such differences; he shall also decide the amount and quantity, character and kind of work done and materials furnished by the Contractor, including all extra work and material; and his decision shall be final and conclusive on the parties.

The prices to be paid by the Company for the work are as follows:

For labor, material, services, use of outfit, tools and
equipment for the completion of the work as specified:

For the installation of boiler plant, comprising setting
of boilers, stokers, fan and fan engines for forced
draft, providing breeching and stack and all work and
material in connection therewith complete, Three
thousand five hundred ninety-six dollars.....\$ 3,596.00

For steam heating plant in store house and oil rooms,
house for foreman's office, bulletin room and engine
men's room including all outside steam supply and
return piping for these buildings complete, Six
hundred sixty-nine dollars..... 669.00

For setting of all pumps and machinery, feed water
heater, etc., in pump pit and engine room, providing
of steam header and all piping, valves, connections,
etc., to boilers, pumps, engine, air compressors, etc.,
in boiler room, engine room and pump pit, placing of
air reservoir and all air piping both inside of build-
ings and in yard, all pipe lines, fittings and valves,
etc., in pipe tunnel, hot well, roundhouse and machine
shop, placing of drop pit pumps including piping, valves,
connections and fittings to pumps and drop pit jacks,
placing of fuel oil tanks with piping and connections
including heating of fuel oil cellar, underground
blow-out piping with connections to catch basin, etc.,
also iron drain piping inside of buildings extending
outside to connections with tile drains, etc., complete,
Eleven thousand three hundred ninety-eight dollars... 11,398.00

For installation of oil tanks, oil pumps and Bower
specialties including provision of all piping, valves,
fittings and connections in oil room and oil cellar,
complete, Three hundred sixty-one dollars..... 361.00

For all plumbing fixtures in lavatory, store house and
engineers' supply room including all piping, connec-
tions, etc., required for and in connection there-
with, complete, Seven hundred fifty-seven dollars.....\$ 757.00

For the entire water pipe system and fire protection
outside of buildings including all fire hydrants,
valves, etc., placing of stand pipes, fire protection
of coal dock also fire protection of machine shop and
store room, water supply to blacksmith shop, etc.,
complete, but not including wooden pipe line from
source of water supply to water tank, Six thousand
two hundred seventy-one dollars..... 6,271.00

For heating of lavatory, One hundred fifty-four dollars. 154.00

For placing 10-inch wooden water piping for tank supply,
including necessary clearing and grubbing of right
of way, excavation, backfilling, and placing fittings,
material to be furnished by the Company as specified,
a lineal foot, Thirteen cents..... 0.13

For work specified to be based on unit prices and
for additions and deductions, the following unit prices:

24" vitrified tile socket pipe in place including fittings,
excavation and backfilling, a lineal foot..... 1.61

20" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot... 1.31

18" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot... 1.13

15" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.92

12" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot... 0.79

10" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.78

8" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.67

6" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.63

4" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.61

3" vitrified tile socket pipe in place including
fittings, excavation and backfilling, a lineal foot.. 0.59

Brick catch basins including cast iron frame cover
and ladder complete as specified including exca-
vation and backfilling, per piece..... 49.00

14"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	2.795
12"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	2.135
10"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	1.83
8"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	1.505
6"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	1.20
4"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	1.00
3"cast iron water piping in place including fittings, excavation and backfilling, a lineal foot.....	0.96
Cast iron fire hydrant in place, as specified, includ- ing excavation and backfilling, per piece.....	35.00
Timber supports in place for pipe line including nails or spikes for fastenings as specified in paragraphs 102 and 103, per 1000 FBM.....	35.00
Iron hangers or supports for pipe line in place as specified in paragraphs 102 and 103, per pound of iron.....	0.10

The Company will furnish free transportation over its own lines, subject to the review and instructions of its Chief Engineer as to the necessity for and proper use of same, for men, tools, outfit, equipment and material to the site of the work and for return to original point of shipment, or to any other point on the lines of the Railway Company to which the tariff rate does not exceed that to point of origin. If such return shipments are made to point to which the tariff is higher than to point of origin, the contractor shall pay such excess of rate only. The Company will charge full tariff rates for transportation of boarding and commissary supplies. Nothing herein contained shall be construed to relieve the contractor from payment of demurrage charges under Car Service Association rules.

Price for extra work.	FOR EXTRA WORK, or work done under written orders of the Engineer for which prices are not named herein, the Contractor shall be paid his actual outlay in such work and ten per cent additional.
Estimates.	Approximate estimates of the work done are to be made by the Engineer or his assistants at or about the end of each calendar month; and payment of the amount of each monthly estimate will be made by the Company on or about the twentieth day of the following month, less however all previous payments and less ten per cent of such estimate. Ten per cent upon all monthly estimates shall be retained until and as security for complete performance of this contract.
Payments.	
Retained percentage.	
Stopping work	The Company at any time before completion may stop the work or any part thereof, or may reduce the force employed or retard the work or any part thereof. On receiving such direction the contractor shall stop work or diminish the force as directed, and shall have no claim whatsoever for damages by reason thereof, but shall receive payment for the work done in full discharge and satisfaction of all demands against the Company. Any notice given by the Company under this paragraph shall be in writing signed by the Chief Engineer, and shall be delivered to the contractor or some person on the work representing him at least five (5) days prior to the required stoppage or reduction.
Accelerating work.	If at any time the Contractor shall not in the opinion of the Chief Engineer be progressing with the work as fast as necessary, or with sufficient force to insure its completion within the contract time, the Chief Engineer may direct the Contractor to put on such additional force and means as in his judgment are necessary, and on the failure of the Contractor to comply with such directions, the said Chief Engineer may declare this contract terminated; and in such case the amount of moneys then remaining unpaid including the percentage retained on all monthly estimates, shall be kept by the Company until the work is completed, and the Company may employ such force and means as in its judgment shall be necessary to complete the work and the cost thereof shall be paid by the Contractor.
Retained percentage forfeited.	
Power to cancel contract.	If the Contractor shall at any time fail to perform any agreement herein contained the Company may cancel this contract; in which event the Contractor shall have no claim for damages, or for compensation for work done or material furnished, or for any portion of the percentage retained on monthly estimates; and the Company shall have the right to take possession of and hold the work done and material furnished and to retain all moneys which may then be unpaid.
Contractor to pay all laborers	The Contractor will promptly pay all laborers and others in his employ as their pay falls due, and promptly pay as they fall due all bills for material and supplies going into the work, and in the event of his failure at any time to do so the Company may retain from subsequent estimates such amounts of money as the Chief Engineer may deem requisite to pay the laborers and all others employed on the work and the said supply and material bills. Before final settlement is made the Contractor shall furnish to the Company satisfactory evidence that the work is free and clear from all liens for labor or materials and that no claim exists out of which a lien may grow.
Contractor to pay damages to crops, etc.	The Contractor assumes and agrees to pay for all injury or damage to crops, fences, farm improvements, or any other property caused by the prosecution of the work, and all damages by fire started from the right of way, except damage to real estate made necessary by the work. When the final estimate is made, if there shall be any unsatisfied claim for such damage, the Company may deduct from the moneys owing the Contractor a sum equal to the amount so claimed together with the estimated cost of adjusting the claim. Such moneys shall be retained until all damages are satisfied when the remainder shall be paid over to the Contractor.
Retention of claims from final estimate.	
Temporary suspension.	If the work be delayed materially from any act or neglect of any agent or employe of the Company the time for completion shall be extended for a period equal to such delay and the Contractor shall have no further or other claim upon account of such delay. He must make claim to the Chief Engineer in writing for extension at the time of the delay, stating the occasion and nature thereof, and failing to do so his right to extension shall be waived.
Extension of time.	
Total suspension.	In case of a total suspension of all work for over ninety days without any fault or procurement of the Contractor, unless such suspension shall have been caused by the winter season or protracted rigor of weather, the Chief Engineer shall make a final estimate and the amount so estimated shall be paid to

the Contractor; he shall be entitled to receive only that proportion of the contract price which the amount or work done and material furnished bears to the total amount covered by the contract.

Insurance.

Damage by fire to buildings or structures during construction will be made good by the Contractor, who will keep all structures fully insured until completion and acceptance by the Company. The cost of insurance will be divided equally between the parties, the policies written in the name of both, loss payable as their interest may appear, and deposited with the Chief Engineer.

Final estimate.

Time of payment of final estimate and retained percentage.

When in the opinion of the Chief Engineer this contract shall have been performed, he shall so certify in writing and give a final estimate and a statement of the balance unpaid; and the Company will within thirty days thereafter pay the full balance. The Contractor will at final payment execute, acknowledge and deliver to the Company under his hand and seal a valid discharge from all claims and demands growing out of or connected with this contract.

Release.

Execution.

IN WITNESS WHEREOF, the Company has caused these presents to be signed by its duly authorized officer and the Contractor has hereunto set his hand and seal.

Witness as to the Company

NORTHERN PACIFIC RAILWAY COMPANY.

By _____

Witness as to the Contractor

_____(SEAL)

_____(SEAL)

SPECIFICATIONS

of

Labor and Material for Steam Plant, Heating Plant, Piping, Fire Protection, Plumbing and Drainage System, etc., for Northern Pacific Engine Facilities at Auburn, Washington.

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1. The contractor for the work covered by this contract will be referred to in these specifications as "Contractor", and the contractor for the construction of the buildings will be referred to as the "Building Contractor". The contractor shall carry out his part of the work in such order and manner as will be directed by the Railway Company's engineer, and as far as possible in such order as not to cause delay to the building contractor in finishing of his work.

STEAM PLANT

2. The contractor shall set in place on concrete foundations prepared by the building contractor, two 150 horse power Babcock and Wilcox Watertube Boilers, including construction of Dutch Ovens, placing of two Jones Underfeed Stokers, setting of fan engine and fan for forced draft, etc., complete, as per manufacturers' general drawing and setting diagrams. The manufacturers of boilers and stokers will supervise erection.

The contractor shall provide all necessary material required for setting of boilers, Dutch Ovens and stokers, and the work shall be done as directed by the manufacturers' supervisor in every particular and to the entire satisfaction of the Railway Company.

The fire-boxes shall be lined with fire bricks laid in fire clay to conform with drawings and directions. The balance of brick masonry for setting shall be selected hard burnt brick, of approved quality, of perfect shape and even in size. The brick to be laid in strong fresh lime mortar made in proportion of one part lime to three parts clean and thoroughly screened sand.

3. The Railway Company will furnish boiler^{stokers,} engine and fan, including all necessary fixtures, and tools for boilers, f.o.b. near site complete. Header with valves, tees, etc., to receive piping

and all connections with pumps, engines, tanks, drainage system, etc., shall be furnished and placed in a satisfactory manner by the contractor in accordance with detail plans furnished by the Railway Company. Blow-off connections and tank in accordance with Railway Company's drawings to be installed by the contractor. Tank and ~~Northern Pacific~~ ~~is standard~~ blow-off cock to be furnished by the Railway Company. Pipe and fittings to be furnished by the contractor. Provide connection from blow-off tank to sewer.

BREECHING AND STACK.

4. Breeching with dampers, iron stack with iron ladder, clean out doors, and guys with substantial concrete ground anchors shall be furnished and placed by the contractor in accordance with drawings furnished by the Railway Company. Paint stack and breeching both inside and outside two coats Solvay stack paint, as manufactured by Somet Solvay Company.

WATER PIPING

5. The cold water main and outside hydrant lines to be provided as specified in paragraphs 83 to 97 inclusive. The contractor shall provide 4" branch from the main to hot well with gate valve at pipe connection and float valve in hot well, adjusted to proper level as will be directed. The contractor shall provide a 10-inch wrought iron suction pipe from hot well to pump pit in power house, including necessary valves and fittings and 10" foot valve with metal valve to stand hot water on suction pipe in hot well.

FILLING UP PIPE

6. From the 10" suction an 8" branch will connect to the filling up and fire pump. Also provide an 8" connection between the cold water main and the suction of filling up and fire pumps using wrought iron pipe, including necessary valves, fittings, air chamber, etc., all as per Railway Company's drawings.

Provide a 6" extra heavy discharge pipe from filling up and fire pump, connected to 5" extra heavy pipe through the tunnel to roundhouse; rise to ceiling and run overhead, as shown on drawing

16136, reduce and connect to 3" pipe running the full length of roundhouse as per Railway Company's drawings.

FILLING UP PIPE IN ROUNDHOUSE

7. From the above 3" main in roundhouse provide 3½" drops between alternate pits, run under floor and rise to 18" above floor as shown on section of roundhouse. At end of riser place 2" x 2" x 3½" tee with two 2" extra strong nipples and two 2" Lunkenheimer valves, Figure 431, Page 164, Catalog #46, with brass hose nipples 3½" diameter, 8 threads per inch, Style No.1, Railway Company's drawing 12088 E.

In every 3½" drop pipe introduce at a distance of 5 feet from floor 3½" tee with 3½" hose connection of pattern to match those of municipal fire department. Provide 3 gate valves with flanged connection in the 3" main, one valve at each fire wall on the side facing supply end of main pipe. The above pipe will be located as shown on roundhouse plans and shall be extra heavy wrought iron pipe.

8. Provide a 5-inch connection between tank main and filling up pipe with a 5" extra heavy gate valve and a 5" extra heavy swinging check valve, same to swing towards filling up main.

WASHOUT PUMP CONNECTION

9. Provide a 10" connection between 10" suction pipe from hot well and washout pump.

10. Provide a 10" connection between tank main and suction of washout pump.

11. Provide 8" discharge from washout pump ^{connecting to 6" pipe} ~~XXXXXXXXXXXX~~ through tunnel into roundhouse, rise to ceiling and run overhead and connect to 5" washout pipe to be run the full length of roundhouse, as per railway Company's drawings.

12. From this 5" washout main provide 3" drops between alternate pits to underneath floor, run under floor and rise to 18" above floor, as shown on section of roundhouse.

At end of riser place 2" x 2" x 3" tee, two 2" extra strong nipples and two 2" Lunkenheimer valves, Figure 431, Page 164, Catalog

#46 with brass hose nipple 3 $\frac{1}{2}$ " diameter, 8 threads per inch, Style 1, Railway Company's Drawing 12088 E. The above washout main and branches must be located as shown on roundhouse plans, and shall be extra strong wrought iron pipe with extra heavy fitting and valves.

13. Provide 2 $\frac{1}{2}$ " extra strong wrought iron pipe branch from washout pump to boiler room for washing out boilers; this pipe to have 2" Lunkenheimer valve, Figure 431, Page 164, Catalog No. 46, with brass hose nipple 3 $\frac{1}{2}$ " diameter, 8 threads per inch, Style 1, Railway Company's drawing 12088 E, located as shown on Railway Company's drawings.

FIRE CONNECTIONS

14. Provide an 8" connection to discharge from filling up pump and washout pump with valves arranged so that either pump may be used independently on fire line. Provide an 8" connection to tank line with an 8" gate valve and 8" swinging check valve swinging toward fire line in connection. All pipe, fittings and valves to be extra heavy, all as per Railway Company's drawings.

BOILER FEED CONNECTION

15. The two boiler feed pumps to have suction from feed water heater so arranged that either pump may be used independently, also suction from tank line arranged in same manner. Pipes, fittings and valves standard and arranged as shown on plan.

16. Provide discharge pipe from boiler feed pumps to boilers with branches from each pump individually valved as per Railway Company's drawings, pipe fittings and valves extra heavy. Provide stop valves in boiler feed connections between check valves and boiler feed main. Provide connection from tank line to each boiler for filling with cold water.

DROP PIT PUMP CONNECTIONS

17. The contractor shall provide the necessary suction and discharge pipes for drop pit pumps, including all fittings and valves, as per Railway Company's drawings.

HIGH PRESSURE STEAM PIPES

18. The contractor shall furnish and place all piping, mains and branches, including valves, except trottle valves for pumps and fittings for connection with boilers, engines, air compressor and pump in pump pit, also high pressure steam piping to drop pit pumps, blower pipe in roundhouse, including all fittings, necessary traps, valves, etc. Traps to be the "Vance". The piping to be as shown on Railway Company's drawings. Pipe fittings, valves, etc., to be approved by the Railway Company. Also high pressure steam pipe branches for heating office, bulletin room and engine-men's room, branches to be valved at connection with main.

Swartwout or equivalent steam separator shall be placed on main steam pipe to Air Compressor and engine. The Railway Company will furnish the separator and the contractor shall install same. Provide necessary high pressure steam connections for Jones Underfeed Stokers, as per Railway Company's drawings and as directed by the manufacturers' supervisor. Provide drains on all steam connections to pumps and stokers so condensed water can be drawn off. Necessary trottle valves, governors and lubricators for engines, pumps and on air compressor will be furnished by the Railway Company and shall be installed by the contractor.

19. The blower pipe in roundhouse to be 1½" (lagged) to run overhead the entire length of house with one inch drop pipe between each pit and provided with ~~Bxxx~~ swing joints and fittings as per Mechanical Departments detail drawing No. 12086 B.

EXHAUST STEAM PIPES

20. Connect the exhaust from engine and air compressor into one main in tunnel under floor and run into pump pit, as per drawings. Connect to same exhaust branches from all pumps in pump pit and stoker. Run outdoor exhaust through roof and provide with Swartwout exhaust head and drip connection to sewer. All necessary valving and fittings to be provided by the contractor.

Run main exhaust from pump pit through pipe tunnel, tapping

two branches from same into hot well with valves at connection with main. Connect the main exhaust with main blow-off pipe from round-house, all as per Railway Company's drawings No. 16126.

21. The offices in store house, and building containing foremen's office, bulletin room and enginemen's room will be heated by exhaust or live steam or a combination thereof.

Run a 2" exhaust branch and 1" live steam pipe branch underground to each of above buildings, the pipes to be valved at connection with main. The pipes to rise to the ceiling in the buildings at points as directed. The live steam pipes to be provided with pressure-reducing valve reducing the pressure to 3 pounds per square inch, and on the reduced side of valve connect to the overhead exhaust main supply^{ing} the radiators. Provide on shut off valve on each side of the pressure reducing valve, and also valved by pass connection between the live steam and the exhaust pipes.

22. Run supply main of ample size for radiators overhead along walls under ceiling and drop supply branches from same to radiators. The radiators shall be of cast iron, those manufactured by the Northwestern Radiator Company at Sauk Center, Minnesota, or equally good, and they shall be located as shown, and of capacity as noted on floor plans. Radiators in store house offices 32" high, and in enginemen's building 26" high. Each radiator to be provided with approved angle or globe supply and return valves and $\frac{1}{8}$ " air cock.

23. Run the return pipes from radiators under floor and outside of buildings under ground preferably in same trench as supply pipes, and connect into one return main in pipe tunnel, the main to run into pump pit and connect to feed water-heater. Provide valved drip connection between steam supply risers and return mains.

24. In oil room and oil room cellar provide pipe coils for heating at locations as will be directed on the ground. There shall be installed at least 180 lineal feet of 1" pipe in oil room and 120 lineal feet of 1" pipe in oil cellar. Provide the coils with neces-

sary supply, return and air valves. Also run a piece of pipe through oil room wall to be used for heating oil in tank car standing on track. The coils in oil cellar to be placed and supported on walls at such elevation as required for proper fall for return piping without use of trap.

25. Heat may be required in the lavatory building. The contractor shall state separately in his bid the cost of supplying this building with heat as follows:

Make connection with the exhaust pipe in roundhouse and run a 1½" pipe under ground to lavatory for steam supply to radiator. Provide radiator, as shown on plan, also necessary valves, air cock, drip connection, etc. The condensation water from this radiator to be trapped into sewer. The pipe under ground to be covered as specified for other steam piping.

26. All steam supply and return piping under floor shall be placed in a 2" plank box tarred on the outside and covered on sides and top with ^{two} layers of No. 2 tarred felt. The pipes to be supported in box on cleats spaced not over 6 feet apart, and lined up to proper and true grade, free from sags or pockets, the pipes to be lagged with 85% magnesia. The underground steam supply ~~xxxxxxxxxxxx~~ piping outside of buildings to be covered throughout with patent waterproof steam pipe covering, as manufactured by Wycoff & Son, Elmira, New York, or equally good in the opinion of the Railway Company.

27. Make connection with blower line in roundhouse and run a pipe line underground and connect to heating coils in fuel oil cellar. Waste the condensation from these coils by trapping same and run into the catch basin or sewer.

28. The amount of radiating surface above specified ^{or noted on plans} for the different buildings are based on the following assumed requirements:

The rooms in storehouse, lavatory building and enginemen's house to be heated to plus 70, and the oil house to plus 50 degrees Fahrenheit when the outside temperature is plus 20 degrees Fahrenheit.

The steam pressure in supply mains not to exceed $2\frac{1}{2}$ pounds per square inch. The contractor shall be required to check up and verify these calculations and if in his opinion more heating areas and larger piping are necessary than those shown or specified, he shall include in his bid the cost of any additions or increases which in his opinion will be necessary to fill the requirements and cover in his bid the cost of such additions, also giving full description of the changes required. The contractor will be held to guarantee the heating plant or any party thereof to fill the requirements stated above.

AIR PIPING

29. An air reservoir will be furnished f.o.b. near the site by the Railway Company, the contractor shall unload and install same at location as per Railway Company's drawings or as directed.

Provide 5" air pipe line from air compressor to the air reservoir and air pipe from air reservoir through pipe tunnel around the entire roundhouse, in machine shop and fuel oil cellar, etc., the sizes ^{to be} as shown on Railway Company's plans. Provide at alternate posts in roundhouse a $\frac{3}{4}$ " drop pipe terminating in $\frac{3}{4}$ " Westinghouse cut out cock five feet above floor, as shown on section. Run air pipe branches overhead in machine shop, as shown with $\frac{3}{4}$ " drops terminating in Westinghouse cut out cocks, same as in roundhouse at all points marked "A" on drawings No. 16126. Run a $\frac{3}{4}$ " air pipe branch to fuel oil cellar and 1" air line to sandhouse. Provide and place any required tees for branches in the air main according to directions. The tees to be plugged.

BLOW OFF PIPE

30. A 5" blow off pipe shall be placed the full length of roundhouse, the pipes to be supported and located as shown on section.

Provide blow off connections over each pit, three feet to the side of the center, as shown on plan and section of house. All blow off pipe mains will be graded to drain towards hot well.

UNDERGROUND BLOW OUT PIPE

31. Inside the rear wall of roundhouse lay a 5" underground blow out main. Run three inch branches from this main between each roundhouse pit to points as shown on general plan. From end of each underground branch provide a 3" riser, which shall terminate in 2" x 2" x 3" tee 8 inches above roundhouse floor; each tee to be provided with 2 two-inch nipples and 2 two-inch gate valves with N.P. standard washout hose threads.

All tees connecting main to branches shall be single sweep tees and all ells shall be long sweep ells. Tees above roundhouse floor to be long sweep tees. Extend the underground blow out main into catch basin. The catch basin shall also be provided by the contractor.

MACHINERY

32. Machinery to be provided by the Railway Company and placed by the contractor will be as follows:

Located in engine room will be :

One Buckey engine - 14 $\frac{1}{2}$ " x 16"

One Generator - 100 K.V.A.

One Excitor

One Air Compressor, capacity about 650 cu. ft. air per minute.

Located in Pump Pit will be:

One filling up and fire pump, Blake, or equivalent 14" x 7" x 12" Duplex standard.

Two feed water pumps, Fairbanks, Morse 6"-4"-6".

One washout pump, Fairbanks, Morse or equivalent 18" x 10" x 18" Duplex.

One Feed Water Heater, Hoppes, Form "R". Size "R".

Located as directed will be:

One pump for operation of drop pits.

Located as per drawing will be:

One air reservoir.

33. All above machinery, etc., will be furnished by the Railway Company on board cars near site of buildings, the contractor shall unload and set same on their respective foundations in a proper and satisfactory manner; the foundations to be built complete ready to receive machinery by the building contractor, who also shall furnish

and place all necessary anchor bolts and set same in accordance with templates or setting diagram furnished him by the Railway Company. Location of all machinery will be as per Railway Company's drawings.

OIL TANKS AND OIL PIPING

34. The facilities for handling oil to be installed in the oil room will be the so called "Bowser System", appliances of which are patented and manufactured by S. F. Bowser & Company, Fort Wayne, Ind.

The oil tanks, as indicated on plans, and the oil pumps, indicators and other Bowser special ties required for installation, will be furnished by the Railway Company near the site.

The contractor shall provide all piping, valves and fittings complete required for the system.

The contractor shall do all the work of installation, unload and set the tanks, pumps, indicators, etc., place all piping, fittings and valves and connect same to the tanks, pumps and indicators complete in operating order, in accordance with the Railway Company's drawings and directions. The pipe system shall include, suction pipes, return pipes, filling pipes, vent pipes and indicator pipes, all to be of sizes marked and arranged as shown. All piping to be properly hung and securely anchored and fastened in a manner satisfactory to the Railway Company. The building contractor will provide openings in floor and walls for piping and caulk up around piping after they are placed.

GENERAL

35. The Railway Company will furnish the contractor with detail plan of pipe system showing in general the locations and dimensions of pipe lines, approximate location of valves, etc., and from time to time furnish such other detail plans as will be required in connection with and to complete the entire work.

36. All labor and material required to complete the entire work as specified in these specifications which is not expressly mentioned to be provided by the Railway Company shall be furnished and installed

by the contractor.

The contractor shall do all excavation required for his part of the work, the backfilling inside of buildings to be done by the building contractor, except such filling as will be required for proper support and beddings under pipes, etc.

37. The building contractor will provide all necessary openings for piping, etc., in walls, floors or roof, and repair same after the plumbing contractor is done with his work. Pipe hangers or racks for support of pipes in tunnel will be provided and bedded into masonry by the building contractor according to direction of the contractor. All other pipe supports in buildings shall be provided by the contractor.

38. When the work on the buildings has advanced so plumbing can be commenced, the contractor will be required to start his work, and to push same forward as fast as possible, the work to be done in such order as to prevent as far as possible any delay or holding up of work, which is to be continued or finished by the building contractor.

39/ Hot pipes must be protected in accordance with the following rules as required by the National Board of Fire Underwriters:

Steam or hot water heating pipes shall not be placed within two inches of any timber or woodwork, unless the timber or woodwork is protected by a metal shield; then the distance shall not be less than one inch.

All steam or hot water pipes passing through floors and ceiling or wooden partitions shall be protected by a metal tube passing entirely through floor, ceiling or partitions one inch larger in diameter than the piping, having a metal cap at the floor, and where they are run in a horizontal direction between a floor and ceiling, a metal shield shall be placed on the underside of the floor over them and on the sides of wooden beams running parallel with said pipes. All wood boxes or casings enclosing steam or heating pipes in buildings, and all wood covers to recesses in walls in which steam or heating

pipes are placed, shall be lined with metal.

40. All material used must be of first quality and approved by the Railway Company. Items reasonably required for completion of the work but not specially mentioned in these specifications nor shown on plans shall be provided by the contractor, the material used to be approved and workmanship satisfactory to the Railway Company.

41. All washout and filling up piping, except suction pipes, will be of extra strong black pipe and have extra heavy fittings and medium valves.

42. All exhaust piping, underground blow off piping, return piping and suction pipes to hot well will be of quality known as "Merchant Weight" wrought iron pipe and fittings and valves standard.

43. All fittings and valves in air pipe, standard, except in tunnel between power house and roundhouse, which shall be extra heavy. All piping and fittings for high pressure steam pipe to be extra heavy and all valves "medium".

44. Flanged couplings must be placed close to all risers and valves and in such locations and positions as will facilitate installation and repairs, except where flanged fittings are used.

45. Ample provision for expansion must be made in all piping. All pipes running in tunnel from power house and all branch pipes to hot well and all overhead piping in buildings must be hung or supported in a manner satisfactory to the Railway Company. Overhead pipes must be supported by brackets from walls, or hangers from roof timbers spaced sufficiently close to prevent sagging of pipes or loosening of joints. Main steam header and exhaust header in power house to be supported on cast iron brackets on wall. XXXXX

46. Drain all steam exhaust and return pipes ^{the direction of} in the normal flow.

47. All high pressure steam pipe, blower pipe, return pipe and boiler feed pipe, exhaust pipe in engine room, boiler room and tunnel, including valves and fittings, shall be lagged with 85% magnesia with No. 10 canvas jacket carefully lapped and fastened at joints. See

Paragraph 36.

1/16" Rainbow Packing shall be used on all flanged joints. Flanges must face each other squarely so as to make tight joints without excessive strain on bolts. All threads shall be cut with sharp dies and shall be clean and smooth. Crane pipe cement shall be used on all screwed joints. Flanges on pipes 5" and larger in diameter shall be screwed on pipes with power driven pipe machines. Flanges on pipes of 8" diameter and larger shall be screwed on pipes until the pipe projects beyond face of flange, the pipe then being faced off flush with face of flange. On all other pipes, flanges shall be screwed on until ends of pipe are within $\frac{1}{4}$ " of faces of flanges.

48. All wrought iron pipe shall be properly reamed after being cut. Change of direction of pipes shall be done with suitable long sweep fittings. Bending of pipes will not be allowed except for circular mains in roundhouse.

49. All high pressure water and steam piping must be tested with hydraulic pressure of 200 pounds per square inch, and the pressure maintained until all pipes have been inspected. Balance of piping to be tested with 125# hydraulic pressure per square inch. All pipes must prove tight at the time of acceptance.

50. The contractor shall give the proper authorities notice relating to work in his charge, and obtain and pay for all official permits required for and in connection with the work.

Under the same general conditions as formerly specified the contractor shall also do the following work:

SAND TANKS AND PIPING:

51. The contractor shall place two sand tanks on coal dock and one in pit of sand house and provide all pipe connections between these tanks including all supports of pipes, all to be done as per plans and directions furnished by the Railway Company.

The sand tanks, special sand valves, sand screens, and drying stoves in sand house will be furnished by the Railway Company, the contractor to do all labor and furnish the balance of material required, which will include all piping, fittings, valves, connection with air main and all required supports of piping.

FUEL OIL CELLAR AND FUEL OIL TANK

52. The building contractor will construct the cellar for tank and the Railway Company will furnish the 6,000-gallon capacity tank and one small tank f.o.b. near site. The contractor shall unload and place the tanks and provide fastenings straps, etc., for anchoring the tanks, and all piping and fittings for filling and tapping oil, air piping, vent piping, and all valving complete. The fuel oil cellar shall be piped for steam heat, as stated in Paragraph 27. Piping to be properly valved and the water from these coils trapped and wasted, run into sewer if possible. Follow Railway Company's drawings and directions for proper and satisfactory installation.

TOILET FIXTURES:

53. The following toilet fixtures shall be furnished and installed by the contractor:

In toilet room of office and store house building:

- One water closet
- One corner lavatory

In lavatory building:

- One set range closets with stalls (4 closets)
- One battery double sectional wash sinks, two double sections in battery.
- One trough urinal, 6 feet long.
- One 9" x 9" bell trap in floor.

In Engineers' and Firemen's supply room:

- Double sectional lavatories (6 basins in set)
- One 40-gallon capacity hot water tank.

54. The water closet in store house toilet to be the Glow "Colonial" (M1514) vitreous sifon jet water closet, with concealed jet arm, oak seat, no cover, nickel plated hinges, round cornered oak tank with nickel plated brackets, 1-3/8" flush pipe with protector and rubber bumper, nickel plated chain and oak pull, brass floor flange, bolts

and rubber gasket, oil finished woodwork.

55. The lavatory in store house toilet to be the Glow "Quaker" (R-396) porcelain enameled iron corner lavatory with concealed hangers, R-326, Fuller faucet, overflow strainer, chain and topper, soap holder and P. trap. Length of sides 16½", basin 11" x 14" inside, height of back 6". Enameled all over.

56. The range closet in lavatory building to be Fig. W-548, Western Supply Company's catalog. Automatic siphon, education closet range, siphon education cast iron tank, galvanized iron flush pipe and hinged oak seats with iron reinforcements. Special partition reaching to floor, substantially fitted with paneled wooden doors for all stalls. Doors to be fitted with nickel plated spring hinges and pulls. The spacing of partitions to be 27" centers, the depth of partitions from wall to face of pilaster 3' 3", the doors to be 5 feet high from floor, one foot open space under doors. Closets to be enameled inside, painted outside, outlet at left hand end.

57. The wash sinks in lavatory to be the Glow elate double compartment wash sink, (R-488) with galvanized iron frame and legs, brass supply pipe with loose key stop valve and two brass standing overflows and wastes with plugs and couplings. Provide twin outlet connection with waste to floor. Length of each section 4 feet, width 38 inches, depth 6 inches.

58. The urinal tray in lavatory building to be the Glow Automatic flushing urinal No. 347, with brass capping in front, with painted iron brackets, vented trap, automatic copper lined wood flush tank, galvanized iron flush pipe and perforated front, ends and back wash down pipes. Height from floor in front 26", back 36", depth inside 7½", width inside 9", width front to back 12", length 6 feet.

59. The double sectional lavatories in engineers' and enginemen's room to be Fig. W-145, Western Supply Company's Catalog, (three double sections) with enameled iron connecting plate, soap cups, oval basins, patent overflow and overflow strainer, nickel plated plugs, chain and rubber stoppers and twelve nickel plated Doherty self-closing basin

cocks, $1\frac{1}{2}$ " nickel plated connected continuous waste, 3" nickel plated "Positive" trap and bronzed iron legs. Dimensions of each lavatory 18" x 34", basins 12" x 15".

60. Provide one galvanized iron water tank for supply of hot water to sectional lavatory, capacity as stated in Paragraph 53.

61. The water tank shall be placed in horizontal position overhead at the most convenient location as directed, and xxxx shall be suspended from ceiling by means of heavy wrought iron straps securely screwed or bolted to roof timbers. Inside of tanks shall be provided an ample amount of steam pipe coils. Provide tanks with flanged outlets for cold and hot water pipe connections and for steam pipe connections. The tanks to be tested to 150 lbs. pressure.

62. Provide 9" x 9" hinged bell trap floor drain having 3" outlet in lavatory floor, also half 8 trap in pipe connected to bell trap.

63. Fixtures above specified of which catalog references are given may be substituted with fixtures of other manufacture than specified if sufficient proofs are furnished to the Railway Company that they are suitable for the purpose intended and of quality equal to those specified in every respect.

PIPING TO FIXTURES

64. For fixtures in lavatory building run a cold water pipe from connection with hydrant line into building. Run $\frac{1}{2}$ " branches and connect to brass supply pipes of wash sinks.

Run 1" branch to supply of automatic tank of range closets and 5/8" branch to tank for urinals. Each branch to be separately valved so that repairs can be made in any part of fixtures or branches without putting other fixtures out of commission.

65. Provide $1\frac{1}{2}$ " valved connection between the water supply and the sewer for flushing same.

In the $1\frac{1}{2}$ " main provide check and waste valve and provide for same proper concrete enclosure with cover and key for operating valve. Locate at a convenient point as directed.

66. In office and store house connect with hydrant line and run a $\frac{1}{2}$ " cold water branch for supply of water closet and lavatory, using $\frac{1}{2}$ " sub-branch to each fixture. Provide check and waste in $\frac{1}{2}$ " pipe with enclosure in same manner as specified in preceding paragraph. Also put in 2" valved connection with hydrant line and sewer for flushing same.

67. Run a 1" cold water branch from hydrant line for supply of sectional lavatory in engineers and enginemen's room. Branch in one $\frac{1}{2}$ " pipe to sectional lavatory and one $\frac{1}{2}$ " pipe to hot water tank. From the hot water tank run a $\frac{1}{2}$ " pipe for supply of sectional lavatories. Hot and cold water sub-branches to each cock to be $\frac{1}{2}$ " pipe. Connect up coils in hot water tank with steam supply and return piping, and provide valves in pipes for closing off and regulating the steam supply. Provide drain connection to sewer properly valved from cold water supply to tank so that tank and pipe can be drained. Introduce check and waste cock properly encased in the 1" supply pipe in same manner as specified for other supply pipes.

68. All water piping to fixtures shall be either heavy galvanized iron pipe or heavy lead. All fittings for galvanized iron piping to be extra heavy galvanized iron fittings. All piping to be properly graded, substantially supported, neatly arranged and where possible, they shall be concealed in walls or partitions. The work to be done in a manner entirely satisfactory to the Railway Company.

SEWER SOIL AND VENT PIPING

69. For office and storehouse fixtures run a 6" cast iron soil pipe from a distance of 12 feet outside of building in through foundation wall, rise in a 4 inch stack in toilet room and run to a distance of two feet above roof. Connect with water closet and lavatory traps, 3" bore from closet and 1 $\frac{1}{2}$ " pipe from lavatory. Run vent pipe from lavatory trap and connect to stack near ceiling.

70. Provide range closets in lavatory building with double 5" trap as shall be obtained from manufacturer of closet. Also provide air pipe between upper trap and tank. From lower trap run 6" cast iron

soil pipe under floor through wall of building to a distance of about 5 feet from building, as shown.

71. Provide other fixtures with traps of approved construction having brass trap screw for cleaning. The trap from urinals to be 2". The wash sinks may be connected into one 2" trap. This trap to have overflow connection. Provide 3" half S trap in pipe connected to bell trap. The half S trap to have cleanout connection with screwed cover in floor.

Run soil pipes from all traps and connect into 6" main sewer as indicated on lavatory plan. Three inch pipes and larger to be of cast iron, pipes smaller than three inches to be heavy galvanized iron pipes; fittings to be extra heavy galvanized iron.

72. Connect with 2" waste from sectional lavatory in engineers supply room and run under floor and run a 4" cast soil pipe to a distance of about 6 feet outside of foundation wall.

VENT PIPES

73. If required by State law or City ordinances to have fixtures above specified ventilated, the contractor shall provide such system of vent piping as will fill the requirements of the law in every respect, and to the satisfaction of the Railway Company. Flash all vent pipes above roof with lead.

74. All material used for and in connection with the plumbing shall be of the best quality of the kind specified, and the work shall be carried out in a manner satisfactory to the Railway Company, and as directed by the engineer in charge of the work. All sewer, waste and soil pipes shall be properly and evenly graded, well bedded or securely supported. In changing directions and making connections use long sweep fittings and sanitary tees or Y branches.

DRAIN AND SEWER PIPE SYSTEM OUTSIDE OF BUILDINGS

75. The following piping inside of buildings and wall thimbles are provided by building contractor.

(a) The catch basin in roundhouse and piping draining into

same from drop pits, also discharge pipe from same to a distance of 5 feet outside of building walls.

- (b) 3" pipe in hot wall wall extended 5 feet outside of wall.
- (c) 4" drain pipe from turntable pit to a distance of 10 feet outside of circular ring.
- (d) Bell trap in pump pit floor and 6" pipe from same to a distance of 5 feet outside of foundation wall.
- (e) 14" cast iron thimble in end wall of roundhouse wall for sewer connection.

76. All other material and labor required for the entire drainage system outside of building except the above mentioned extensions for connections shall be provided by the contractor and the work will be paid for on basis of unit prices. The contractor shall in his bid state unit prices for the following items to cover cost of outside drainage and sewer system.

(a) Cost per lineal foot in place for tile piping of the following dimensions: 24", ^{20"}/_{18"}, 15", ^{10"}/_{8"}, 6", 4" and 3" inside diameters, including excavation and backfilling complete. The cost of fittings required for the different connections and changes in directions shall be included in the cost given in bid per lineal foot of piping; the lengths to be measured along center line of pipes after they are placed, and at connections the measurement shall be taken to the center of intersection of the two connecting pipes, except for connection with catch basins.

(b) Cost of brick concrete catch basins per piece complete, including cast iron frame and cover, iron ladder, excavation and backfilling.

77. The approximate amount of the different sizes of tile piping will be as shown on general plan. The arrangement ^{and sizes} may be varied from that shown on plan by the Railway Company's engineer to suit local conditions. Additional piping not shown or different sizes than those marked may be required and such changes, additions or deductions shall all be included in or deduction made from the cost on basis of unit prices.

78. All sewer and drain piping inside and under the structures with such extensions as especially specified for each structure, except those provided by the building contractor, shall be included in the contract price for ^{the} work. The cast iron fittings and cast iron pipe required for drain connection at water leg of tank shall be provided and included in the contract price for the work.

79. It may be required to elevate the water in the main sewer in order to obtain fall to the river. Pumping machinery with housing and valves, etc., for this purpose will not be included in this contract. The contractor shall, however, provide and operate any necessary pumping machinery for keeping the trenches dry during the progress of any and all parts of his work.

CATCH BASINS

80. The bottom of catch basin to be a 10" thick concrete slab. Depth of basins not less than 2 feet below bottom of outlet pipe. The basins to be 4 feet inside diameter, walls built of best quality hard burnt common brick in cement mortar, walls to be 8" thick. Use cement mortar in a proportion of 1 part American Portland cement to 3 parts clean sharp sand. Taper the walls towards top to a diameter to fit and receive cast iron manhole frame and cover. Elevation of top to be approximately the same as base of rail in roundhouse. Provide and place heavy cast iron manhole cover and frame. Also provide iron ladder to bottom of manhole made of $\frac{3}{4}$ " round iron anchored into brick wall and spaced about 16 inches apart. Location of catch basins to be as shown or as directed. Provide long sweep cast iron outlet elbow with outlet opening turned down inside the basin connections to all outlet pipes from basins ^{to be} of same diameter as drain pipe.

81. All tile drain piping used for this work shall be the best quality salt glazed tile socket pipe of approved manufacture. All fittings to be long sweep fittings. The pipes shall be laid to even uniform grade to such depth as will be directed, and to suit conditions. All pipes to be evenly and well bedded on solidly packed ground. Joints in tile piping shall be made with Portland Cement

mortar, equal parts cement and sand, soft tempered and pressed into place with the fingers without use of trowel. The space of the inside of the pipe must be solidly filled, smoothed to the surface and the filling shall extend one inch beyond the socket, and shall be rounded off all around the pipe. The material for filling around and to a distance of one foot over pipe must be free from stones, coarse gravel and vegetable matter, and shall be solidly tamped, after which the trench may be refilled.

82. All excavation and backfilling for the drainage system as above specified to be done by the contractor on conditions above specified. No filling shall be done before the piping has been inspected by the Railway Company's engineer and so ordered by him.

WATER PIPING AND FIRE PROTECTION

83. The contractor shall furnish all labor and material for all water piping, hydrants, valves, fittings, etc., as indicated on piping plan and as specified in the following paragraphs, and include same in the contract price for the work, except the 10" wooden supply pipe to tank, which shall be provided on basis of unit prices.

All pipe lines shall be of sizes as marked on drawings and specified. The material for piping, if not otherwise specified, shall be best quality medium weight cast iron pipe ~~xxxxxxxxxxxx~~ ~~xxxxxxx~~.

84. Provide base elbow under water tank leg and make connection with same, run pipe line to boiler house, pump pit and branches from this line to the two stand pipe pits, two branches to cinder pits with 1" sub-branch to enginemen's room. Connect tank supply and tank outlet pipe and provide all valves and fittings for same to conform with sketches on general piping plan.

85. From discharge side of pumps run an 8" main across end of pipe tunnel and through tunnel wall. Outside of tunnel divide this main in two branches, one 8" and one 6" for supply of all fire hydrants. See general piping plan. The branches to each individual yard hydrant to be 4" pipe as shown. Connect to pumps in pump pit

as per Railway Company's special drawing prepared by the Mechanical Engineer. The main from tank to first stand pipe branch to be 14", from this branch to the second stand pipe branch 12", the balance of pipe running into pump pit a 10" pipe. The branches to each stand pipe pit to be 12" pipes, and branches to hydrants opposite cinder pits 3" pipes.

86. Provide in the hydrant main, in yard at points as shown, or directed, 2 gate valves, same size as pipe, also cast iron valve boxes with extensions having a screw top cover located at an elevation even with base of rail in yard. Provide 1" x 1" tee shaped operating rod with key and permanent handles for each valve.

87. All yard hydrants except those located on each side of cinder pit shall be 4" cast iron hydrant with 3-way hose connections, two of which shall have the Auburn fire departments hose thread, and the third to have a suction pipe thread of the Auburn Fire Departments engine. All hydrants shall set 4 feet in the ground.

88. The cinder pit hydrants shall be 2½" hose valve connected to 3" wrought iron riser about one foot above ground. Provide automatic drip gate valves close to each riser. Cast iron valve box with extension cover and key, same as specified for shut off valves to be installed over each drip valve.

89. Run 4" hydrant branches into machine shop and store room. Run 3" sub-branches to each hydrant riser, rise in 3" wrought iron pipes to a distance of 5 feet from floor and terminate in 2½" approved hose valves threaded the same as those of the municipal fire department. Provide for each valve a reducing nipple for 3" house hose. There will be three of these valves, two in the machine shop and one in the store room, the risers to be substantially secured to the post or wall with strong wrought iron strap brackets. For each valve shall be provided 70 lineal feet of 2" unlined linen hose of quality approved by the Fire Underwriters and their approval stamped on it. Each hose to have plain screw tip hose pipe and coupling. Also pro-

vide for each hose one hump swinging hose rack of ample size to receive hose and to be neatly secured in place. The hose to be folded in rack ready for use. In each hydrant riserⁱⁿ ~~xxxxxxxxxxxx~~ machine shop shall be provided a 3" x 3" x $\frac{1}{4}$ " tee with $\frac{1}{2}$ " brass hose bibb. Locate about 2 feet from floor.

90. In blacksmith shop shall be provided one and in the yard two 1" branches with 1" brass bibbs for general use. Locate as directed on the ground.

Provide check and waste with operating rod, enclosure and pipe extension with screwed cover for those bibbs.

In all individual branches for hose valves in machine shop and store room provide automatic drip gate valves with cast iron valve box, extension pipe having screwed cover and key with T shaped operating handle for valve similar to those specified in Paragraph 86.

91. Provide all branches as formerly specified for supply of fixtures.

92. The fire protection for coal dock shall be provided to conform with arrangement as shown on standard plan sheet 134 complete. All piping on dock must be properly strapped and secured to woodwork. Also provide proper walking planks on dock, if required, for reaching valves.

93. Three 10" stand pipes will be furnished by the Railway Company f.o.b. near site. These stand pipes shall be unloaded, put together and set in place by the contractor in brick stand pipe pits erected by the building contractor. The contractor shall furnish and place all piping and fittings for the stand pipe connection to water piping including gate valves in pits and any required bolts, etc., for fastening stand pipe in place. The installment to be done as per Standard Plan No. 145. The building contractor will cement up openings around pipes and do any other necessary repairs of the pit platform after the installment of stand pipes.

94. All excavation, filling and backfilling for and any banking up under piping that may be required unless otherwise expressly stated

in these specifications shall be done by the contractor.

All water piping not otherwise stated or directed shall be laid to a depth of not less than four feet below base of rail in yard. In all cases shall the piping be so covered up by the plumber that they will be safe from frost and any banking up required shall be done according to the direction of the Railway Company's engineer. The pipes shall in all cases be laid to an even and true grade, free from sags and pockets and on solidly packed and settled ground.

95. All joints in cast iron pipe must be thoroughly caulked with picket oakum, then run with molten lead well drives in and neatly finished. All joints must be perfectly tight.

96. Filling over and around the pipes shall not be commenced before the piping has been inspected by the Railway Company's engineer and so ordered by him. Filling to be done in same manner as specified for sewer and drain piping.

97. All tools, scaffolding, necessary sheet piling and equipment for pumping shall be provided, placed and operated by the contractor.

TANK SUPPLY PIPE

98. There will be required a 10" wooden gravity supply pipe line from connection at the water tank to the source of water in Little Soos Creek located approximately 4.9 miles distance from water tank.

The contractor shall, if required, place this pipe line, the work to be done on basis of unit price per foot of pipe as shall be stated in his proposal and in accordance with the specifications and directions of the Railway Company's engineer.

99. For a distance of about 4 miles the pipe line will be placed on the Railway Company's Right of Way, parallel to the main track, the balance of line will be placed along Little Soos Creek to the intake. (See plat and profile of pipe line, dated August 23, 1911, Tacoma, Washington).

(100) The Railway Company will furnish the required amount of pipe including fittings, air chamber and valves, also provide the dam at intake. The Railway Company will also distribute the pipe in carload lots at proper intervals for part of pipe line following the right of way and unload the balance of pipe near point where the pipe line branches away from track.

101. The contractor shall do all necessary grubbing and clearing and excavate the trench for the pipe to such depth as shown on profile and as directed. The pipe shall be laid on solid bed throughout and the ground evenly and well packed over and around the pipe. The joints to be made in the best customary manner for wooden pipes, and according to directions. The pipe shall be laid to even uniform grade, and there shall be no sags or pockets in any part of the line, except where so shown on profile.

102. The placing of all fittings and valves and the air chamber at White River Crossing shall be included in the unit price given for pipe, also the cost of securing and placing all necessary pipe supports or pipe hangers required for pipe line, where it runs under bridges across streams.

103. The material (timber and iron work) required for pipe supports shall be furnished by the contractor and the material used for this purpose will be paid for on basis of unit price per 1000 FBM and per pound of ironwork. The supports shall be provided, arranged and placed to conform with such detail drawings as will be furnished hereafter, and as directed on the ground.

104. After the pipe is laid and inspected by the Railway Company's engineer the contractor shall backfill the trench in proper manner. The filling around the pipe and one foot over pipe to be good, clean gravel, free from large stones and vegetable matter.

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