

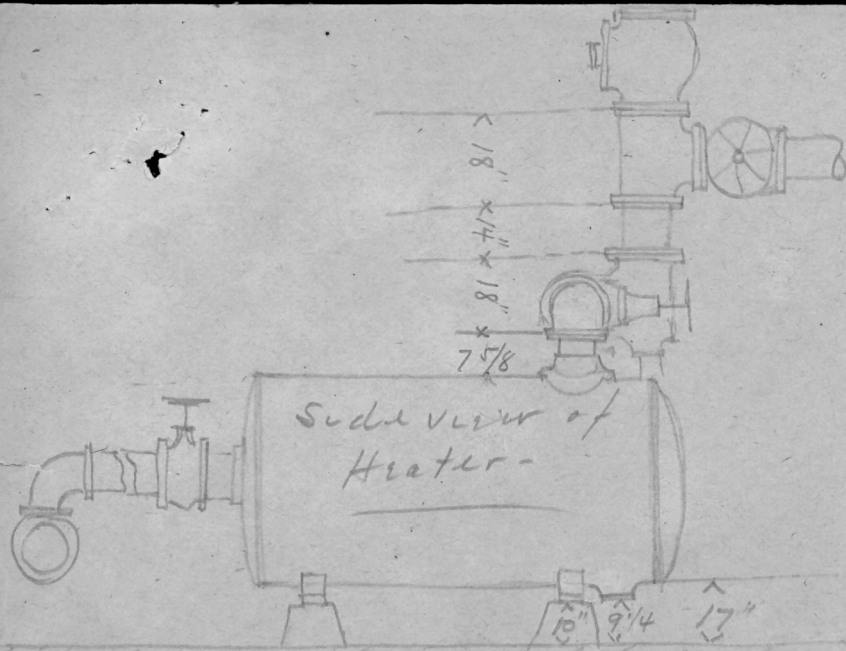


Mechanical Department records.  
Northern Pacific Railway  
Corporate Records.

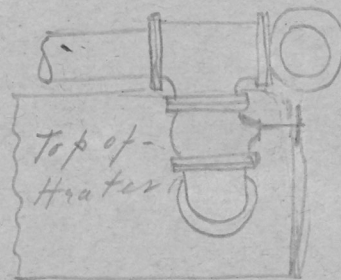
## **Copyright Notice:**

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





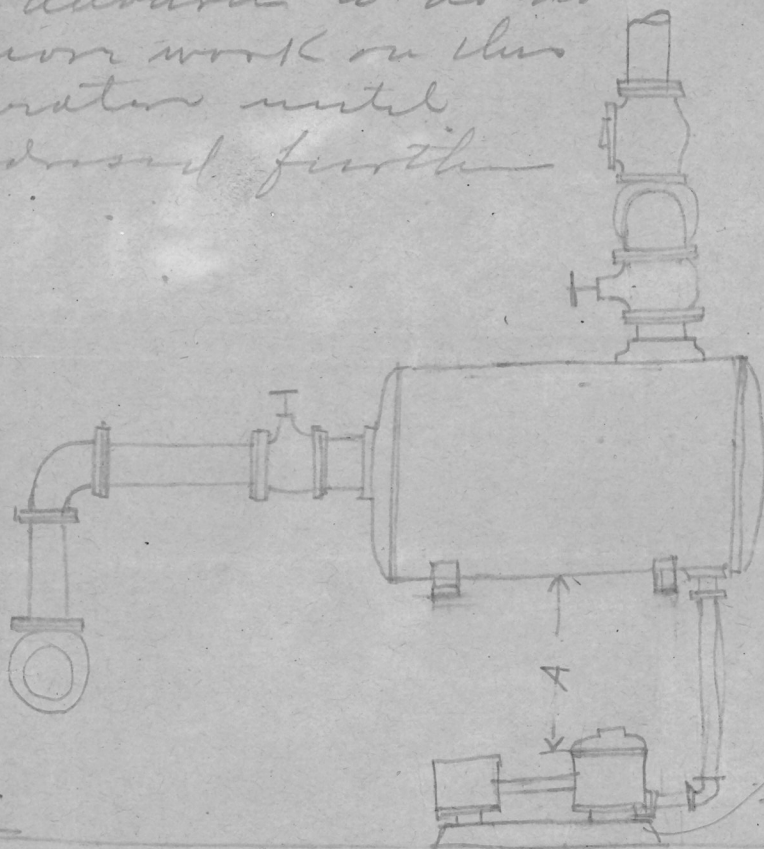
This shows  
Heater as properly  
installed at  
Auburn.



Line of present floor  
are told that a finish coat  
will be put on later

Told the foreman  
at Auburn to do no  
more work on this  
heater until  
advised further

This shows a  
way it can be  
connected -



Small foundation  
should be made  
under boiler feed pump

A. Should be at least 24 inch  
Heater can be supported on angle iron or  
iron pipes as shown in Hoppe. Catalogue



Form 1386

# TELEGRAM.

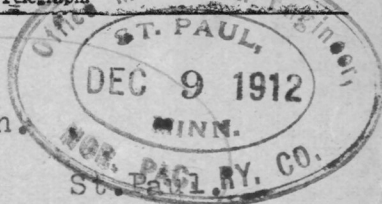
All Railway Messages must be written in ink on these blanks, which must not be used for other purposes, and these for parties on trains (except trainmen) enclosed in sealed envelopes. The exact time sent, time received, personal signal of sending and receiving operators, call of sending office and name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

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

208 BY.B.A.

Tacoma rec 7-1912.

W.J.Bohan



Your wire Of the 5th re cd today.Mailed you sketches as requested

A Ousdahl.

347pm.

St. Paul, Minn. Dec. 5, 1912.

Improvements 1911-12  
Feed Water Heater & Boiler Feed Pumps.

Mr. A. Ousdahl,  
C/o R.M. Crosby,  
Tacoma, Wash.

Dear Sir:-

Referring to Mr. Curry's letter of Nov. 17th to Mr. Crosby, copy of which was sent you, relative to changes in location of Feed Water Heaters, etc., at Pasco. I wired you today as follows:-

"See Mr. Curry's letter Nov. 17th to Mr. Crosby, copy to you. Send me quick, copies of sketches one and two. wish this connection with Auburn, Pasco, Parkwater, Centralia, Mississippi Street Improvements."

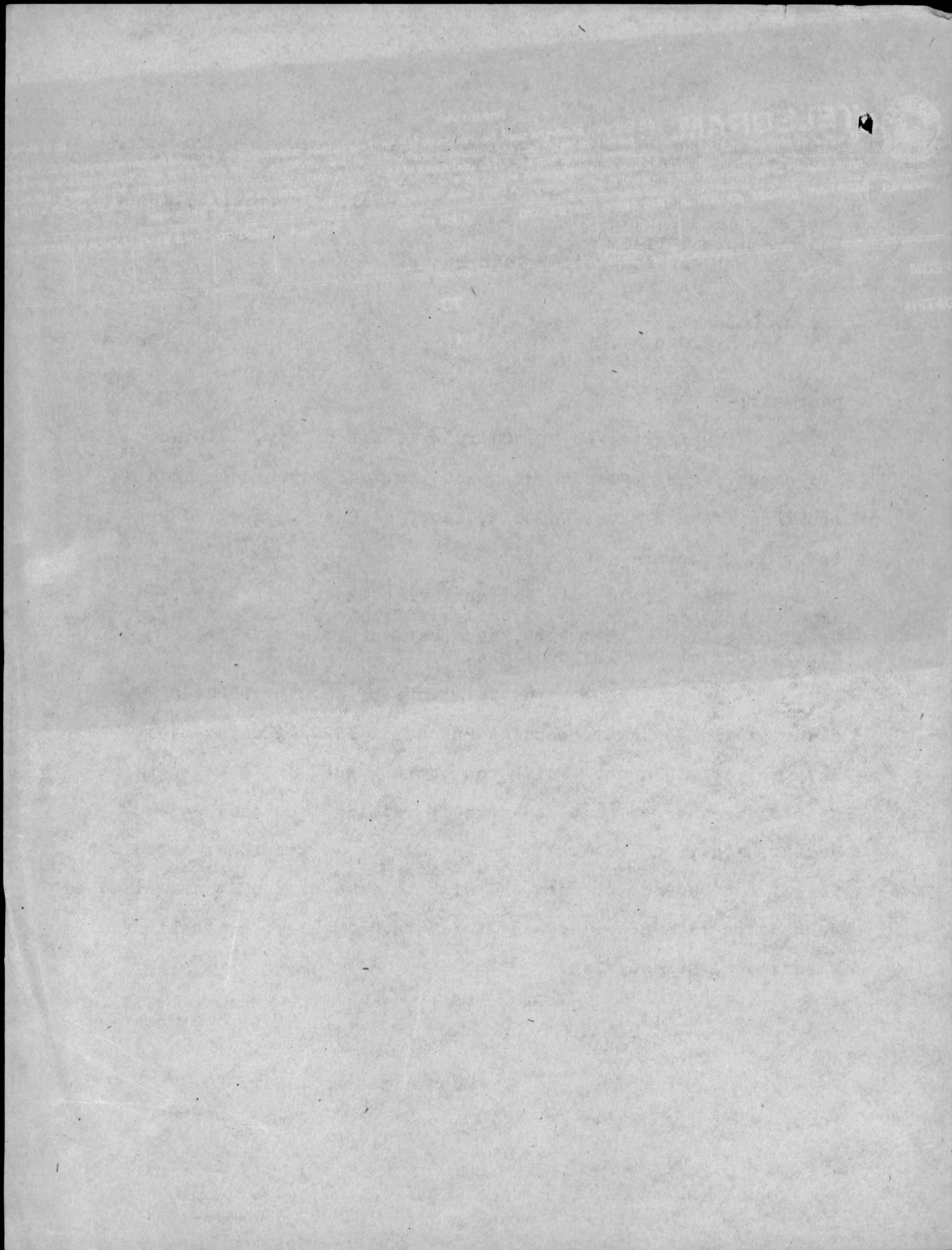
Am attaching herewith prints of drawing 16206-C steam piping in power house at Pasco and 16207-A water piping in pump pit at Pasco. Wish you would kindly indicate on these prints the changes that you make in raising this feed water heater, etc., and return to me as quickly as possible, as we wish to get our records correct and wish to take care of this matter in connection with power houses at Auburn, Parkwater, Centralia and Mississippi Street also.

Yours truly,

Mechanical Engineer.

10-H.





Tacoma, Nov. 22, 1912.

File 044

*Mr Curry*

Mr. L. M. Perkins,

Engineer Maintenance of Way.

Dear Sir:

I have a letter from Mr. Curry dated the 17th, a copy of which was furnished you, in regard to the arrangement of the water heater and boiler feed pump which were installed too low, at Pasco, according to the instructions contained in a page from Hoppes' catalogue No.40, which I attach for your information together with sketches furnished by Mr. Ousdahl, showing an improvement recommended by him which would result in economy and permit the use of hot water supply to stationary boilers should the heater be out of commission. A photograph furnished by Mr. Curry is also submitted for your guidance in carrying out the plan recommended by Mr. Ousdahl and confirmed by Mr. Curry.

The oil house just put into service has a number of defects which should be corrected while this work is under way. I noticed that the bolts which engage the strips to which the Bowser system is applied, are about four inches too long, and project through the wall on the outside in such a way as to prevent opening the shutters. These bolts should be shorter and applied with the nuts on the inside. Some of the shutters are minus parts of the hinges, and neither the doors to the upper or lower section of the oil house have been supplied with any



Mr. L. M. Perkins

- 2 -

Nov. 22, 1912.

kind of latch. The inside doors to the basement will not properly close and are not painted, and only one of the outside basement doors has been painted. Some of the pipework in the basement is only wired up, and the old pipe to the water main projects into the basement about five feet from the floor, and should be cut off, which indicated to me that probably the work has not been completed.

I spoke to Mr. McIntyre about this, and he said he would look into it, and I merely bring this to your attention that you may take up personally.

Yours truly,

General Master Mechanic

RMC F

Cy HMC

(M.E. COPY)

On Yellowstone Division, Nov. 17, 1912.

Stationary Plants  
Parkwater-Centralia  
and Auburn.

File 5325.



Mr. R. M. Crosby,  
General Master Mechanic,  
Tacoma, Wash.

Dear Sir:

On train three today I talked to Mr. Ousdahl about stationary plant installations on your district.

Herewith attached note a photograph showing the pump pit at Pasco. The particular feature of the arrangement to which I wish to call your attention is the comparative height between the heater connection and the boiler feed pump, the heater being installed too low according to instructions embodied in accompanying page from Hoppes catalogue No. 40, which instructs that the heater should be at least two feet above the suction pipes of the pumps. Mr. Ousdahl advises that the heater at Pasco is about level with the pumps and the photograph so indicates, as you will note. See accompanying sketch No. 1. Also note accompanying sketch No. 2 showing an improvement which Mr. Ousdahl recommends, the adoption of which will cost but little and result in an economy, as the additional connection will permit of continuous use of hot water supply for delivery to stationary boilers should, for any reason the heater be out of commission.



Mr. Crosby:-----2.

Mr. Ousdahl also recommends that the pumps, which are shown as setting on the floor in the accompanying photograph, be raised up and placed on a foundation, as shown in sketch marked No. 1.

I am writing you direct to save time so that you can confer quickly with Mr. L. M. Perkins who, I am sure, will be pleased to co-operate with you in arranging for the changes designated. Please acknowledge.

Yours truly,

HMC R

Mechanical Superintendent.

Copy WCS  
LMP  
WJB  
AO



St. Paul, Minn., Nov. 15, 1912.

Improvements 1911-12  
General  
Power Plants

*Pasco*

File 5325

Mr. R. M. Crosby,  
General Master Mechanic,  
Tacoma, Wash.

Dear Sir:-

Mr. Ousdahl is returning to Pasco, with complete and detailed instructions regarding the maintenance and operation of the power plant.

He will instruct all concerned regarding the firing and maintenance of the boilers, weighing of coal, obtaining Bristol recording steam gauge records, etc., and maintenance and operation of electrical and other machinery in connection with the power plant. He will remain at Pasco until instructions are thoroughly understood and fully complied with. He will also represent the Mechanical Dept. in seeing that the installation of Mechanical Dept. apparatus, including air, steam and water piping, is satisfactorily installed and in accordance with specifications.

I wish you and also your Master Mechanic at Pasco to kindly co-operate with Mr. Ousdahl in carrying out his instructions. He has been instructed to confer with you direct upon any questions of importance arising, so that you

St. Paul, Minn., Nov. 15, 1912.

Improvements 1911-12  
General  
Power Plants

Mr. R. H. C.

- 2 -

File 5325

can promptly take them up and settle them with Mr. Perkins. This particularly refers to questions regarding installation of Machinery Dept. apparatus, which is in charge of the Engineering Dept.

Kindly see that Mr. Gusdahl is provided with all necessary facilities to prosecute his work to a successful conclusion.

After he has completed the work at Pasco and has everything in first-class shape, it is the intention that he carry on the same kind of work at Auburn, Centralia and Parkwater, insofar as the starting and operation of the plants are concerned. He will go from one plant to another during the process of construction to see that Mechanical Dept. facilities are properly installed.

Mr. S. A. Williamson, Sales Manager of the Under-Feed Stoker Co. of America, from whom we purchased the stokers for the various plants, will leave St. Paul Wednesday evening for Pasco, and will thoroughly inspect that part of the work pertaining to his apparatus, and take up matters regarding its correct installation and operation. We wish these stokers in-

St. Paul, Minn., Nov. 15, 1912.

Improvements 1911-12  
General  
Power Plants

Mr. R. H. C.

- 3 -

File 5325

stalled to the entire satisfaction of Mr. Williamson, and I would like to have you kindly get in touch with him before he leaves the Coast, and have a full understanding regarding any criticisms that he may have to make as to installation at any of the plants. I have requested Mr. Williamson to call upon you at Tacoma.

Yours truly,

Mechanical Superintendent

6-2

Cy. Mr. A. Cusdahl:-

Please note the above and arrange to go to Pasco tonight and take care of the work as verbally explained to you in detail today.

H. H. Curry



St. Paul, Minn., June 5, 1912.

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

- 1 One 24"x24"x24" Heavy duty crank planer, motor driven, complete with General Electric, or equivalent, 220 volt, 3 phase, 60 cycle, constant speed induction motor of ample capacity. Gearing to be guarded and machine equipped throughout with all necessary devices for protection of workmen. Vandyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.
- Manufacturers of machine desired: Cincinnati Shaper Co., Niles-Bement-Pond Co., Newton Machine Tool Works.
- 2 One Motor driven, combination wet and dry grinder arranged for one 16"x2" dry grinding wheel, and one 14"x2" wet grinding wheel, with General Electric, or equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor of ample capacity mounted direct on arbor. Machine to have safety collars for wheels and to be equipped with all necessary devices for protection of workmen. Vandyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.
- Grinder desired: Bridgeport #2 motor driven combination wet and dry grinder shown on page 52 of Bridgeport safety Emery Wheel Company's catalog of 1907.
- 3 One 100-ton Motor driven locomotive box and forcing press with 18"x24" platen and 18" movement of ram, complete with crane and General Electric, or equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor of ample capacity. Gearing to be guarded and machine equipped with all necessary safety devices. Vandyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.
- Machine desired, 100-ton locomotive box and forcing press as shown on sheet 978 of Watson-Stillman Co. catalog.

1 1/2 HP 900 RPM

AUBURN

ENGINE FACILITIES

COMPTROLLER'S #326

OF 1911.

SA 5380

St. Paul, Minn. June 5,

2

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

- 4 One ✓ Motor-Driven Double Punch and Shearing, 36" Throat both sides, capacity to punch  $7/8$ " hole in  $3/4$ " sheets, shear  $5$ " x  $3/4$ " bars, split  $5/8$ " plates and cut off  $1\frac{1}{2}$ " rounds, complete with regular equipment and General Electric or equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor. Gearing to be guarded and machine equipped with all necessary devices for protection of workmen.

VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of machine desired:  
Williams, White & Co.-R.C. & S. Co.  
Agts.; Niles-Bement-Pond Co., Long & Allstatter Co., Hilles & Jones.

- 5 One ✓ 800# Single Frame Steam Hammer, with ram and dies at angle with frame, complete with anvil, dies throttle valve and Detroit 1 pint double connection sight feed lubricator.  
VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of hammer desired;  
Chambersburg Engineering Co., Niles-Bement-Pond Co., William Sellers & Co.

- 6 One ✓ Electric Forge Blower, capacity 3-5 forges with direct connected General Electric, or equivalent, 220 volt, 3 phase 60 cycle induction motor of ample capacity.

Blower desired, Buffalo #4-E Electric Forge Blower, R.C. & S. Co. Agts.

- 7 One ✓ 42" Motor-Driven vertical boring mill with two heads on crossrail, 3 jaw combination check table with universal and independent movement of jaws, complete with General Electric or

Mechanical Superintendent's Requisition No. 1000, Page 2.

5745-9000rpm

2A HC

10745



St. Paul, Minn. June 5, 1912.

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

7 One Cent.

equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor of ample capacity. Machine to be equipped with all necessary safety devices.

VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of machine desired, Colburn Machine Tool Co., Gisholt Machine Co., Bullard Machine Tool Co., Niles-Bement-Pond Co.

8 One

✓ 36" Motor Driven heavy quick change gear engine lathe, 10'-0" between centers, complete with General Electric form "K" or equivalent, 220 volt, 3 phase, 60 cycle, constant speed induction motor of ample capacity and with large face plate with independent chuck jaws, small face plate, steady rest, follow rest, and taper attachment.

Machine to be equipped with all necessary safety devices.

VanDyke positive prints of foundation and erecting plans, to be furnished by successful bidder immediately on receipt of order.

Manufacturers of lathe desired, Lodge & Shipley, Machine Tool Co., Niles-Bement-Pond Co., American Tool Works Co., Prentice Bros. Co.

St. Paul, Minn. June 5, 1912.

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

- 9 One ✓ 24" motor driven heavy quick change gear engine lathe, 6'-0" between centers, complete with General Electric form "K" or equivalent, 220 volt, 3 phase, 60 cycle, constant speed induction motor of ample capacity and with large and small face plates, steady rest, and with one Cushman or equivalent, 20" independent chuck.

Machine to be equipped with all necessary safety devices. VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of lathe desired Lodge & Shipley, Mch. Tool Co., R.K. LeBlond Mch. Tool Co., Niles-Bement-Pond Co., American Tool Works Co., Prentice Bros. Co.

- 10 One ✓ 18" motor driven heavy quick change gear engine lathe, 4'-0" between centers, complete with General Electric form "K" or equivalent, 220 volt, 3 phase, 60 cycle, constant speed induction motor of ample capacity and with large and small face plates, steady rest, and with one Cushman or equivalent 15" independent chuck. Machine to be equipped with all safety devices.

VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of lathe desired Lodge & Shipley, Machine Tool Co., R.K. LeBlond Mch Tool Co., Niles-Bement-Pond Co., American Tool Works Co., Prentice Bros. Co.



St. Paul, Minn. June 5, 1912

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

- 11 One ✓ 36" Heavy pattern motor driven sliding head upright drill press with geared feed and automatic stops, and with General Electric form "K", or equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor. Machine to be equipped with all necessary safety devices.

Manufacturers of machine desired  
Cincinnati-Bickford Tool Co., Manning,  
Maxwell & Moore, Niles-Bement-Pond  
Co.

- 12 One ✓ 24" Heavy Pattern Motor Driven Sliding Head Upright Drill Press with geared feed and automatic stops, and with General Electric form "K", or equivalent 220 volt, 3 phase, 60 cycle, constant speed induction motor of ample capacity. Machine to be equipped with all necessary safety devices.

Manufacturers of machine desired,  
Cincinnati, Bickford Tool Co., Manning,  
Maxwell & Moore, Niles-Bement-Pond  
Co.

- 13 One ✓ 1½" Motor Driven Double Head Belt Cutter, equipment to consist of oil pump, wrenches and automatics, five sets each of ½", 5/8", 3/4", 7/8" and 1" and two sets each of 1-1/8", 1½", 1 3/8", and 1½" high speed chasers for U.S. Std. threads. Nine high speed nut taps as per chasers, one adjustable top chuck, and one set of assorted sockets as per chasers and with General Electric form "K" or equivalent, 220 volt, 3 phase, 60 cycle induction motor of ample capacity. Machine to be equipped with all necessary safety devices.

Manufacturer of machine desired  
Landis Machine Co.



St. Paul, Minn. June 5, 1912

G. A Kenrick, Assistant Engineer,

Auburn, Wash.

- 14- One ✓ Power pipe machine with stand, motor driven, to cut and thread 1" to 4" pipe both right and left, complete with opening and adjustable dies and General Electric form "K", or equivalent, 220 volt, 3 phase, 60 cycle, constant speed induction motor. Machine to be equipped with all necessary safety devices.
- VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.
- Manufacturers of machine desired Curtis and Curtis Mfg. Co.
- 15- One Westinghouse Air Brake Triple Valve Test Rack Co.'s #26020 complete including assembling plate and all devices for testing quick action and plain triple valves.
- 16- One ✓ Iron frame power grindstone complete with 48" dia. x 8" stone and 24" x 5" pulley. — 1-H.R.
- Grindstone desired Keystone #1 Mfg. by Cleveland Stone Co.
- 17- One Flue cutting off machine per Dwg. 5058. To be built at So. Tacoma Shops. 5-H.R.

St. Paul, Minn. June 4, 1912.

G. A. Kenrick, Assistant Engineer,

Auburn, Wash.

18 One

✓

Three Spindle Medium Vertical and Radial Boring Machine with two vertical and one radial spindles, arranged for boring with bits up to 14" and with cross adjustment up to 12", complete with timber table and counter-shaft with one tight pulley of proper size for connection to motor. Gearing, set screws, etc., to be guarded and machine equipped with all necessary devices for protection of workmen.

VanDyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Machine desired, Greenlee #361 Three Spindle Medium Boring Machine with Timber Table.

19 One

✓

Heavy double Arbor Saw Bench, range for 16" saws cutting off 4" thick, ripping 18" wide and cutting off 30" wide, complete with two 16" cut off saws and two 16" rip saws, and with direct connected General Electric or equivalent 220 volt, 3 phase, 60 cycle, induction motor of ample capacity. Machine to be equipped with necessary protective devices.

VanDyke positive prints of erecting and foundation plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of machine desired:  
Greenlee Bros. & Co., J.A. Fay & Egan Co.  
American Woodworking Machinery Co.,  
Bentel and Mergedant.

20 One

✓

5 H.P. 220 volt, 3 phase, 60 cycle constant speed induction motor, 1200 R.P.M. synchronous speed, complete with pulley, rails and oil filled auto-starter and fuse blocks with two sets of fuses for running circuits.

VanDyke positive prints of General drawing of motor to be furnished by successful bidder immediately on receipt of order.

Motor desired General Electric form "K" or equivalent.

Mechanical Superintendent's Requisition No. 1000, Page 7.

*motor drive  
7 1/2 HP - 900*

*5 HP - 1800*

*Cancelled*



St. Paul, Minn. June 4, 1912

G. A Kenrick, Assistant Engineer.

Auburn, Wash.

- 21 One  
✓ 1 H.P. 220 volt, 3 phase, 60 cycle constant speed induction Motor, 1800 R.P.M. synchronous speed, complete with pulley, rails and fuse blocks with two sets of fuses for running circuits.

VanDyke positive prints of General drawing of motor to be furnished by successful bidder immediately on receipt of order.

Motor desired General Electric form "K" or equivalent.

- 22 One 5 H.P. 220 volt, 3 phase, 60 cycle constant speed induction motor, 1800 R.P.M. synchronous speed complete with pulley and rails.

Second hand General Electric 5 H.P. Motor, serial #66049 now on hand at Missoula to be used to fill this order.

- 23 One  
✓ 5½" x 2" x 5" Duplex Steam Pump for 350# water pressure, brass fitted, complete with Lunkenheimer regrinding throttle valve and Detroit one-half pint single connection lubricator.

VanDyke positive prints of foundation and erecting plan to be furnished by successful bidder immediately on receipt of order. Pump desired Fairbanks-Morse or Blake.

- 24 One 30" x 42" blow off tank per drawing 14345 (to be made at shops.)

*Grindstone*

*1200 RPM actual  
speed of motor  
- Filmer  
Curt*

# MACHINERY FOR AUBURN.

## Motor Driven Scheme

|                                                      | Motor<br>Driven | Misc.    |
|------------------------------------------------------|-----------------|----------|
| of 24" Crank Plainer <i>Cir.</i> ✓                   | 1511. ✓         |          |
| of Combination Wet and Dry Grinder <i>Stirling</i> ✓ | 294.50 ✓        |          |
| of Driving Box and Rod Press - <i>Stirling</i> ✓     | 1400. ✓         |          |
| of Punch and Shear ✓                                 | 2050 ✓          |          |
| of 800# steam hammer <i>Bennett</i> ✓                |                 | 1250.    |
| of 42" boring mill <i>Stirling</i> ✓                 |                 |          |
| of Electric forge blower ✓                           | 2937. ✓         |          |
| of 34" long enough for extended <i>Stirling</i> ✓    | 95.00 ✓         |          |
| of 30" x 16" Engine Lathe <i>Stirling</i> ✓          | 2825.00 ✓       |          |
| of 24" x 16" Engine Lathe <i>Stirling</i> ✓          | 1885.00 ✓       |          |
| of 18" x 16" Engine Lathe <i>Stirling</i> ✓          | 1150.00 ✓       |          |
| of 36" Upright Drill - <i>Cir. Bick</i> ✓            | 775.00 ✓        |          |
| of 24" Upright Drill - <i>Cir. Bick</i> ✓            | 435.00 ✓        |          |
| of 1½" Double head bolt cutter <i>Stirling</i> ✓     | 1000.00 ✓       |          |
| of 1"-4" Pipe machine ✓                              | 400.00 ✓        |          |
| of Triple valve test rack ✓                          |                 | 325.00   |
| of Grindstone ✓                                      | 163.00 ✓        | 163.00   |
| of Flue cutting off machine ✓                        | 175.00 ✓        | 175.00   |
|                                                      | 17095.50        | 1575.00  |
|                                                      |                 | 17095.50 |
|                                                      |                 | 18670.50 |

1- Combined cross & up saw  
metal table.

1- Boring machine for car repair &  
engine repair wood work



MACHINERY PROPOSED FOR AUBURN.  
PARTIAL BELTED SCHEME.

|                                                 | Motor<br>Driven | Belted   | Misc.    |
|-------------------------------------------------|-----------------|----------|----------|
| 24" Crank planer                                | 1511.00         |          |          |
| Combination wet and dry grinder                 | 294.50          |          |          |
| Driving box and rod press                       | 1400.00         |          |          |
| Punch and shear                                 | 2050.00         |          |          |
| 800# steam hammer                               |                 |          | 1250.00  |
| Electric Forge Blower                           | 95.00           |          |          |
| 42" Vertical Boring Mill                        | 2937.00         |          |          |
| 30" x 16' Engine Lathes                         |                 | 20.65.00 |          |
| 24" x 10' Engine Lathes                         |                 | 1200.00  |          |
| 18" x 6' Engine Lathes                          |                 | 700.00   |          |
| 36" Drill press                                 |                 | 577.00   |          |
| 24" Drill Press                                 |                 | 340.00   |          |
| 1 1/2" double bobt cutter                       |                 | 775.00   |          |
| Power pipe machine                              |                 | 225.00   |          |
| Triple valve test rack                          |                 |          | 325.00   |
| 48" x 8" Grindstone                             |                 | 88.00    |          |
| Flue cutting off machine                        |                 |          |          |
| motor and line shafting for<br>belted machinery |                 |          |          |
|                                                 | 8287.50         | 1000.00  |          |
|                                                 |                 | 7040.00  | 1575.00  |
|                                                 |                 |          | 7040.00  |
|                                                 |                 |          | 8287.50  |
|                                                 |                 |          | 16902.50 |

St. Paul, Minn. May 24, 1912.

~~ONE~~ 42" motor driven vertical boring mill with two heads on crossrail, 3 jaw combination chuck <sup>table</sup> with universal and independent movement of jaws, complete with General Electric or equivalent, 220 volt, 3 phase, 60 cycle constant speed induction motor of ample capacity.

Machine to be equipped throughout with all necessary safety devices. Van Dyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.

Manufacturers of machine desired, Colburn Machine Tool Co., Gisholt Machine Co., Bullard Machine Tool Co., Niles-Bement-Pond Co.

ONE 36" ~~x 18~~ motor driven heavy quick change gear engine lathe, 10'-0" <sup>between centers</sup>, complete with General Electric form K. or equivalent, 220 volt, three phase, 60 cycle, <sup>constant speed</sup> ~~four speed (900, 720, 600, 450~~

~~R.P.M.)~~ induction motor of ample capacity and with large face plate with independent chuck jaws, ~~and~~ small face plate, steady rest, follow rest, and taper <sup>attachment</sup>.

Machine to be equipped with all necessary safety devices.

Van Dyke positive prints of foundation and erecting plans, to be furnished by successful bidder immediately on receipt of order.

Manufacturers of lathe desired, Lodge & Shipley Machine Tool Co., R.K. Le Blond Machine Tool Co., Niles-Bement-Pond Co., American Tool Works Co. <sup>Prentiss Bros. Co.</sup>

ONE 24" ~~x 10~~ motor driven heavy quick change gear engine lathe, 6'-0" <sup>between centers</sup>, complete with General Electric form "K" or equivalent, 220 volt, 3 phase, 60 cycle, 4 speed (900-720-600-450

\$ 7937.<sup>00</sup>

for Auburn

motor driven

\$ 4660.<sup>00</sup>

for Auburn

Belted 2065.<sup>00</sup>

for Auburn



*constant speed*  
voltage, 3 phase, 60 cycle, ~~4 speed (900, 720, 600, 450 R.P.M.)~~  
induction motor of ample capacity and with large and small face  
plates, steady rest, and with one Cushman or equivalent,  
20" *independent* universal, ~~3 jaw~~ chuck.

Machine to be equipped with all necessary safety devices.

Van Dyke positive prints of foundation and erecting plans to  
be furnished by successful bidder immediately on receipt of  
order.

Manufacturers of lathe desired Lodge & Shipley, Mch. Tool Co.  
R.K. LeBlond Mch. Tool Co., Niles-Bement-Pond Co., American  
Tool Works Co. *Prentice Bros. Co.*

ONE 18" ~~motor~~ motor driven heavy quick change gear engine lathe,  
*4'-0" between centers,*  
complete with General Electric form "K" or equivalent, 220  
voltage, 3 phase, 60 cycle, *constant speed* ~~4 speed (900, 720, 600, 450 R.P.M.)~~

induction motor of ample capacity and with large and small  
face plates, steady rest, and with one Cushman or equivalent  
15" independent ~~3 jaw~~ chuck.

Machine to be equipped with all necessary safety devices.

Van Dyke positive prints of foundation and erecting plans  
to be furnished by successful bidder immediately on receipt  
of order.

Manufacturers of lathe desired Lodge & Shipley, Mch. Tool Co.,  
R.K. LeBlond Mch. Tool Co., Niles-Bement-Pond Co., American  
Tool Works Co. *Prentice Bros. Co.*

ONE 36" Heavy pattern motor driven sliding head upright drill  
press with geared feed and automatic stops, and with general  
electric form "K", or equivalent, 220 volt, 3 phase, 60 cycle  
*constant* ~~4 speed (900, 720, 600, 450 R.P.M.)~~ induction motor.  
Machine to be equipped with all necessary safety devices.

*Motor driven  
\$ 1885.00 Auburn*

*Belted  
\$ 1200.00  
1st Auburn*

*Motor driven  
1150.00 Auburn  
Belted  
700.00 Auburn*

*Motor  
\$ 775.00 Auburn  
Belted  
\$ 577.00 Auburn*

Manufacturers of machine desired, Cincinnati-Bickford Tool Co., Manning, Maxwell & Moore -Niles-Bement-Pond Co.

ONE 24" Heavy pattern motor driven sliding head upright drill press with geared feed and automatic stops, and with General Electric form "K", or equivalent 220 volt, 3 phase, 60 cycle, ~~four~~ <sup>constant</sup> speed (~~900, 720, 600, 450, R.P.M.~~) induction motor of ample capacity. Machine to be equipped with all necessary safety devices.

Manufacturers of machine desired, Cincinnati Bickford Tool Co., Manning, Maxwell & Moore, - Niles-Bement -Pond Co.

ONE 1½" motor driven double head bolt cutter, equipment to consist of oil pump, wrenches and automatics, five sets each of 1", 5/8", 3/4", 7/8" and 1" and two sets each of 1 1/8" 1 ¼", 1 3/8" and 1½" high speed chasers for U.S. Std. threads, nine high speed nut taps as per chasers, one adjustable top chuck, and one set of assorted sockets as per chasers and with General Electric form "K", or equivalent, 220 volt 3 phase, 60 cycle, ~~4 speed (900, 720, 600, 450 R.P.M.)~~ induction motor of ample capacity.

Machine to be equipped with all necessary safety devices.

Manufacturer of machine desired Landis Machine Co.

ONE Power pipe machine with stand, motor driven, to cut and thread 1" to 4" pipe both right and left, complete with opening and adjustable dies and General Electric form "K", or equivalent 220 volt, 3 phase, 60 cycle, ~~4 speed~~ <sup>constant</sup> induction motor. Machine to be equipped with all necessary safety devices. Van Dyke positive prints of foundation and erecting plans to be furnished by successful bidder immediately on receipt of order.



Manufacturers of machine desired Curtis and Curtis Mfgt. Co.

ONE Westinghouse air brake triple valve test Rack. Co.'s

*325% Auburn*  
#26020 complete including assembling plate and all devices  
for testing quick action and plain triple valves.

ONE Iron frame power grindstone complete with 48" dia. x 8"  
stone and 24" x 5" pulley.

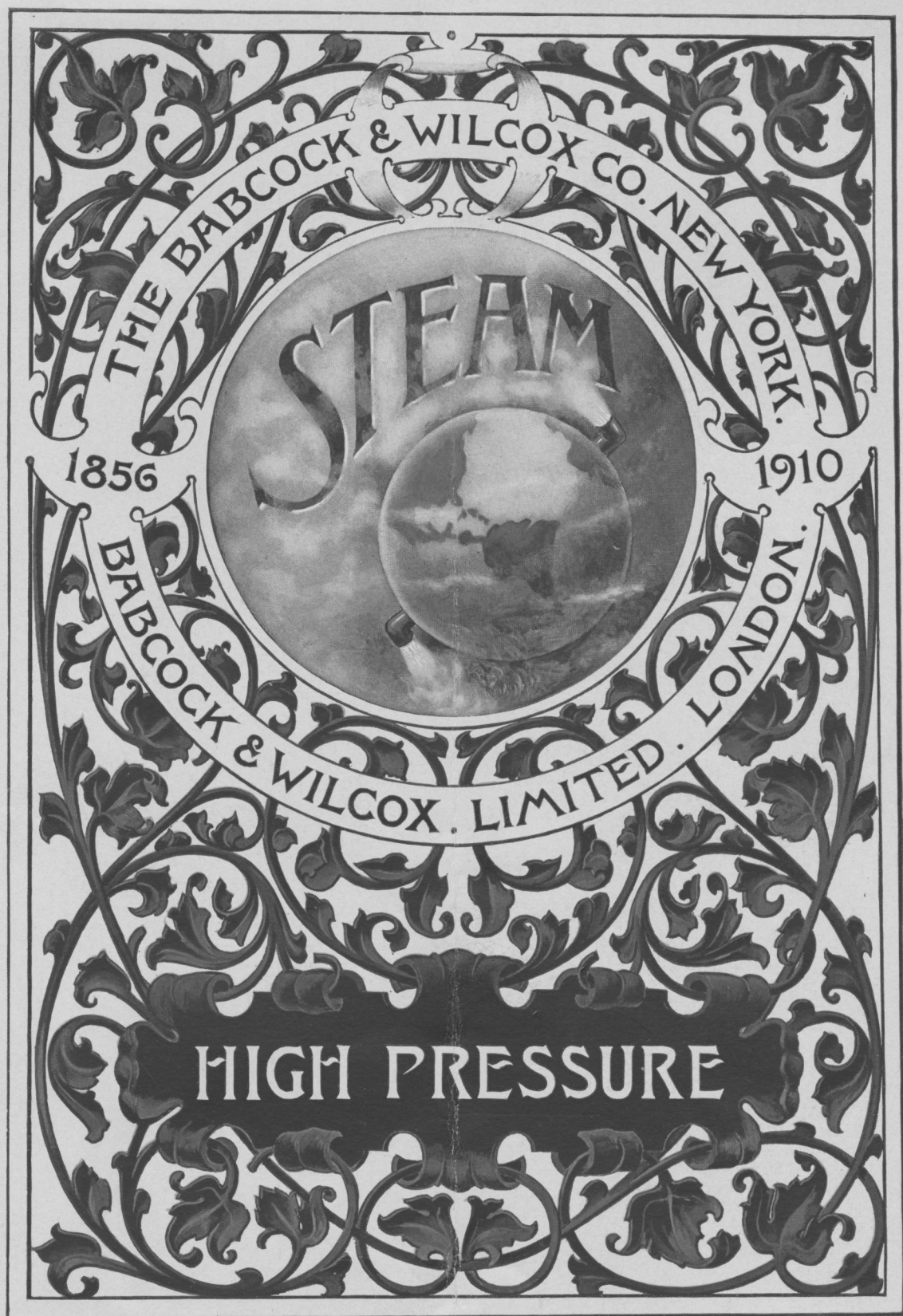
*88% Auburn*  
Grindstone desired Keystone #1 Mfd. by Cleveland Stone Co.

*70% Auburn*  
ONE Flue cutting off machine per <sup>dwg.</sup> ~~diag.~~ 5058. To be built at  
So. Tacoma shops.

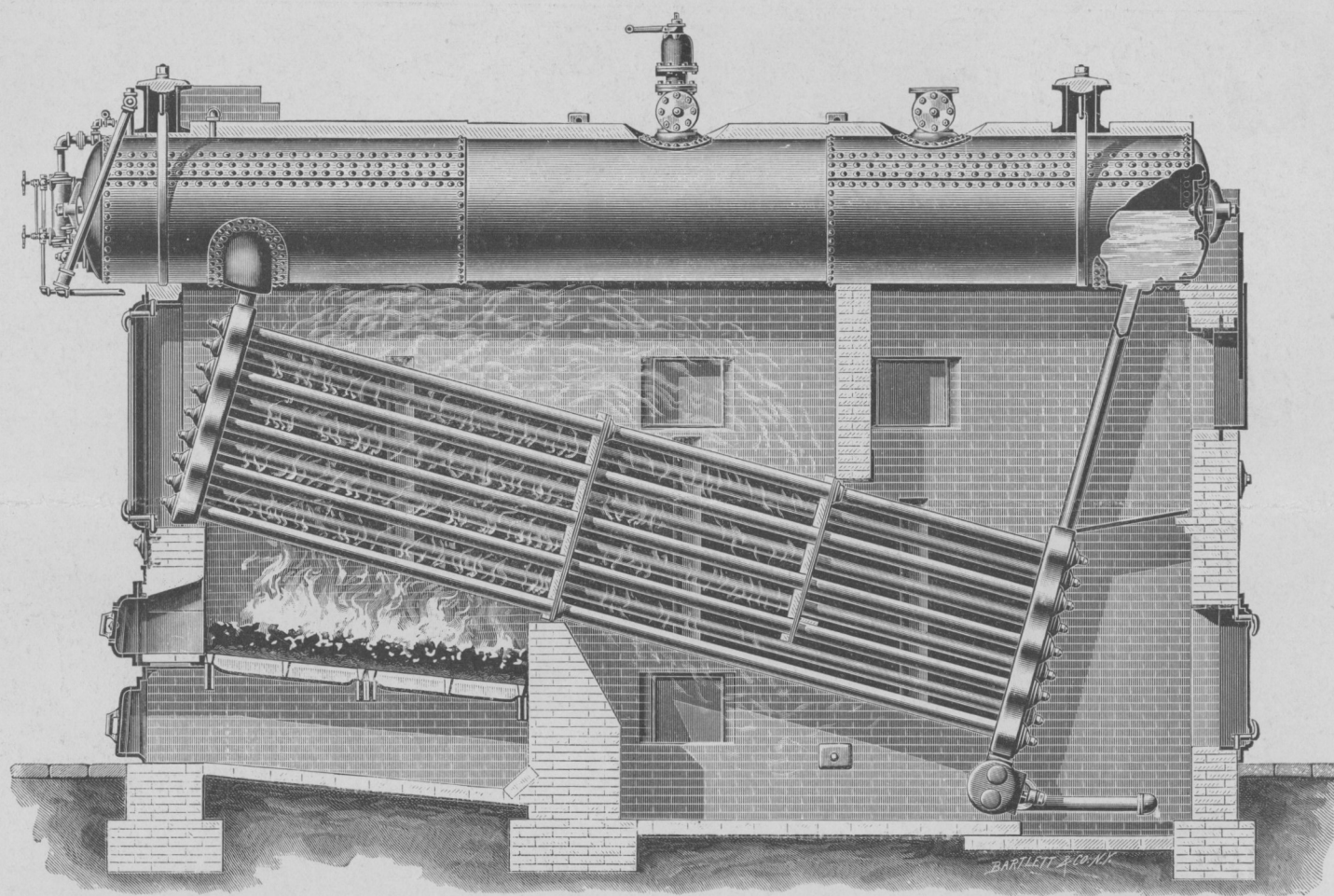
*Add for 2 motors of other machinery is  
motor driven. \$250% Auburn*

*See Pasco Report  
for description of  
other machinery*

SPECIFICATION







# The Babcock & Wilcox Co.

## WATER TUBE STEAM BOILERS.

Cable Address  
NEW YORK "GLOVEBOXES"  
ALL FOREIGN OFFICES "BABCOCK"

NEW YORK,  
85 Liberty St.

BOSTON, 40 Post Office Square  
PHILADELPHIA, North American Building.  
SAN FRANCISCO, 99 First Street.  
PITTSBURGH, Farmers Deposit Bank Bldg.  
NEW ORLEANS, 533 Bayonne St.  
DENVER, 435 Seventeenth St.  
SALT LAKE CITY, 313 Atlas Block.  
PORTLAND, OREGON, 416 Wells-Fargo Bldg.



CHICAGO, 1207 Marquette Bldg.  
ATLANTA, GA. 4132 Candler Bldg.  
CLEVELAND, 706 New England Bldg.  
SEATTLE, Mutual Life Bldg.  
HAVANA, CUBA, 46% Calle de la Habana.  
LOS ANGELES, 321 Trust Bldg.  
CINCINNATI, O. Traction Bldg.  
HOUSTON, TEXAS, Land & Trust Bldg.

No. 4527-A

Chicago Jan'y 16<sup>th</sup> 1912

WE PROPOSE TO FURNISH TO

OFFICE

Northern Pacific Ry Co.  
St Paul, Minn.

HORSE-POWER  
AND  
ARRANGEMENT

2-151 H.-P. WROUGHT-STEEL SECTIONAL  
BOILER

(ONE H. P. EQUALS  $34\frac{1}{2}$  LBS. OF WATER EVAPORATED PER HOUR FROM AND AT  $212^{\circ}$  FAHR.)

HAVING A TOTAL OF 3020 SQUARE FEET OF HEATING SURFACE AND SQUARE  
FEET OF GRATE SURFACE. ARRANGED TO BE SET 2 BOILER IN one BATTERY  
AND — BOILER SINGLY

AS PER THE FOLLOWING SPECIFICATION

HEATING  
SURFACES

The heating surface of each boiler to consist of one steam and water drum 42 inches in diameter and 20 feet 4 inches long, placed above and connected to a set of 8 sections of tubes, each section consisting of 9 tubes, four inches in diameter and 18 feet long. The lower ends of the sections to be connected to a mud drum. The connections between all parts to be made by expanding wrought tubes into bored tube seats.

### WROUGHT STEEL

SPECIFICATION  
OF OPEN  
HEARTH STEEL

All wrought metal for pressure parts, except tubes, to be of the best Open Hearth steel, stamped with maker's name, and having a tensile strength of 56,000 to 62,000 pounds per square inch, to show an elongation of not less than 25 per cent, in a parallel test piece of 8 inches accompanied by a reduction in area of at least 50 per cent.; to endure bending double upon itself both before and after being brought to a flanging heat and quenched.

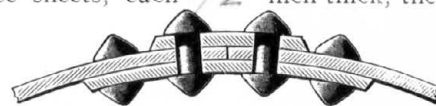
FORGINGS

All forgings for pressure parts to be made from Open Hearth steel of from 52,000 to 58,000 pounds tensile strength, and formed by hydraulic power.

### DRUM CONSTRUCTION

THICKNESS  
OF SHEETS  
RIVET SEAMS

The cylindrical portion of the drum to be made of three sheets, each  $\frac{1}{2}$  inch thick, the longitudinal seams butt strapped inside and out. The seams to have two rows of rivets passing through both straps and the shell, and two rows through the shell and inner strap only, the butt straps to be bent to a proper radius in a hydraulic press. The circular seams lap-joint, single riveted.



FITTING UP

All holes for double-riveted seams to be punched  $\frac{3}{16}$  inch smaller than the diameter of rivets to be used, and drilled out to full size after the sheets are rolled and assembled with their butt straps.

# ASSEMBLING

After drilling, the straps are to be removed, all burrs cleaned off and the plates assembled, metal to metal, with parallel turned bolts fitting the holes, before riveting.

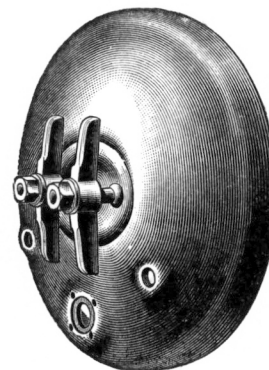
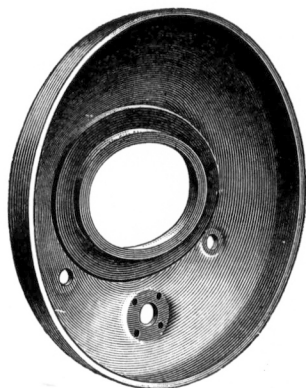
Each course to be built independently to template. The various courses and their heads to be assembled by a hydraulic forcing press.

## HYDRAULIC RIVETING

All rivets to be driven by hydraulic pressure and held until cool.

## DRUM HEADS

All drum heads to be fitted with manholes, 11 inches by 15 inches. The heads to be hydraulic forged at a single heat, with manhole ring and stiffening plate in position, and to have flat raised seats for stand pipe and feed connections. The edges of head and manhole face to be turned off true.

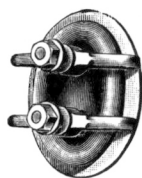


## MANHOLE FITTINGS

The manhole plate and guards to be of forged steel. The plate to be faced and turned to a true oval to fit head.

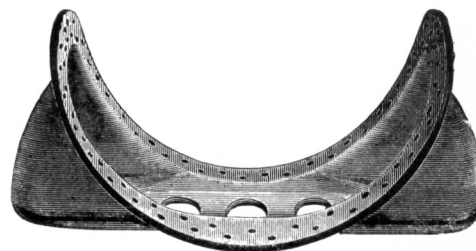
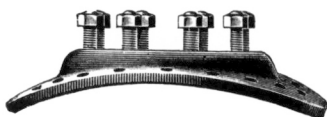
## DRUM NOZZLES

The drum nozzles to be of forged steel, faced, and fitted with stud bolts, with taper threads.



## CROSS BOXES

The drum cross boxes to be hydraulic forged from a single sheet without seams or rivets.



## SECTIONS

## TUBES

The sections to be built up of 4-inch charcoal iron tubes, or of hot finished, seamless Open Hearth steel tubes, as buyer may prefer.



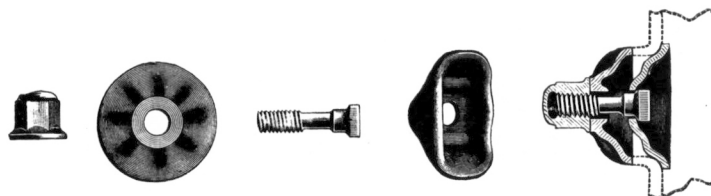
## HEADERS

The tubes to be expanded into forged steel headers of serpentine form, disposing the tubes in a staggered position when assembled in the furnace.

## HAND-HOLE

A hand-hole of sufficient size to permit the cleaning, removal and renewal of a tube to be placed opposite each tube end, said hand-hole to have a raised seat milled off to a true surface.

## OUTSIDE HAND-HOLE FITTINGS



*vertical*  
The hand holes to be closed on the outside by a forged steel cap milled to a true surface, and to be held in position by a forged steel safety clamp, closing the hand-hole opening from the inside, and secured by a ball-headed bolt to insure correct alignment. All joints to be made tight, metal to metal, without packing of any kind.

## INSIDE HAND-HOLE FITTINGS

*The* Or, if preferred, headers will be provided with elliptical hand-holes, faced inside and closed by an inside fitting plate held to its seat by a stud and secured by a forged steel binder and nut. The joint between plate and header to be made with a thin gasket.



## MUD DRUMS

The mud drum to be a forged steel box  $7\frac{1}{4}$  inches square and of proper length to be connected with all of the sections in the boiler by means of wrought nipples expanded into counterbored seats. To be tapped for blow-off connections and furnished for hand holes for cleaning. The hand holes to be faced inside and closed by an inside fitting forged plate with stud, secured by a forged steel guard and nut.

Cast iron mud drums 12 inches in diameter can be supplied if buyer prefers.

## CONNECTING TUBES AND NIPPLES

The tubes and nipples forming connections between steam drums and sections and between sections and mud drums are to be of hot finished, seamless, Open Hearth steel of heavy gauge.

## VALVES AND FITTINGS

Each boiler to be provided with "Consolidated Co's" nickel-seated safety valves,  $\frac{1}{4}$  inches diameter, set to blow at 200 pounds (unless otherwise ordered).

One Ashcroft steam gauge, with 12-inch dial.

One water column fitted with extra-heavy bronze mountings for glass water gauge, with special shut-off device operated from fire room floor, to allow renewal of glass when under pressure.

Three try cocks with lifting handles for operating from fire room floor, and fitted with steam metal valves.

Independent blow-off pipes for bottom of column, and glass gauge, to be carried down the front, terminating with valves at height of hand.

A combination stop and check valve of heavy bronze pattern, to be flanged directly to the drum head, operating automatically in case of rupture of feed piping.

One stop valve for feed,  $1\frac{1}{2}$  inches diameter, and one check valve for feed,  $1\frac{1}{2}$  inches diameter, to be placed hand high from boiler-room floor.

$1-2\frac{1}{2}$  inch blow-off valves, with loose sleeve for blow-off pipe, for building into brickwork, to allow for expansion and contraction.

Two  $\frac{3}{4}$  inch stop valves connected to steam or safety-valve outlet, for steam dusting hose connection.

Heavy brass pipe, and fittings, to be used for connecting all the above mountings to the boiler.

BLOW-OFF

HAND HOLES

CONNECTING  
TUBES AND  
NIPPLES

SAFETY VALVES

STEAM GAUGE

WATER COLUMN

WATER GAUGE

TRY COCKS

BLOW-OFF

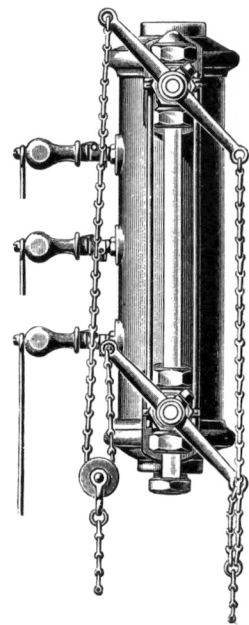
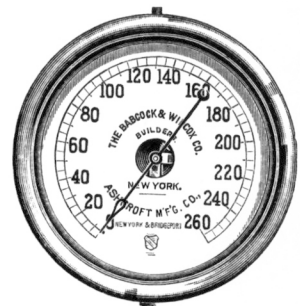
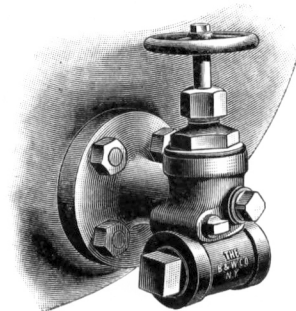
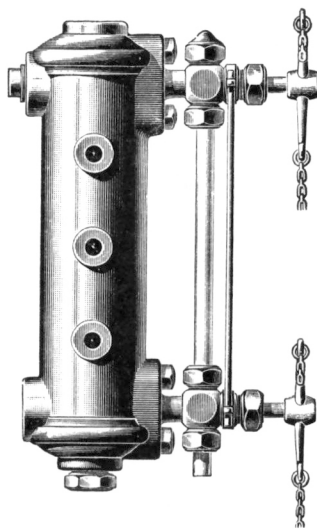
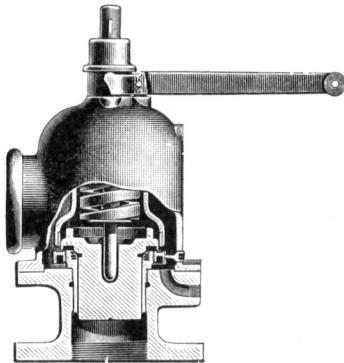
COMBINATION  
STOP AND  
CHECK

STOP VALVE  
CHECK VALVE

BLOW-OFF

CLEANING  
VALVES

PIPE AND  
FITTINGS



## CROSS PIPE, FOR MULTIPLE DRUM BOILERS.

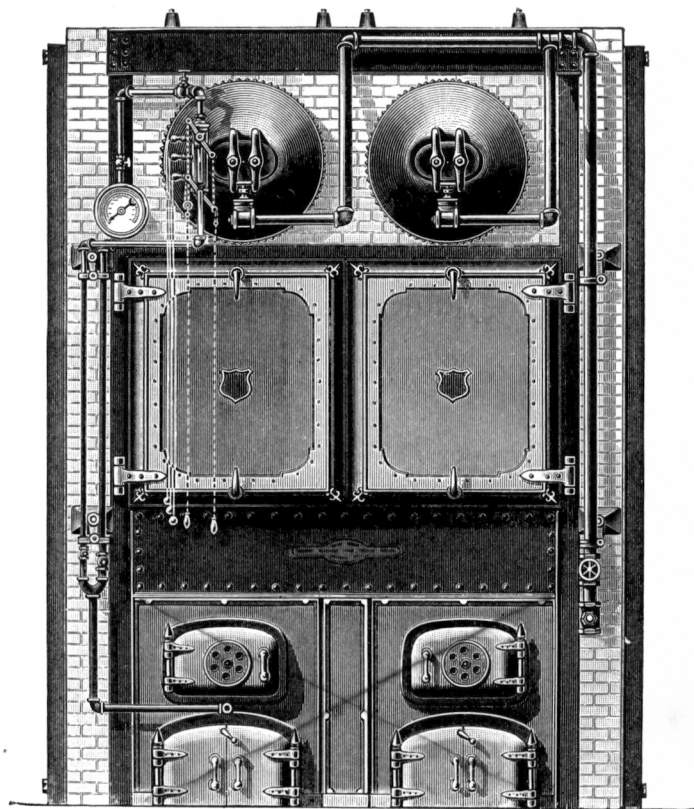
When two or more drums are used on one boiler, drums are to be connected by cross pipe having flanged outlet for main steam connection.

### MAIN STEAM OUTLET

Main steam outlet to be 5 inches diameter, 11 inches flange.

### BOILER SUPPORTS AND FRONT

Each boiler to be suspended, at front and rear, from wrought-iron supporting frames, entirely independent of the setting, to allow for contraction and expansion without straining either the boiler or the brick work, and to allow of repairs or renewal of the latter without disturbing the boiler or its connections.



The boiler front to be fitted to front supporting frame and to be of ornamental design. To be provided with large doors for access to front headers and panels above fire fronts.

The fire fronts to have independent frames for fire doors which are to be bolted on, and ash doors fitted with blast catches. All joints to be fitted and faces of doors planed.

### FURNACE AND WALL FIXTURES

~~Dead plates and supports, the plates are to be arranged for a fire-brick lining.~~

~~Fire-brick arches for fire-door openings.~~

~~A full set of grate bars and bearers, the latter to be fitted with expansion sockets for side wall.~~

Two sets of flame bridge plates with necessary fastenings, and special fire-brick for lining the same.

One bridge wall girder for hanging bridge, with expansion plates for side walls.

A full set of cleaning and ash doors for side walls, giving access to all parts for exterior cleaning.

One swing damper and frame.

All the necessary buckstays, tie and anchor rods, anchor plates and lintels for securing all parts in position.

### TOOLS

1 steel wrench for hand-hole nuts.

1 Lagonda turbine tube cleaner.

set of fire tools, consisting of poker, slice bar and hoe.

1-18' set of best steam hose and cleaning pipe with special nozzle for blowing dust and soot from the exterior of tubes.

CROSS PIPES

STEAM OUTLET

TUBE DOORS

FIRE FRONTS

FURNACE  
FITTINGS

GRATES

FLAME  
BRIDGES

BRIDGE WALL  
GIRDER  
CLEANING  
DOORS

DAMPER  
BUCKSTAYS  
ETC.

## MATERIAL AND WORKMANSHIP

All materials to be of the best quality, each specially adapted to the service required, and the workmanship to be first-class in every particular.

### WORKING PRESSURE

The boiler, as specified, will carry 200 pounds pressure, if desired.

### TESTING

All pressure parts to be tested and made tight under hydrostatic pressure before leaving shop, as follows:

Sections, 400 pounds. Drums, 300 pounds. Mud drums, 300 pounds.

When erected complete on foundations, the whole structure to be tested and made tight at 300 pounds pressure. Purchaser is to supply water for hydrostatic test.

### WEIGHT, SPACE AND BRICK WORK

WEIGHT  
SPACE

Approximate shipping weight, *54400* pounds.

The space occupied by *Battery*, including brick work, *19* feet *9* inches long, *14* feet *3* inches wide, *17* feet *2* inches high to the top of steam flange.

The space occupied by ———, including brick work, ——— feet ——— inches long, ——— feet ——— inches wide, ——— feet ——— inches high to the top of steam flange.

BRICK WORK

The brick work (to be provided by the purchaser) will require about *9900* fire bricks and *26600* red bricks, not including foundations nor flues, measured from 3 inches below floor line and including paving in ash pits and behind bridge wall.

### ERECTING

Full drawings and directions for erecting to be furnished, and services of man to superintend erection—board and traveling expenses and cost of transportation of tools to and from place of erection, to be paid by purchaser, who is also to furnish the ordinary labor. It is expressly understood and agreed, however, that the purchaser will indemnify this Company and save it harmless from all liability for any injury or damages to the persons performing such ordinary labor

DELIVERY

To be delivered f. o. b. New York.

PRICE  
TERMS

Prices as per accompanying letter.

One-half payable on presentation of sight draft with shipping receipt. Balance, sixty days from shipment. Foreign and mining shipments on presentation of bills of lading.

Payable in New York Exchange, free of expense to us for collection charges.

Deliveries subject to strikes, accidents or causes beyond our control.

This proposal will be void, unless accepted within thirty days.

DELIVERY  
LIMIT

THE BABCOCK & WILCOX CO.

*H. M. Brown*



ORDER  
(Printed in Copying Ink)

Job \_\_\_\_\_  
(B. & W. Co's Number)

THE BABCOCK & WILCOX CO.,  
85 LIBERTY ST., NEW YORK.

Gentlemen :

We hereby accept your proposition No. \_\_\_\_\_ dated \_\_\_\_\_  
for \_\_\_\_\_ horse-power B. & W. Boiler , \_\_\_\_\_

Drawings Nos. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, accompanying your proposal are hereby  
not accepted.

Charcoal Iron or Seamless Steel Tubes ? \_\_\_\_\_

Cast Iron or Wrought Steel Mud Drum ? \_\_\_\_\_

Safety valve to be set to blow at \_\_\_\_\_ pounds. (150 pounds unless otherwise ordered.)

The fuel will be \_\_\_\_\_

If ordinary flat grates are to be used, give grate-bar opening \_\_\_\_\_

For settlement of any undetermined details please communicate with \_\_\_\_\_

at \_\_\_\_\_

Date to be shipped \_\_\_\_\_

Ship to \_\_\_\_\_

Via \_\_\_\_\_

NOTE : State railroad on which most convenient delivery can be made and if delivery is to be made at  
any special siding or freight station.

Signature \_\_\_\_\_

Tacoma - 6-29-13

Mr. H. M. Curry

Mech Supt

St Paul



Dear Sir:-

I was at Auburn yesterday with the Buckley engineer Mr. Dave Horner. Inspected the engine governor etc which we found in good shape regulating as good as ever. Enclose two indicator cards showing light and varying loads. The varying load was produced by starting Coal dock motor. The Buckley man took with him a defective Cap-nut from one of the links in the governor - which failed some time ago - said he would send a new one - Will be at Parkwater to morrow -

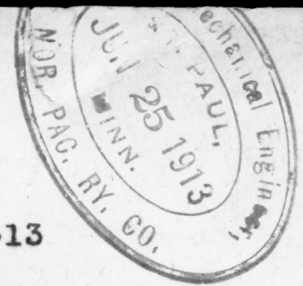
Yours Truly.

A. Ousclahl

A large, stylized handwritten signature in dark ink, which appears to be 'A. Ousclahl'.



Auburn Wash. 6-21-13



Mr. W. J. Bohan  
Mech. Eng.  
Dear Sir:-

The status of the electrical work at Auburn is as follows:  
All work is finished on the engine facilities excepting there is left 5% on each the machine shop light and machine shop power. The ice house is now 25% finished. We have our accounting for material about 90% complete. I expect to have all this cleaned up next week.  
Force 4 wireman.

Very truly yours,

*A. Reed*  
Gen. Foreman Elect.

/D



HAC-h

Saint Paul, February

Mr. H. M. Curry,

Mechanical Superintendent.

Dear Sir:-

Referring to your letter of January 11th, in answer to mine of December 31st, your file 5325, in regard to piping return condensation from heating systems.

Sometime ago in talking with some one in Mr. Bohan's office I learned that Mechanical Department had advice that the Pasco return was piped to hot well instead of to the feed water heater. Mr. Perkins advises that the returns at Pasco are piped so that they may be turned either into the hot well or to the feed water heater as desired, and that it is his understanding that this entirely meets with the specifications.

Yours truly,

*W. A. Smith*



Seattle, 4-11-13.

Mr. H. M. Curry,

Mechanical Superintendent, St. Paul.

Dear Sir:-

The Auburn terminal was opened and placed in operation at 12:01 A.M., April 10th, without any commotion whatever, insofar as the mechanical end of it was concerned, and which is commendable on the part of the men who were required to furnish the power, considering that there was not a single hand tool on the job, excepting those taken there by each of the machinists and boilermakers, who were transferred from Seattle, Lester and Ellensburg. Each of these men took their own kit.

Up to the present time I have made the following transfers to Auburn, Seattle Loco. Dept.:-

- 2 Boilermakers
- 1 Boilermaker Helper
- 1 Boiler Washer
- 1 " " Helper
- 3 Machinists
- 2 Wipers
- 2 Fire Cleaners
- 2 Cinder Pit Men
- 1 Sandhouse Man

14 Total

None as yet from Car Department, but expect to transfer about 25 as soon as Schmelz gets his bad orders reduced, which at the present time should come down rapidly, as there is only one freight train, "North Bend Local", coming into Seattle from the north, and the transfers from Auburn. All other freight trains from the north go to Auburn via Belt Line.



Transferred from Ellensburg:-

|       |                   |
|-------|-------------------|
| 2     | Machinists        |
| 1     | Boilermaker       |
| 2     | Outside Laborers  |
| 1     | Car Inspector     |
| 1     | 1st Class Car Man |
| 1     | 2d " " "          |
| <hr/> |                   |
| 8     | Total             |

This for the reason that all the heavy locomotive work formerly taken care of at Ellensburg will now be handled at Auburn, also the car situation will be materially improved.

- Lester -

|   |           |
|---|-----------|
| 1 | Machinist |
| 1 | Laborer   |
| 1 | Wiper     |

On account of the Auburn-Lester pushers now laying over at Auburn and which I figure has relieved the work at Lester to the extent of these three men and possibly more, I will add that later when Auburn has become well equipped and in running order and adjusted to the new order of things, I will be able to make a further reduction at Seattle of 3 machinists, 2 wipers and one more cinder pit man, and transfer them to Auburn, as 4 more switch crews will be taken off at Seattle in a short time.

In making the above changes, it was not done without first going into the matter thoroughly with the foreman and all concerned, but believe me in making all this preparation to start Auburn, which involved the placing of R.H. and car forces, getting engines and crews to handle the first day's business was no small

job, and there are some other things in connection with this matter that I desire very much to tell you about but not write about it. However, I have felt wholly equal to the occasion and things went off beautifully but strenuously.

The tools in the Auburn shop are all in position with the exception of the 20" lathe, which by the way has not been received, and I have wired Mr. Crosby to trace it. The tools connected up and in operation are as follows: 16" lathe, wet and dry grinder, small drill press, 36" lathe, crank planer, bolt cutter, blower, Watson-Stillman press, punch and shears and pipe cutter. Some of the above have only temporary switches, as the material for making the permanent connections has in some manner become delayed. The following tools will be ready for operation within the next two or three days or as soon as the electric connections and belting arrive: Iron boring machine, wood boring machine, saw and grindstone. The steam hammer was being set today and will probably be four or five days before it is placed in operation. Its blower is electrically connected but as yet there are no forges.

The drop pit rams are in about the same condition as when you saw them, excepting that Mr. Bennet, the bondsman for the contractors who threw up the job, is now personally setting the rams by sinking boiler iron casings in which to set them, and it will be impossible to give any definite date as to when the job will be finished, although he told me today that he (Mr. Bennet)



had succeeded in getting one of the casings placed.

The stationary boilers and Jones stokers are working fine, although the scales for weighing the coal and cinders have not yet arrived, neither am I able to get scales of any kind at Auburn, but expect to have this lined up in a couple of days.

The pumps and piping are in good shape, with the exception of a bad leak where the 10" suction pipes come into the tunnel from the hot well. This is overcome by keeping the water below this point.

The grounds around the buildings are an unsightly mess, as they are strewn with rubbish of every conceivable nature, which will include timbers, lumber, "scrap" piping, concrete mixers, boxes and barrels and rubbish of every kind, but McPhee is after it and is making a little showing. This rubbish was left by the contractors, who it seems left the job very suddenly.

McPhee is R.H. Foreman at Auburn, and as yet I have made no appointment at Ellensburg, but have a great many applications, and the one who looks the best so far is young Cook, who is now night foreman at Tacoma. He is certainly a good looking boy, and from all accounts a good hustler and good mechanic.

Everything on the division is going along good. We have a large number of work trains on the north end, and have 4 S-4 engines in work train service out of Sedro Woolley and have about completed a boiler washing outfit at Sedro which will enable me to take care of the boiler washing of nearly all engines tributary

to Everett, Bellingham and Sedro. The S-4 engines had to be taken to Sedro via the G. N. Ry. account of the Snohomish River bridge, which is not considered safe for engines of their heft.

Referring again to Auburn, I have made request for three more of those cluster lights for the outside, as there is but one of these lights and is located at the extreme north end of cinder pit, leaving the space between them and the coal dock in darkness, and I hope you will see your way clear to authorize same, as they are surely needed, as all the water and oil stand pipes are located in the space where there is no light.

The fuel oil station at Auburn tested out all right, and have a small amount of oil in the sump and tank, and I may add that the coal dock is also satisfactory, as we have now unloaded about 10 carloads in the pockets.

The Buckeye engine in the power house is about the only thing that has given much trouble. This on account of some considerable difficulty experienced in getting the required speed regulation. Its speed varies from 5 to 20 RPM, although the lights burn steady and bright and the motors seem to run very steady.

Will write to you again in a few days.

Yours truly,

(Signed) C. S. Larrison

(COPY)



June 21, 1913.

Improvements - General  
Motors  
Starters

Robinson, Cary & Sands Co.,  
St. Paul, Minn.

Attention of  
Mr. G. Willius, Jr.

Gentlemen:-

Referring to our telephone conversation.

The "Delta-Star" starting switch furnished with Crocker-Wheeler motors is so designed that the oil creeps up the conductors very badly, and it is necessary in starting some of our machines (for instance, the boring mill at Auburn, which is equipped with a 7-1/2 HP Crocker-Wheeler motor, serial #137001) to start the belt by hand, which is, of course, very undesirable, the motor with its starting apparatus not permitting sufficient torque.

Will you kindly advise what action you will take to correct this situation on your motors.

It will not be consistent for us to use this type of starter on future motors, unless it is materially improved.

Yours truly,

6-E

Mechanical Engineer.

Cy. KRH

St. Paul, Minn. June 19, 1913.

Electric Motors  
General

Mr. W.J. Bohan:-

While at Centralia I noticed the oil creeping very badly from the starting switch on the Crocker Wheel Motor which drives the tank pump. Mr. Reed tells me this is a common fault of the Crocker Wheeler Starter.

Other faults of this switch are:- In that it is a delta star starter there is no adjustment for starting tongue. At Auburn, the Crocker Wheeler motor will not start the boring mill, it being necessary to pull on the belt, No remedy whatever.

It also costs more to wire this switch than any other because of the three extra wires running to the machine, taking larger conduit and fittings.

Is it necessary that we continue the purchase of this type of motor?

K.R.Hare.

12-H



Saint Paul, August 9, 1913.

AUBURN  
Improvements 1912-13  
Motors  
Starters

File 5352

Mr. R. M. Crosby,

General Master Mechanic, Tacoma.

Dear Sir:

Complaint has been made that the  $7\frac{1}{2}$  H. P. Crocker-Wheeler motor, operating the boring mill at Auburn, has not sufficient starting torque, due to the design of the starting switch, to start the machine.

I have taken this matter up with the manufacturers and their representatives, Robinson, Cary & Sands Co., and they advise that they will immediately ship an auto starter with no voltage release and necessary oil to replace the Star Delta switch.

Immediately upon receipt of the new starting device, please have the Star Delta switch disconnected, cleaned up thoroughly, securely packed to prevent damage in transit, and shipped to Robinson, Cary & Sands Co., St. Paul, advising when it goes forward, giving shipping details.

Yours truly,

6-0

Mechanical Superintendent

Cy-OCW

BHR

CSL

KRH

FWR

ESTABLISHED 1871.

INCORPORATED 1889.

# ROBINSON CARY & SANDS CO.,

## RAILWAY EQUIPMENT AND SUPPLIES,

FOURTH & WACOUTA STS.

ST. PAUL, MINN.

July 10, 1913

IN REPLY REFER TO DESK 5

All quotations are made for prompt acceptance, and subject to change without notice. Statements of delivery subject to delays occasioned by strikes, fires or other causes beyond our control.

Mr. W.J. Bohan, Mech. Engr.,  
Northern Pacific Ry Co.,  
C I T Y.

Dear Sir:-

Referring to your letter June 21st subject Improvements - General Motors, Starters. So far as concerns the  $7\frac{1}{2}$  H. P. starter to which you make reference. Please be informed that we are arranging to forward under original shipping instructions a  $7\frac{1}{2}$  H. P. auto starter equipment with no voltage release and necessary oil to replace the Star Delta switch which does not enable securing the necessary starting torque.

Please instruct your proper authorities to return to us here using the enclosed tag, the Star Delta switch, as soon as consistent after installation of the auto starter.

If any other Star Delta switches are not giving satisfactory service, please give us a specific statement as to the trouble. Further give us the serial number of each and every Star Delta switch so that same may be replaced at the earliest consistent moment.

Yours truly,

ROBINSON CARY & SANDS CO.

Mechanical Engineer

To W.P. Ry  
Ct. Div. St. Paul  
Auburn  
Back

Motor

Auburn

Robinson Cary & Sands Co.



" COPY "

St. Paul, Minn. Jan. 24, 1913.

Changes in South Tacoma,  
Boiler Plant.

Mr. A. Ouedahl,  
Pasco, Wash.

Dear Sir:-

Kindly note Mr. Crosby's letters to me of January 3rd and 16th, in which he suggests that you make some investigation of the South Tacoma boiler plant.

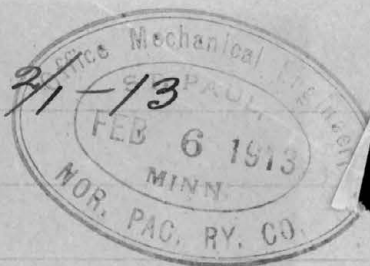
I would like to have you do this offering any suggestions that may be practicable with the end in view of securing improved and more economical service from the stationary boilers at that plant. Bear in mind that under no circumstances do I wish any action taken that will tend to interfere with continuously maintaining maximum boiler pressure. It is imperatively necessary to do this to meet our compressed air shop requirements as while using the present boilers the adoption of a policy in the way of burning an inferior grade of coal or any other measures that will tend to interfere with maintaining steam pressure will be a vastly "penny wise and pound foolish" one.

Mr. Malott is very thoroughly in touch with the situation and I wish you to work strictly in conjunction with him. It also being my desire that you give him opportunity of noting correspondence herewith attached which I desire returned with the results of your investigation or any tests that you may conduct. It to be understood that I do not wish any laterations made without Mr. Malott's approval.

HMC R

Yours truly,  
Mechanical Superintendent.

Centralia 2/1-13



Mr. W. J. Bohan

Mech. Eng.

Dear Sir:

As a report on the progress of the electrical work at Auburn I submit the following;

|                                |        |      |          |
|--------------------------------|--------|------|----------|
| Round house                    | lights | 100% | finished |
| Mach. shop + drop pit Section  | "      | 85%  | "        |
| Laboratory                     | "      | 100% | "        |
| Oil room                       | "      | 100% | "        |
| Power house                    | "      | 99%  | "        |
| Power house                    | Power  | 97%  | "        |
| Coal dock                      | lights | 99%  | "        |
| Sand house                     | "      | 100% | "        |
| yard tool + Storage build.     | "      | 100% | "        |
| Freight transfer house         | "      | 85%  | "        |
| " " "                          | line   | 80%  | "        |
| Shop engine house + turn table | "      | 60%  | "        |
| Coal dock                      | "      | 100% | "        |
| Passenger trans. depot         | "      | 60%  | "        |
| Turn table tractor             |        | 100% | "        |
| Store house                    | lights | 100% | "        |
| Foreman's office build.        | "      | 100% | "        |

Force for the week 1 leading wireman 1 helper.

Respectfully,  
A. M. Reed



St. Paul, Minn. Nov. 6, 1912.

As below.

- 1      2      48"x10' vertical air reservoirs,  
shell 5/16" dished heads 7/16" thick,  
with two 1/2" drain valves, flanged  
connections per Master Steam and  
Hot water Fitter's Standards, for 5" inlet and outlet.  
reservoirs to be designed for 125# per  
square inch working pressure.
- P A S C O .  
Comptroller's No.  
328 of 1911.
- A U B U R N  
Comptroller's No.  
326 of 1911.
- Reservoirs to be duplicates of  
those furnished on order 5-76 of  
May 2, 1912.

Ship one each of the above  
reservoirs to:-

G.A. Kenrick, Assistant Engineer,  
Auburn, wash.

L.J. McIntyre, Assistant Engineer,  
Pasco, wash.

Mechanical Superintendent's Requisition No. 1081.

Autumn 1911-12

Mr. W. J. Bohan  
Mech. Eng.  
Dear Sir:



The following is my week end report as to the progress made on the electrical work at Autumn.

|                                     |              |
|-------------------------------------|--------------|
| Round house lights                  | 25% finished |
| Power " "                           | 99% "        |
| Oil room " "                        | 99% "        |
| Coal dock " "                       | 15% "        |
| Sand house " "                      | 99% "        |
| Shop Eng. houses & Turn table lines | 1% "         |
| Freight transfer house lights       | 70% "        |
| " " " line                          | 18% "        |
| Pass. " depot "                     | 1% "         |

Resp Yours  
A. Reed



ESTIMATED COST OF INSTALLING AIR PIPING  
IN CAR YARDS AT AUBURN.

|                                            |                                                  | Labor  | Material | Total.     |
|--------------------------------------------|--------------------------------------------------|--------|----------|------------|
| No. Pieces                                 | Description                                      |        |          |            |
| 1                                          | 2½" Check Valve                                  |        | \$2.25   | \$2.25     |
| 1                                          | 2½" Reducing Valve                               |        | 25.00    | 25.00      |
| 1                                          | Tee 2½"x2½"x2½"@45¢ (Galv.)                      |        | .45      | .45        |
| 13                                         | Tees 2½"x2½"x1¼"@45¢ (Galv.)                     |        | 5.85     | 5.85       |
| 1                                          | Tee 1¼"x1¼"x2½"@45¢ (Galv.)                      |        | .45      | .45        |
| 5                                          | " 2½"x2½"x1"@45¢ (Galv.)                         |        | 2.25     | 2.25       |
| 2                                          | " 2½"x1¼"x2½"@45¢ (Galv.)                        |        | 1.90     | 1.90       |
| 1                                          | Reducer 5" to 2½"                                |        | .50      | .50        |
| 109                                        | Tees 1¼"x1¼"x1" @ 12¢ (Galv.)                    |        | 14.17    | 14.17      |
| 3                                          | 2½" Elbows @ 36¢                                 |        | 1.08     | 1.08       |
| 3                                          | Crosses 2½"x2½"x1¼" @ 60¢                        |        | 1.80     | 1.80       |
| 226                                        | Short Nipples 1" @ 1.1¢                          |        | 2.49     | 2.49       |
| 113                                        | 1" Westinghouse Cutout cocks<br>@ \$1.20         |        | 135.60   | 135.60     |
| 113                                        | 1" Westinghouse Air hose<br>connections @ \$1.25 |        | 141.25   | 141.25     |
| 21                                         | Plugs 1¼" @ 2½¢                                  |        | .53      | .53        |
| 1                                          | Plug 2½" @ 9¢                                    |        | .09      | .09        |
| 5300                                       | Ft. 2½" (Galv.) Pipe @ 26.1¢                     |        | 1383.30  | 1383.30    |
|                                            | Laying 2½" pipe 5300 Ft. @ 10¢                   | 530.00 |          | 530.00     |
| 5100                                       | Ft. 1¼" Galv. Pipe @ 10.26¢                      |        | 523.26   | 523.26     |
|                                            | Laying 1¼" Pipe 5100 Ft. @ 5¢                    | 255.00 |          | 255.00     |
| 1                                          | Drainage Reservoir                               |        | 20.00    | 20.00      |
| 2500                                       | Board Feet 2" lumber @<br>\$12.00 per 1000 Ft.   |        | 27.00    | 27.00      |
| 113                                        | Hydrant Boxes cost to con-<br>struct @ 20¢       | 22.60  |          | 22.60      |
| 230                                        | Lbs 5" Nails 3¢                                  |        | 6.90     | 6.90       |
| 226                                        | pairs 5" hinges @ 20¢                            |        | 45.20    | 45.20      |
|                                            | Boxing Checks & Reducing Valve                   | 1.00   |          | 1.00       |
|                                            |                                                  | 808.60 | 2340.32  | 3148.92    |
| Superintendence, Shop and<br>Store Expense |                                                  | 121.29 | 234.03   | 355.32     |
|                                            |                                                  | 929.89 | 2574.35  | 3504.24    |
| Freight                                    |                                                  |        |          | 272.91     |
| Total-----                                 |                                                  |        |          | \$ 3777.15 |

Mechanical Superintendent.

Office of Mechanical Superintendent.  
St. Paul, Minn. September 21, 1912.

R. F. A. No. 490.

C. D. No. ....

## AUTHORITY FOR EXPENDITURE.

Requisition dated

October 11, 1912.

Comptroller's No. ....

From

Division

Mechanical Department.

For

Installing Air Piping in Auburn Car Yards.Amount, \$ 3,777.00

## REMARKS AND RECOMMENDATIONS.

See Form 1363 attached.

Operating Expenses - - \$ .....

Additions and Betterments } Acct. No. A-23 \$ 3,777.00

                                  " " ..... \$ .....

                                  " " ..... \$ .....

Material and Supplies - - \$ .....

Engineer Maintenance of Way.

Chief Engineer of Maintenance of Way.

Chief Engr., Mech. Supt. or Supt. Telephone

General Manager.

Third Vice-President.

Second Vice-President.

## DISTRIBUTION OF CHARGES.

Operating Expenses ..... \$ .....

Additions and Betterments ..... \$ .....

Material and Supplies ..... \$ .....

Rail Renewal Fund ..... \$ .....

..... \$ .....

Total, \$ .....  
.....

Comptroller

Approved.....191

President

## COMPTROLLER'S RECORD OF NOTICE OF APPROVAL AND OF COMPLETION.

Form 1345 issued

191

Work commenced

191

Work Completed

191





## REQUISITION FOR AUTHORITY FOR EXPENDITURE.

Form 1363  
(Revised 12-30-04)

October 11, 1912.

Comptroller's No.

Division. Mechanical Department. Applicants No. 490.

Authority is requested for an expenditure as per detailed estimate attached of \$ 3777.00.

For { new work  
additions at Auburn  
maintenance

consisting of Installing Air Piping in Car Yards.

The location is shown by plan attached, and is on not on this company's property. To secure required rights, it will be necessary

Charges are to be made against

for

as per

The expenditure is recommended for the following reasons:

The installation of air pipe lines in Auburn freight yard is recommended for the purpose of bettering the service, by making it possible to charge up and test brakes on trains that the inspectors cannot get to in time to make the incoming test with the engine that brings the train in, by saving time in charging and testing brakes so that repairs can be made before trains are made up to get out and the charging and testing of brakes in outgoing trains before the road engine is on the train, making it possible for the road engine to couple on, make a brakepipe test and get out without the delay incident to charging and testing from the engine.

When such a plant is in operation, many brakes that are not in good working condition can be located and repaired that would otherwise get away, and the general efficiency of freight brakes raised accordingly.

30 days

will be required for construction, which should be commenced

at once

November 15, 1912.

in order to complete by

and be done by Division forces

under charge of

October 11, 2. Mech. Supt.

191 (Title)

191 (Title)

191 (Title)

191 (Title)

## SKETCH

## INSTRUCTIONS

Use this form, made in quadruplicate, for requesting authority for special expenditures, the general scheme of which, when approved, must not be changed except on similar authority.

Do not commence work for which authority is requested until advised by the Comptroller of approval, or work for which right of way arrangements or deposits by other parties are to be completed, until such matters are adjusted.

Make estimates, personally signed: (a) in sufficient detail to show kinds of material, quantities, all other items, and prices; (b) if part of the cost is to be charged others (for which obtain special instructions regarding prices to be used), show in detail how derived, give the total cost, deduction to be charged, and net for which authority is requested; and (c) where a formerly existing facility is involved, give data enabling determination of the proper division of cost between operating expenses and other accounts.

Show location by sketch on back when necessary information can thus be given in a convenient and comprehensive manner, otherwise attach plat; new work being shown in color, preferably red.

Under recommendations make full explanation and statement of present situation and of all items pertaining to and explaining the improvement desired, and in particular for the following (a) traffic—necessity, results, and advantages; (b) operating—necessity, resulting improvement in service, and economy; (c) agreements, or other considerations affecting the undertaking; and (d) disadvantages, or difficulties that may ensue.

Division and local officers responsible or interested must personally sign requisitions, which with all correspondence attached will be forwarded through the regular channels to the General Manager, except that requisitions for work west of the Rocky Mountains will be submitted to the Assistant to the President for approval, before being forwarded to the General Office at St. Paul.



St. Paul, Minn., Nov. 25, 1912.

AUBURN, PARKWATER, CENTRALIA  
Improvements 1911-12

Mr. A. Ousdahl,  
Mechanical Inspector,  
C/o Mr. G. F. Egbers,  
Pasco, Wash.

Dear Sir:-

As promised when you were in the office recently, I am sending you herewith copies of Engineering Department's plumbing specifications for Auburn, Parkwater and Centralia, also blueprints of this department's drawings, as follows:-

A U B U R N

Dwg.No.

|         |                                       |
|---------|---------------------------------------|
| 16126-B | Piping - General Plan                 |
| 16231-A | Steam Piping - Power House            |
| 16230-A | Water Piping - Pump Pit               |
| 16232-B | Location of Air Reservoirs and Piping |
| 16673   | Location of Tools in Machine Shop     |

P A R K W A T E R

|         |                                       |
|---------|---------------------------------------|
| 16389-A | Piping - General Plan                 |
| 16338   | Steam Piping - Power House            |
| 16333   | Water Piping - Pump Pit               |
| 16754   | Location of Air Reservoirs and Piping |
| 16766   | Location of Tools in Machine Shop     |

C E N T R A L I A

|         |                            |
|---------|----------------------------|
| 16402-A | Piping - General Plan      |
| 16400   | Steam Piping - Power House |
| 16411   | Water Piping - Pump Pit    |

Yours truly,

Mechanical Engineer

## *Setting and Connecting of Hoppes Feed-Water Heaters*

**T**HE Heater should be placed in such position that the bottom of the shell will be **at least two feet above** the suction valves of the pump. It should then be carefully leveled both ways by means of the set screws at the extremities of the legs, a spirit level being placed upon the leveling bar on top of Heater.

The exhaust inlet pipe should be connected to the opening in the back head and the outlet pipe to the opening on top of Heater. "P," (page 17) is the suction connection to boiler feed pump and "B" is the blow-off or drain.

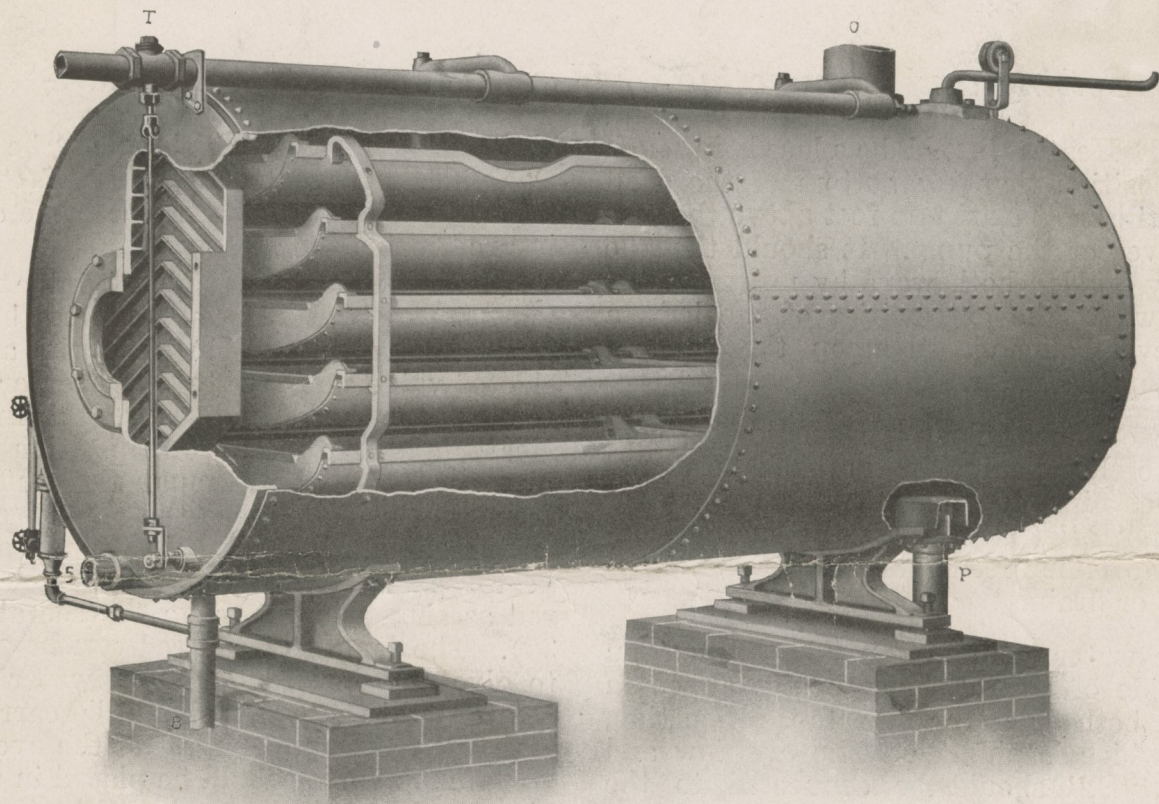
The water column may be placed on either side of Heater, holes being tapped in shell on both sides for the top connection, one of which is plugged. The overflow and oil drip, "S," should be connected to the sewer, and when the Heater is used in connection with a heating system we furnish a

Trap (see page 34), which should be used in this pipe. The regulating valve, float and all fittings will be found in the box; the connecting rod inside the Heater.

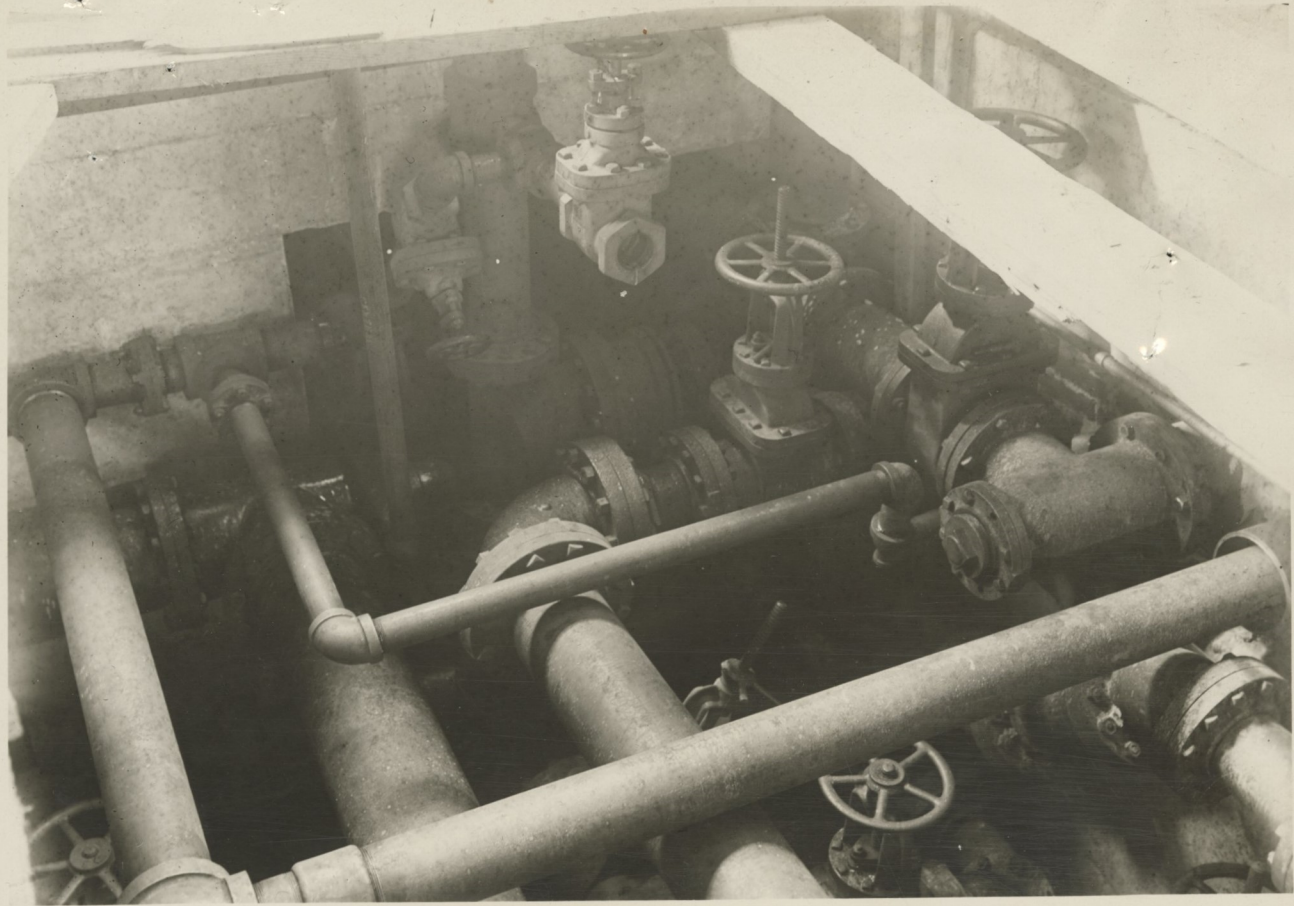
In attaching the float and valve to heaters **not** provided with outside float box, first secure the valve, "T," in place with arrow on side of valve pointing **toward** Heater. Then remove the head and pans, get inside of Heater and put the float in position by running the brass stem through the stuffing box from the inside. Place the small iron lever on the outside end, drive in the pin and connect the lever with the valve stem by the rod as shown in cut, page 17 (see also page 35). The length of the rod **can be adjusted** to give any desired height of water in the Heater, and the water should be carried just high enough not to run out of the overflow.

A stop valve should be placed in the feed pipe to shut off the water, the regulating valve being intended for regulation only.





"Standard" Type Hoppes Exhaust Steam Feed-Water Heater and Purifier, Showing Oil Catcher.

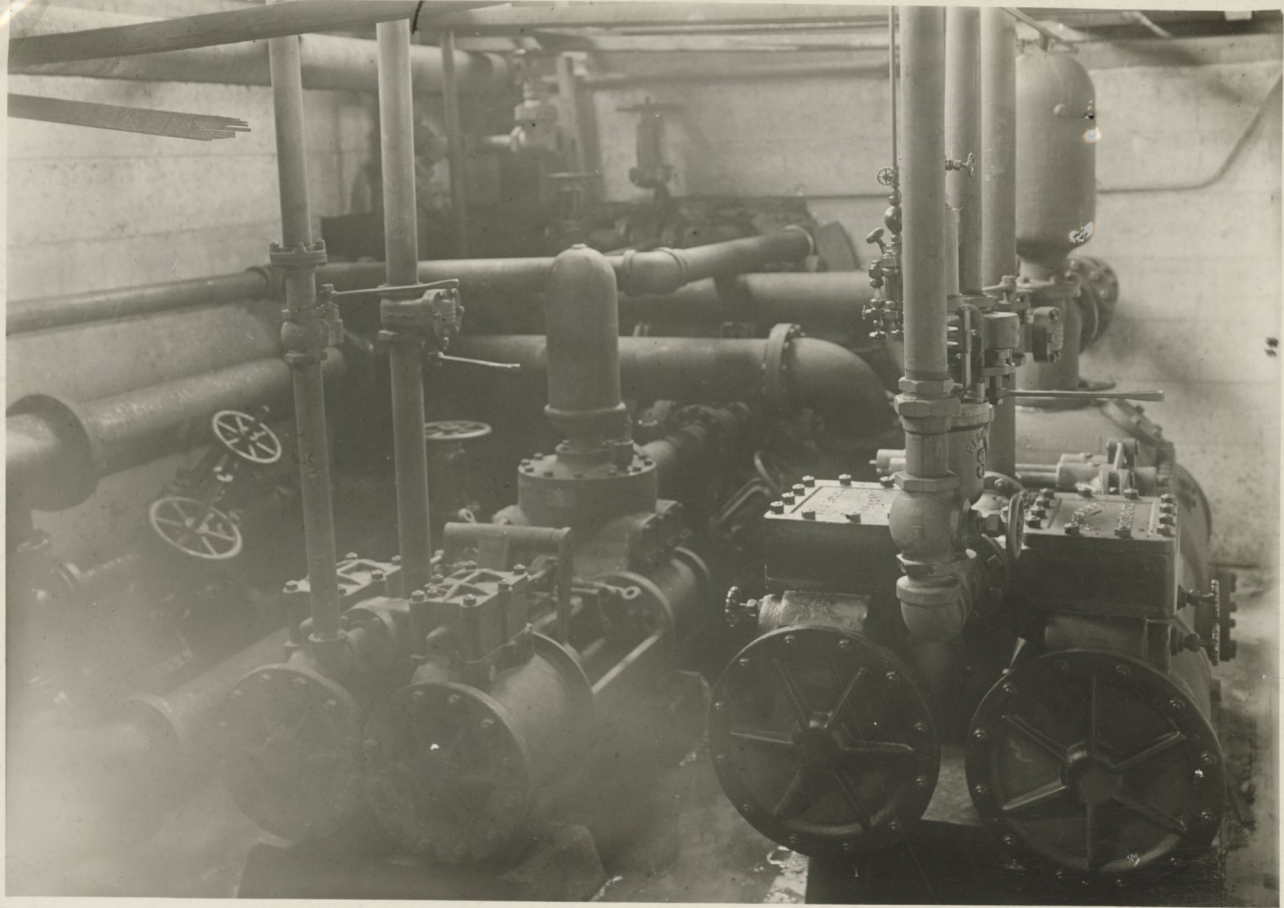


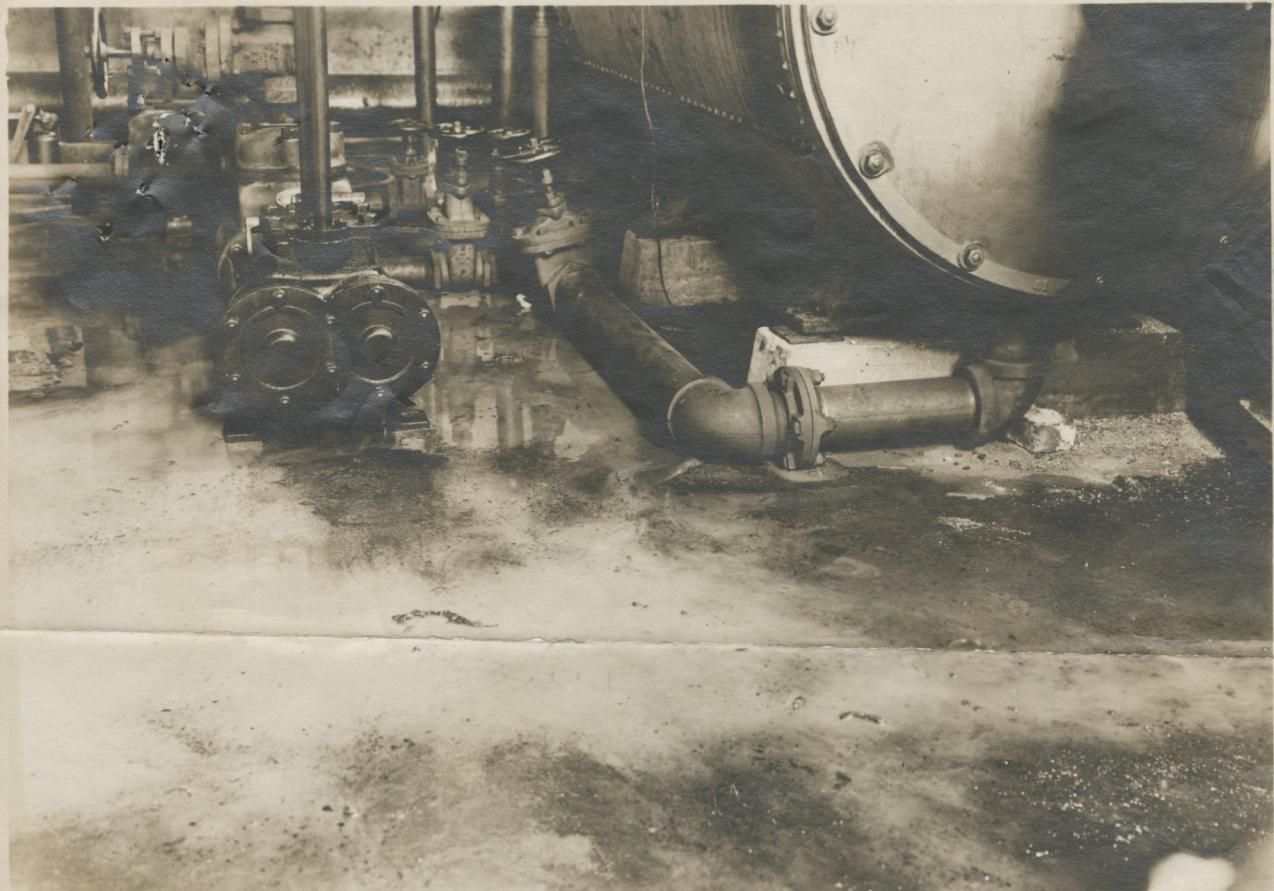












Pump Pit at Pasco -



# NORTHERN PACIFIC RAILWAY COMPANY

## INDEX TO SPECIFICATIONS - AUBURN ENGINE FACILITIES.

### General Specifications

-oOo-

| PAGES                    |         | PAGES                       |         |
|--------------------------|---------|-----------------------------|---------|
| Original                 | Addenda | Original                    | Addenda |
| Specifi-                 | to Spe- | Specifi-                    | to Spe- |
| cations.                 | cifica- | cations.                    | cifica- |
|                          | tions   |                             | tions   |
| Brick Masonry            | 11      | Piling                      | 23      |
| Concrete                 | 8-10    | Protection & Responsibility | 4       |
| Cut Stone                | 10      | Removal rubbish             | 5       |
| Carpenters work (Timber) | 13      | Roofing                     | 20-22   |
| Drawings                 | 2       | Structures                  | 1       |
| Errors                   | 3       | Site                        | 2       |
| Excavation               | 7       | Supervision                 | 4       |
| Flashing                 | 16      | Sub-Contractors             | 5       |
| Grading                  | 6       | Temporary Enclosures, Heat. | 5       |
| Hardware & Iron          | 15      | Track laying                | 18      |
| Laying out work          | 3       | Unit Price Work             | 6       |
| Mortar                   | 7       | Work to be ex-              | 19      |
| Millwork                 | 14      | cluded                      |         |
| Painting                 | 17      | 1-2 Water Proofing          | 23      |

### Detail Specifications

#### Round House & Machine Shop:

|                      |       |                 |       |
|----------------------|-------|-----------------|-------|
| Drawings, etc.       | 25    | 2-3 Coal Dock   | 41-42 |
| Doors                | 25    | Fuel Oil Cellar | 29    |
| Drop pits & Eng Pits | 26    | Hot well        | 35    |
| Fire Walls           | 27    | Lavatory        | 44    |
| Floors               | 27-29 | Pipe Tunnel     | 36    |
| Gutter & Down Pipes  | 29    | Store House     | 37-38 |
| Lantern & Lant. Sash | 28    | 3 Sand House    | 43    |
| Miscellaneous        | 29    | Stand Pipe      | 45    |
| Rear Wall            | 28    | Turntable Pit   | 31    |
| Roof Boards          | 28    | Yardmen's House | 5-6   |
| Stringers & Caps     | 27    | Water tank      |       |
| Smoke Jacks          | 27    | 2 Foundation    | 46    |
| Boiler House         | 32-35 | 4-5             |       |
| Cinder pits          | 40    | 5               |       |



Traps for high pressure drains  
shall be the Vance #18

85% magnesium

9147 Logging on all steam, exhaust & feed  
water piping, valves & fittings

51147  $\frac{1}{16}$ " "Rainbow" packing for all flanged  
make joints. Flanges must face each other  
new. squarely so as to make tight joints without  
51148 excessive strain on bolts and shall be  
#448 screwed into pipe with angle power  
to insure tight joints between the  
pipe and flanges.

Cast iron buckets for steam and  
exhaust piping.

#446 grade all steam and exhaust pipes  
in the direction of the normal flow  
of steam.

#18 Provide drain connections on all steam  
connections to pumps and stoker engine so  
condensed water can be drained off.

#52 Steam heat for fuel oil cellar.

Bordo

27 + 52.



-000-

Specifications of labor and material for structures to be erected for the Northern Pacific Railway Company at Auburn, Washington, as enumerated below.

—0—

GENERAL SPECIFICATIONS

Structures:

(1) The structures to be erected under this contract comprise the following:

(A) A 25 stall brick roundhouse of which 21 stalls are to be 90' deep and 4 stalls 116.5' deep including 2 drop pits.

(B) Foundation for an 85' turntable.

(C) A brick machine shop 66'8" by approximately 112' including office annex 17' x 28' (Annexes to roundhouse)

(D) A brick boiler house, engine and dynamo room and oil room 49' x 114'8" including stack foundation.

(E) A concrete hot well 24' diameter 14' deep.

(F) A concrete pipe tunnel between pump pit in boiler house and roundhouse including branch tunnel to hot well.

(G) A brick storehouse 40' x 62' including wood platform.

(H) A concrete fuel oil cellar, inside dimensions 10' x 20' - 10' deep.

(I) One 100 and one 200 foot cinder pit with retaining walls for depressed track.

(J) A two track coal dock 36' x 60' with trestle and hoist house.

(K) A brick sand house 22'2" x 17'6" with wood sand sheds 22'2" x 149'4".

(L) A brick lavatory building 16' x 16'.

(M) Two brick standpipe pits.



(2) A plat of the site will be furnished to the contractor showing approximate location of structures. Necessary stakes establishing exact location of each building, will be set, and elevations establishing floor levels will be given to the contractor by the Railway Company's Engineer in charge when required.

#### Examination of Site

(3) Bidders will be required to make a careful examination of the site on the ground, and obtain their own information in regard to nature of soil, elevation of ground, in relation to the established grade of buildings and as to the existing obstructions or difficulties on the site.

(4) Ground lines shown on the plans indicate approximate top of ground after being graded or filled to proper level, and must not in any case be assumed by the contractor as the existing ground elevation.

#### Drawings

(5) The drawings furnished and these specifications are to be the basis of this contract and are of equal force, any work herein specified and not shown on drawings or vice versa, must be considered as included in this contract, as if both shown and specified.

(6) Parts not specially detailed shall in all cases be constructed in a manner satisfactory to the Railway Company, the contractor shall in no case proceed in doubt, but shall obtain from the Railway Company's engineer such information as is necessary for full understanding of the requirements. The Railway Company will furnish such additional drawings, details or explanations as they may deem necessary to give full description of the work. The contractor must make request in writing for any additional drawings he may require and state when same must be furnished to him in order not to delay the work.

Dimensions marked on drawings must be carefully followed. Figures shall be used, when given, in place of scaling, and large scale drawings in preference to those of smaller scale.

All drawings, etc., received at any time during the continuation



of this contract are to be carefully preserved, and at its termination to be returned to the Railway Company, before certificate of payment is made.

Errors and Omissions:

(7) The contractor shall not take advantage of clerical errors, disagreement or manifest omissions or discrepancies in the drawings or specifications, but shall immediately refer same to the Railway Company's engineer for solution or correction, his decision in all cases to be final. Items not shown nor specified which are reasonably necessary for a proper and satisfactory completion of the work shall be provided by the contractor without extra charge.

In order to avoid mistake in the work which might be caused by such errors, disagreements or omissions, the contractor shall make himself familiar with the plans and carefully check and compare the plans and specifications and have any discrepancies explained and corrected before ordering material and proceeding with the work, it being strictly understood that he will be held responsible for any mistakes or omissions in the work as a result of failure to do so.

Laying out of work:

(8) The Railway Company's engineer in charge will locate the buildings upon the site, as specified in paragraph two, and after their locations are once fixed the contractor shall be responsible for carrying out the work in strict accordance with the plans. If any mark or stakes are disturbed or lost during the work the contractor shall pay for having them reset.

Extras and Changes:

(9) The Railway Company reserves the right to make any alterations or changes during the progress of the work, either by increasing or diminishing the work required under these specifications.

For any alterations, the injury or advantage to the contractor shall be estimated by the Railway Company's engineer and such allowances or deductions shall be made as he may deem just and



equitable but no claim for any increase in price shall be allowed unless made in writing before work on the altered portion shall have commenced. Any change or alteration of plans and specifications shall have the Chief Engineer's written approval, and no extrawork will be allowed or paid for unless the contractor shows a written order for same from the engineer in charge. Any oral order relating to changes which affects the cost will not be recognized as authorizing changes. If alterations occur in work for which unit prices are given, the additions or deductions in cost shall be based on such unit prices.

Supervision:

(10) The work will be done under the supervision of the engineer of the Railway Company and shall be carried out in every respect to his entire satisfaction and acceptance. The Contractor shall give his personal attention to the work or provide a competent foreman in his place, who shall be constantly at the building from the beginning to completion. The Contractor shall dismiss any of his employees if the engineer in charge considers said employees incompetent or careless and so informs the contractor.

Tools and Scaffolding:

(11) The Contractor shall at his own expense provide all tools, machinery and scaffolding required for full and proper execution of the entire work. The staging to be strongly built and securely braced.

Protection and Responsibility:

(12) The contractor shall have charge of the site and be responsible for the protection of his work and work of any subcontractor during the progress of construction. He shall take charge of, and be responsible for, any loss or injury from any cause, to any material, delivered at or in the vicinity of the work, to be used by him thereon in connection with this contract prior to its completion.

The contractor shall assume all responsibility for damages to life and limb and adjacent property. He shall erect substantial barricades and hang red lights at all obstructions, excava-



tions or other dangerous places and shall observe and obey all laws and ordinances of the City of Auburn relating thereto. Derricks, hoists, scaffolding and other apparatus shall be sound, safe and secure and shall be so maintained until taken down and removed. He shall carry accident and liability insurance on all workmen employed on the premises under this contract, and shall be responsible for injury to other persons due to his negligence or that of his employes.

Sub-Contractors:

(13) The contractor shall not sublet the work or any portion of the work to any person who may be objectionable from any cause. The contractor alone will be held responsible in every transaction pertaining to this contract and no subcontractor will be recognized by the Railway Company independently of the General Contractor.

When this contract is awarded, the contractor shall let all sub-contracts as promptly as possible thereafter, and immediately notify the Railway Company with whom such contracts have been made.

Temporary Enclosures and Heating:

(14) The contractor shall provide, if required, temporary coverings or screens for openings in the building; also furnish such temporary heat including necessary fuel which in the opinion of the engineer may be required to insure a proper and speedy completion of the work.

Permits:

(15) The contractor shall give to the proper authorities all required notice relating to the work in his charge, obtain and pay for all official permits for building, water, street obstructions or any other permits required, and furnish to the Railway Company's engineer the original or certified copies of all permits.

Removal of Material and Rubbish:

(16) As soon as the work is completed the contractor shall remove all tools, staging, surplus materials, rubbish, etc. from the Railway Company's premises and leave the structures and site in a clean and finished condition. All walls, roofs, floors, etc.,



must be cleaned and left clean and free from dirt and dust, and the windows washed.

Unit price Work:

(17) Such foundations for machinery etc., as herein specified to be extra work, additional work such as increased depth of foundations over that shown on plans and not covered by specifications, and other additions or deductions shall be paid for in addition to or deducted from the contract price on basis of unit prices for the following classes of work:

- (a) Excavation, wet, at unit price per cubic yard.
- (b) Excavation, dry, at unit price per cubic yard.
- (c) Concrete "A" in place, including excavation and backfilling, at unit price per cubic yard.
- (d) Concrete "B" in place, including excavation and backfilling, at unit price per cubic yard.
- (e) Concrete "C" in place, including excavation and backfilling, at unit price per cubic yard.
- (f) Concrete "C" reinforced in place, including excavation and backfilling, at a unit price per cubic yard, but not including reinforcing rods.
- (g) Reinforcement bars in place per pound.
- (h) Anchor bolts in place per pound.
- (i) Brick masonry in lime mortar in place, per 1000 bricks, wall measure.
- (j) Brick masonry in cement mortar in place per 1000 bricks, wall measure.
- (k) Vitrified brick paving in place, per square yard.
- (l) Dimension lumber in place, per 1000 FBM, including bolts, nails, etc.
- (m) 1" Lumber in place, per 1000 FBM including nails.
- (n) Piling driven in place, per lin. ft. below cut-off
- (o) Waterproofing of floors including cement mortar bed and top protection for same, per square yard.
- (p) Waterproofing of exterior walls, per square yard.

Grading:

(18) The Railway Company will do the grading of the building site to an elevation termed subgrade, which is approximately 12" below top of rail in roundhouse. All filling inside of buildings, under floors, etc., shall be done by the contractor.



Excavation:

(19) All the excavation for the structures listed in Paragraph 1, including excavation of trenches required for sewer pipes catch basins, etc., inside of buildings shall be done by the contractor.

(20) The depth and width of foundations, as shown on plans, may be varied according to the judgment of the engineer in charge. If the ground at the proposed depth, as shown, does not appear to be suitable to support the structure, the foundation shall be carried down until soil of required firmness is found.

(21) The contractor shall at his own expense provide the necessary timbering and planking for the excavation of trenches and shall do the necessary pumping and bailing to keep the pits dry, without extra charge to the Railway Company.

(22) Surplus excavated material, if suitable, will be used for filling under floors and surfacing between tracks, and any surplus over and above the amount required, and all unsuitable material, must be removed from the Railway Company grounds and disposed of by the contractor.

(23) All trenches shall be properly backfilled by the contractor. Where such trenches are to be floored over fill in thin layers and thoroughly wet tamp each layer until ground is perfectly packed.

Mortar:

(24) Cement mortar will be made of Portland Cement and sand in a proportion of one part cement to three parts sand. These ingredients must be measured. They must be thoroughly mixed while dry, then wet and worked to the proper consistency. This mortar will be used when cement mortar is specified, without further remarks.

(25) Lime mortar will be composed of lime and sand in the proportion of one part of the former to four parts of the latter. The proportion of lime and sand may be varied to suit the nature of the lime used, but the product must be in all cases satisfactory to the Railway Company's engineer in charge of the work.



(26) Pointing mortar is to be of equal measurements of dry sand and Portland cement, thoroughly mixed and worked to proper consistency.

(27) The proportions of ingredients as specified in paragraphs 24, 25 and 26 may be changed by the order of the engineer in charge if the mortar thus made is not satisfactory to him.

Cement mortar must be made in small quantities as it is required for use, and none shall be used after it has commenced to set.

(28) Portland cement of good and uniform quality and of an approved brand shall be used for all work requiring cement.

(29) Cement and lime not required for immediate use shall be stored in a proper building which shall be provided by the contractor.

(30) All Portland Cement to be used in the work must fill the requirements specified in Northern Pacific Railway Company's specifications for Portland Cement dated April 27th, 1904.

(31) Only strong fresh burnt lime shall be used for making mortar.

(32) Clean sharp sand, thoroughly screened, shall be used for all work. The Railway Company may require sand of different fineness for different work, and may require sand to be washed.

(33) All mortar shall be prepared on clean plank beds made for the purpose.

#### Concrete:

(34) The concrete used in the construction will be three classes designated "A", "B" and "C".

(35) Concrete "A" to be as follows:

The ingredients to be Portland Cement, clean sharp sand, and broken stone or gravel, any piece of which shall pass through a  $2\frac{1}{2}$ " ring. These ingredients shall be used in a proportion of one part cement, three and one-half parts sand and seven parts broken stone, but the proportion of broken stone may be slightly varied to accomplish the object desired, which is to have sufficient



mortar in the mass to surround each piece of stone and to fill all voids.

(36) Sand and cement must be thoroughly mixed while dry, spread out on a bed and the broken stone placed on top of it. Wet the bed thus formed by sprinkling with water and turn over until every piece of stone is covered with mortar, wheel to pit and place in layers and tamp thoroughly with a 16 pound tamping iron until the mortar flushes to the surface. The mixture must be worked as fast as possible, and the concrete must be placed in its bed in less than 20 minutes after the water is put on.

(37) Concrete "B". The ingredients for mortar to be the same as for concrete "A" and are to be mixed and deposited in trenches where required, when stones of various sizes are to be thrown in and tamped until they are entirely surrounded by mortar. Stone used for concrete "B" shall not be larger than eight inches in any direction, and there shall be a sufficient amount of smaller stones to prevent the requirements of an excessive amount of mortar.

(38) Concrete "C", to be made of the same class of material and in the same manner as concrete "A". The proportions of ingredients to be one part cement, three parts sand and five parts broken stone.

(39) All top surfaces of concrete masonry must be finished true and level. In freezing weather concrete shall be protected in a satisfactory manner until it has set. Wherever necessary side moulds of planks shall be used.

(40) Concrete "B" will in general be used for footing courses under foundation walls and for stack foundation.

Concrete "A" will in general be used for foundation walls (except for facing of engine pits), cellar walls, trench walls, boiler and machinery foundations.

Concrete "C" will in general be used for floors in boiler room and oil rooms, in turntable foundations, for facing of walls of engine pits, for hot well, fuel oil cellar and cinder pits.



For other work which may require concrete the engineer in charge shall decide which class is to be used. Also see detail specifications.

(41) All concrete floors shall receive one-half inch lining of cement mortar to be applied before the concrete underneath has set, also side of trenches and pits.

Finish top of concrete ledge around outside of buildings with cement forming an incline of one vertical to four horizontal. The cement mortar lining to be deposited simultaneously with the balance of the concrete work.

(42) All iron and steel work such as anchor bolts, reinforcement bars, pipe thimles, pipe supports, steel beams and any other iron work shall be provided, properly located and set into the masonry by the contractor in accordance with general and detail drawings or as directed by the railway company's engineer wherever required.

#### Cut Stone

(43) Cut stone used for this work shall be best quality native sand stone either from the Hercules Sandstone Company, Tenino, Washington, or equally good in the opinion of the Railway Company. Samples of stone shall be furnished to the Railway Company for approval and acceptance and all stone put into the work shall be equal to the approved sample.

(44) All stone shall be of uniform color and hardness, free from stains, checks, sand holes or any other defects.

(45) In general cut stone will be used for the following classes of work:

For all exterior door and shutter sills except under large engine doors.

For <sup>sills under</sup> all interior fire doors.

For pilaster caps under trusses and girders.

For capings on all fire walls.

For such of the window sills where cut stone is shown on the drawings; it will, however, be optional with the contractor



to use cast iron sills for windows of similar pattern as those to be used for roundhouse and machine shops.

All cut stone to be of sizes and shapes as shown on general and detail drawings.

(46) All door and shutter sills to have beveled bush-hammered top, lower bed dressed to one-half inch. Face may be quarry shaped with projection not to exceed one inch. Back of sills to be cut straight so as to fit neatly against floor.

(47) Copying stones to have bush-hammered top, lower bed and joints dressed to one-half inch, face quarry shaped with projections not to exceed one-half inch.

(48) Pilaster caps to be bush-hammered on top and all exposed sides, lower bed dressed to one-half inch. Back of stones facing brick work to be pitched off so as to fit neatly against masonry.

(49) All cut stone work to be set in cement mortar with vertical joints not to exceed  $3/8$  inch and joints pointed with pointing mortars. Each stone must be set true to line on a cement mortar bed spread evenly over the entire surface so as to secure an even and true bearing; each stone to be hammered accurately in place.

(50) Cut stone work must be protected from damage by proper plank covering wherever required, and left in place until all outside work is completed. Any cut stone work damaged during the time of construction shall be removed and replaced at the expense of the contractor.

#### Brick Masonry:

(51) All bricks to be used in these structures shall be of good approved quality common bricks, well burnt, of good shape, even in size and uniform in color, and in all cases suitable for the purpose it is used in the opinion of the Railway Company's engineer. Fair average samples of bricks for the different classes of work shall be submitted to the Railway Company for inspection, approval and acceptance, and the bricks used in the structures



shall in no case be inferior to the approved samples. All bricks must be carefully handled to prevent breaking and chipping.

(52) The stock of brick must be assorted and only hard bricks of uniform color must be used for face brick.

(53) Bricks in walls will in general be laid in common bonds, five stretcher courses to one header course. All bricks must be laid in full mortar beds with shoved joints. Particular care must be taken to secure straight and level bed joints of moderate and uniform thickness. All joints must be struck and cut as the work proceeds. Bricks must be wet before laying.

(54) No arches will be placed over openings but the courses shall continue over same on steel angle lintels, steel I-beams or rails of shapes and sizes as shown on plans and details.

(55) Anchors, anchor bolts, hinge castings, nailing strips, lookouts, etc., must be well and neatly bedded in the brick work.

(56) Bricks for paving roundhouse floor, engine pits and cinder pits shall be vitrified bricks of quality to be selected and approved by the Chief Engineer.

(57) Bricks in lime mortar will in general be used for walls above ground line.

Bricks in cement mortar will in general be used for all brick work below ground, such as trench walls, catch basins, manholes and in all cases where brick work is exposed to water. Hard burnt brick must be used for all underground work.

(58) The bricks in roundhouse floor and engine pits to be laid as follows:

After the ground is brought to a proper level and tamped, then fill with clean sharp sand or gravel to within  $3\frac{1}{2}$  inches of grade, wet the sand well, tamp thoroughly with rammers and trim off with straight edge, taking care to get an even surface. Lay the bricks on edge close to each other, breaking joints so that tops come one-half inch above grade. After laying, roll the bricks with 3000 lbs. rollers and fill the cracks thoroughly with cement grouting.



Floors in pits to be arched as shown in detail section of engine pits. Crown the floor between pits, maximum crown to be 3" at rear of house, decreasing to 1½" at front end of house.

Timber and carpenter work:

(59) All timber must be sound, free from wanes, shakes and large black unsound knots or knots in clusters, thoroughly seasoned and dry.

(60) Where the quality of material is not specified according to the grade of the local market, it will be understood to be suitable for the purpose for which it is to be used and all timber will be subject to the inspection and acceptance of the engineer in charge.

(61) Timber having defects which affect its strength must be excluded from all work, where it is subject to considerable load.

(62) All dimension lumber not otherwise specified shall be ~~sixer~~ No.1 common red fir.

(63) Where sizes are given they are understood to mean the dimensions of timber as they come from the saw, without reference to diminution in size caused by dressing.

(64) The general truss timbers, girders, bolsters, wall plates, etc., to be surfaced one side and one edge, posts and braces to be surfaced on four sides, purlins and rafters to be sized. Floor and platform planks to be surfaced on one side and two edges. Floor sills to be rough.

Timbers required to be dressed more than on one side must be squared, i.e., the dressed sides must be at right angles to each other.

(65) All carpenter work must be well and thoroughly done. Particular care must be taken to secure close and fitting joints, and a thorough connection of all parts of the structure. Special work like framing and finishing shall be done by men skilled in these specialities.

(66) All timber and workman ship shall be subject to inspection before and after it is put into the work, and the engineer may order



any part of the structure, which in material and workman ship does not correspond with the requirements of these specifications and the plans, removed and substitution made in proper manner at the expense of the contractor.

(67) All labor and material required for scaffolding for temporary supports shall be furnished by the contractor, thoroughly built and substantially braced and fastened.

Millwork:

(68) All material used for making doors, sash, frames, casing and work of this description, must be made of best quality No.1 clear vertical grain fir, except such parts of window frames as will not be exposed, which may be of common lumber, all thoroughly yard seasoned and kiln dried. All work of this character must be offered to the engineer in charge for inspection before it is primed.

(69) All sash to be glazed with second quality single thickness American glass, <sup>except where otherwise marked on plans</sup> well spriged, puttied and back puttied. Use Hennens waterproof glazing paste or equally good approved putty.

(70) The contractor must properly protect all frames, sash and doors, not used immediately, from the action of the rain and sun.

(71) In general all millwork, except such as will be used for inside work, shall receive one priming coat before shipping. This will not apply to frames shipped "knocked down" which will receive their priming after they are put together and before they are put into the work.

(72) All door and window frames must be carefully squared before they are put into the work and stayed to keep them in position and from being sprung by the masonry.

(73) In general all transoms over doors and all single sash, except for lanterns, will be stationary. All windows having two sash in height will be counterweighted. Windows having three sash in height the upper and lower sash to be counterweighted and the centre sash to be stationary. Lantern windows shall swing on center pivots and be provided with proper locking device as specified in detail specifications.



(74) All doors, frames, etc., must be made substantial and neat, securely framed and pinned and in all cases in accordance with detail plans.

All exterior exposed finishing lumber such as cornices, casings and trimmings throughout, also interior casings and trimmings, etc., to be No.2 clear finished lumber.

Interior partitions and ceiling lantern reflectors, etc., to be ceiled with 1" x 4" No.3 clear matched fir except in offices where No.2 clear matched and beaded coiling shall be used.

#### Hardware and Ironwork:

(75) Windows to be counterweighted shall be balanced with cast iron counterweights and hung with No.8 Silver Lake sash cord of the best quality. In general each window shall be provided with one plain bronze wrought sash lock and two plain bronze wrought sash lifts. All window sills in brick walls to be cast iron as per special detail. Provide sash sockets for top rail of upper sash.

(76) Small single frame doors shall be hung with three pieces 6" x 6" wrought iron butts and provided with extra heavy thumb latches and rim dead locks, except where otherwise specified in detail specifications.

(77) Locking apparatus, hinges, hinge castings, hinge lugs, pulleys and other iron work for large swinging doors, sliding doors, sliding shutters and fire doors, and brace blocks and rods for trusses, shall be in accordance with details. All bolts and rods used for trusses, roof supports, etc., shall have cast washers under head and nut. All braces in round house and machine shop to be secured to posts and bolsters with 5/8" x 8" lag screws with plate washers under head.

(78) Dowel all posts to concrete masonry with 1" x 8" iron dowels. Bash wicket door shall have three pieces extra heavy, tee hinges, one mortise dead lock, one extra heavy thumb latch and one five inch wrought iron barrel bolt.

(79) Provide fastening posts with latches and catches to conform with details for all large swinging doors to keep them in position when open.



(80) All doors in fire walls must be built and hung in accordance with the rules and regulations of the National Board of Fire Underwriters and to conform with general and detail plans.

(81) All hardware and trimmings used for and in connection with doors and windows must be of substantial character, and, as in case of material and workmanship, must be approved by the engineer in charge.

(82) The special ironwork, such as hinges, lugs, locking apparatus for doors, sliding shutters, ironwork for trusses, anchoring, etc., must be made according to description in general and detail specifications, and to conform with the details.

All wrought iron used in the structures must be of best quality, tough, fibrous and ductile, all neatly made and thoroughly welded.

(83) All steel beams and lintels over door and window openings must be provided and placed to conform with general and detail drawings and directions. In general double steel angles with the short legs riveted together will be used for lintels and they shall extend not less than 6" into wall on each side of opening. For openings of less than four foot span it will be optional with the contractor to use strong cast iron lintels of approved stock patterns for lintels instead of angle iron. All structural steel for the structures shall be made to conform with Carnegie Steel Company's standard specifications for steel, all riveted connections to be standard connections.

(84) All cast iron used in the structures shall be of the best quality gray iron free from scales, sand holes, cracks or any other defects, true to the pattern and of workmanlike finish. Particular care must be taken, especially in cased work, to have the holes for lug bolts or rods large enough to admit these without battering the threads.

Flashing:

(85) Provide flashing on all fire walls, along lanterns, around smoke jacks, ventilators, etc., wherever required in manner



as specified under roofing. No.24 galvanized iron counter-flashing to be provided in all cases wherever required, or as directed, whether shown on the drawings or not.

Painting:

(86) All material to receive paint must be perfectly dry at the time of application. All dirt, grease or other objection-<sup>before</sup>able matter shall be carefully removed by the painter/commencing the painting. All knots and pitchy places shall be treated with shellac. All nail holes and cracks must be filled with putty of same color as the paint after the priming coat is applied. The mixing of paint shall be done in the presence of the Railway Company's inspector. All paint shall be well brushed out and applied as furnished by the manufacturers without thinning unless otherwise specified. All material for paint shall be brought to the work in the respective manufacturer's original packages. All paint not otherwise specified shall consist of white lead and pure linseed oil with such coloring matter as required to obtain the desired tint. Paint must be thoroughly stirred from the bottom of can before applied.

(87) All exterior frames of all buildings shall be primed on all surfaces while at shop, except those shipped knocked down which shall be primed after they are put together. Pulley stiles shall receive pure linseed oil and dryer only.

(88) All exposed exterior woodwork of all structures not otherwise specified shall receive two coats of lead and oil paint in addition to the priming coat. Paint shall be thinned with pure linseed oil and one pint of turpentine to each gallon of paint except for the last coat, when paint shall be applied as furnished without thinning.

(89) All exposed interior woodwork of frames, casings, windows shutters and doors throughout shall be painted two coats light lead.

(90) All interior walls and ceilings in offices, bulletin room and lavatory shall be painted two coats light lead.



(91) The entire exterior walls and roof including posts under pockets of coal dock shall be painted two coats of waterproof Asbestine cold water paint. Also paint trestle bents, sides of outer stringers, railing, etc., and entire hoist house with same material.

(92) In machine shop, store room and sand house paint all posts and brick walls two coats of lead and oil paint to a height of one foot above floor, and give balance of exposed wood and brick surfaces, not painted, two good coats of whitewash.

(93) All exposed iron and steelwork including truss rods, bolts, washers, etc., in roundhouse shall be painted two coats of metallic paint of an approved brand.

All other exposed metal both inside and outside of all structures, except steel lining in coal dock hopper and pockets shall be painted two coats approved metallic paint.

(94) The building contractor shall also paint all exposed uncovered piping with two coats black asphaltum paint after same are placed by the plumbing contractor. This work to include painting of all pipe hangers and pipe supports.

#### Track Laying:

(95) All track material and track laying work, both inside and outside of buildings, if not otherwise specified, will be furnished and done by the Railway Company, except necessary ties and track stringers in the buildings and for circular ring of turntable pit, which shall be furnished and placed by the contractor ready to receive rails.

#### Drainage:

(96) The contractor for these structures will be required to furnish and place all drain pipes inside of buildings including extension through and outside of walls to such distances as hereafter specified; also brick catch basin located in roundhouse.

In roundhouse end wall at delivery end of roundhouse sewer provide 14" cast iron pipe thimble extending out through



wall for connection to vitrified tile sewer.

(97) Provide 4" cast iron sewer pipe branches from each drop pit in roundhouse and machine shop and run into catch basins shown on plan. From the machine shop drop pit branch run a 3" iron pipe through machine shop wall to receive overflow from hot well. Run a 6" cast iron sewer pipe from catch basin in roundhouse to a distance of five feet outside of roundhouse wall.

(98) Provide 3" cast iron overflow pipe from hot well to a distance of five feet outside of wall and 4" drain pipe from bottom of turntable pit to a distance of 10' outside of circular pit wall.

At each inlet provide cast iron sewer trap and clean out.

Place in floor of pump pit in boiler house a 6" bell trap, connect to 6" S trap and continue in a 6" cast iron pipe to a distance of five feet outside of foundation wall.

(99) Build catch basin in roundhouse on concrete footing of hard burnt bricks 42" inside diameter to a depth of 2 feet below bottom of outlet pipe. Taper at top to a diameter of two feet and provide standard cast iron catch basin frame and cover flush with floor. Walls of catch basin to be 8" thick. Build ladder of 3/4" wrought iron bars spaced 16" center, ends bent and securely bedded into brick walls.

(100) All drain pipes must be laid to proper and uniform grade and they shall be located as shown on plan or as directed. All pipes left without connection must be plugged. All changes in directions must be made with long sweep bends, and connections made with proper Y branches.

Work to be excluded:

(101) All material and labor on all overhead piping in roundhouse, underground blow off piping, with necessary drain connections, pipe lines in tunnel, and their connections with roundhouse piping and hot well, pipe connections with boilers, engine and pumps, etc., boilers and setting of boilers, breeching and iron stack, heating pipes in oil room and oil cellar, air compressor and dynamo, Hydraulic <sup>jacks</sup> for drop pits including pump and piping, oil tanks in oil cellars and oil room including piping, fire protection



~~fix~~protection for coal dock and all outside and inside water pipes and hydrants and outside drain pipes, sand tanks, pipes, connections and sand stoves will not form part of this contract.

(102) The contractor for this work shall be required to provide all necessary openings for piping, etc., at such places as will be directed by the plumbing contractor or shown on detail plans, and he shall brick up such openings and repair walls, floors and roofs, etc., after the plumbing contractor is through with his work, and leave the entire work in a perfectly finished condition.

He shall also build boiler and machinery foundations, and do such other work in connection with plumbing and piping as will be more fully specified in detail specifications.

#### Roofing:

(103) Before commencing the roofing, sweep the roof clean from nails, chips and dirt, knot holes and other openings in roof boards must be smoothly covered with tin securely nailed in place before roofing is laid. The roof boards must be perfectly dry before roofing is laid.

(104) The roundhouse, machine shop, storehouse and lavatory shall be roofed with 5 ply pitch and-gravel roof in accordance with the following specifications.

(105) The first ply to be of W.B. felt saturated with paraffine composition as manufactured by H. T. Watson Co., 318 Wells Street, Chicago, or equally good, laid with 3" laps and all laps to be mopped with roofing pitch the full width of lap so as to make it perfectly air tight, turn up 7" against all walls and mop to the walls tight.

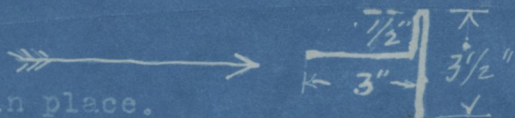
(106) Second: Lay 3 ply of #2 best woolen, coal-tar-saturated felt, weighing 15# to the 100 square feet, lap same 12" and 10" to the weather, mopping the full width of the laps (22") and tack down 3' apart in the middle of the ply with 7/8" barbed #10 nails and tin disks 1 1/2" in diameter every third course. Turn up felt against wall 7" and mop to the wall with roofing pitch. Coat the entire surface



of roof with 35# to the square of best medium domestic-run coal tar roofing pitch, apply with mop, but not so hot as to burn pitch and felt.

(107) Third: Lay the 5th ply cap sheet, mopping all laps, 3" laps, with pitch, turn up 7" against all walls and stick to same with pitch. Put on an extra double ply made up of one sheet folded in the center, stuck together with roofing pitch and laid with pitch to the roof and 7" up on all walls. This makes 7 ply of felt against all walls well laid in pitch. Nail a white pine lath at the upper edge of felt flashing with 20d nails. After lath has been put on, mop the entire felt flashing and lath, also 2" above it on wall and 6" on roof with pitch. Over this lay a 24# galvanized iron flashing 10" high and turn 1½" into the brick joint or tack to sheathing, spike well to wall with 20d nails. The above flashing is to be mopped with soft roofing pitch on the under side before putting in place, and after it has been placed and pointed with cement, mop the outside of it with roofing pitch 12" above roof line.

(108) Fourth: Coat the roof with 80# of best domestic run coal tar soft roofing pitch to the square, to be evenly spread on the roof and put on gravel while pitch is hot, using 1 cubic yard of gravel to 700 square feet of roofing. Gravel to screen through ¾" screen and to be free from sand and clay dirt. At eaves and gable edges of roof put on an eave strip made up of #24 galvanized iron, forming same as per sketch:



(109) All material and workmanship must be strictly first-class in every respect and in accordance with the specifications and directions of the Chief Engineer or the engineer in charge.

(110) Tarred felt must be saturated with coal tar pitch and must weigh at least fifteen pounds per square, single thickness. The pitch must be best quality of straight run coal tar pitch distilled direct from American coal tar.

(111) Gravel must be perfectly clean, free from sand, dirt,



clay and vegetable matter and of such size that it will pass through three eights inch screen and be retained on a sand screen.

Specifications for boiler house roof:

(112) Starting at the eaves, lay two layers of two and one-half ply perfection brand Special Steep Roof Fabric, or equally good, saturated with Special Steep Roof composition, and weighing approximately 35 pounds per square single thickness. Then cover the entire surface with two thicknesses of the same material, covering each sheet one-half the width of the sheet plus three inches, this will allow the third sheet to lap the first three inches. Under the bottom edge of every second sheet nail down the preceding sheets with barbed wire nails and stamped tin roofing caps, each sheet to be thoroughly cemented to <sup>the</sup> preceding one with hot asphalt composition. After the felt is all laid in this manner, start at the highest point of the roof and spread an even and continuous layer of Perfection Special Steep Roof Composition, or equally good. As fast as this is spread it is to be covered with crushed stone which has been washed and screened through 3/8" mesh and retained on a screen 3/16" mesh. In valleys lay an extra thickness of felt making three in all. Flash and counter flash on fire walls around lantern, ventilators, etc., in similar manner as specified for roundhouse (paragraph 107).

Guarantee:

(113) The contractor is held to guarantee all material and workmanship put on the roofs to be the best of the kind specified, and that he will make any and all repairs at his own expense that may be caused by imperfect material or workmanship, also that he will promptly repair any and all leaks upon written notice from the Chief Engineer. This guarantee is to hold good for a period of ten years from and after the date of final payment for said work and a written guarantee to this effect furnished to the Railway Company.

(114) For roofing materials for balance of buildings see detail specifications.



### Piling

(115) Piling may be required under foundations of part or all brick buildings. All piles shall be furnished and driven by the contractor to conform with piling plans as will be furnished hereafter, and will be paid for on basis of unit prices as specified in paragraph 17.

(116) The piles shall be either of cedar, fir, or other suitable wood, sound and straight, not less than 8" diameter at the small end and not to exceed 18" diameter at the large end. The necessary length of piles shall be obtained by the contractor by driving a sufficient number of test piles which shall be done under the direction of the Railway Company's engineer in charge.

All piles must be driven until the fall of hammer weighing 2400 pounds with a fall of 25 feet, or an equivalent blow, causes a penetration not to exceed one inch.

### Waterproofing:

(117) The pump pit in boiler house, oil cellar, drop pits and other ducts or deep depressions may require to be waterproofed. The contractor shall provide such waterproofing and shall be paid for same on basis of unit price per square yard as specified in paragraph 17. The necessity of waterproofing shall be determined by the Railway Company's engineer on the ground, and the work shall be done in accordance with the following specifications:

(118) Outside cellar, pit, tunnel or duct walls, pit or cellar floors, top of footing courses for cellar duct or pit walls shall receive No.4 Dehydratine Water Proofing as manufactured by Gross & Horn, New York, or equally good in the opinion of the Railway Company.

(119) Apply to all surfaces to be waterproofed one heavy coat of No.4 Dehydratine, care being taken that the surface to which it is applied is dry, and that the coating is applied thoroughly and that no pin holes are left uncovered.

(120) Directly after this coat has been applied lay one thickness of burlap to the surface of the Dehydratine, pressing same



down firmly so that the entire sheet adheres to the wall or bottom. Care should be taken that the burlap is properly lapped, and that laps are perfectly cemented together with No.4 Dehydratine. Over the burlap apply two coats of No.4 Dehydratine.

(121) Properly cement the waterproofing courses over footing courses with that of the outer surface wall and also with the waterproofing course under floors.

(122) On all surfaces below low water line increase the waterproofing course by adding another layer of burlap and at least three additional coats of No.4 Dehydratine.

(123) Cellar or pit floors to be waterproofed must be excavated to solid gravel bed which must be tamped and rolled and brought to within proper elevation below finished floor. On the bed thus prepared shall be laid a safety coat of cement mortar 2" thick, the top of which to be level with top of footing course and to be troweled smooth. Apply waterproofing as specified above and properly cement same with the waterproofing course on top of footings.

This waterproofing course to receive a top safety coat of 2" cement mortar for protection of the waterproofing. After this cement mortar coat is sufficiently hardened apply on same the concrete floor of thickness as given on plans.



- DETAIL SPECIFICATIONS -

Roundhouse and Machine Shop:

(1) For constructions of roundhouse follow the standard plans sheets Nos. 92 to 98 and 100 to 109, except where otherwise shown on the general plan and special drawings for stalls adjoining the machine shop.

The hot air main concrete and tile branch pipes including the A.B.C. dampers in engine pits shall not be provided for this structure. The quantities given in bill of material for roundhouse sheets 107 to 109 shall not be depended on as complete, but shall be followed as to qualities, grades, dimensions, surfacing of lumber, etc.

Doors:

(2) In each fire wall of roundhouse provide swinging fire door marked "F" as detailed on Sheet 101. Also provide for each of these openings one automatic sliding fire door made of two thicknesses of 1" x 6" S.I.S. & M. fir, the doors to be covered with I.C. Tin in accordance with Fire Underwriters rules. Provide these doors with Allith-Keystone Style fire door fixtures No. 600 complete. Fusible link to be situated at center of door about 2" below top of opening. Provide doors with one flush and one sunk handle. Apply the fixture to door and secure to wall in a manner as required by the National Board of Fire Underwriters.

(3) Door in permanent end wall of roundhouse marked "W" to be of frame as per detail standard sheet No. 101.

(4) The doors between machine shop and bulletin room and office to be 3' x 7' - 1-3/4" thick 2nd quality 4 panel doors set in rabbetted 1-3/4" thick plank frame and hung with 3 pieces 5" x 5" wrought iron butts to each door. These doors to have good quality Knob locks of approved pattern.

(5) The large engine doors with fastening posts, hinges, lugs, lug bolts, hinge castings, locking devices and other iron work to be as per standard details. Rear door in machine shop to be of



same pattern as large roundhouse doors. The hinge castings for this door to be of the square pattern as detailed on standard plan sheet No.104, and the lintels over door to be of steel shapes as per special detail.

Provide wicket doors in large engine doors for those marked "W" on plan.

(6) In the fire wall extended to form deep part of roundhouse provide stationary windows of Enestra sash and  $\frac{1}{2}$ " thick wire glass both for upper and lower tier of windows, where so marked on machine shop ground plans. All other windows to be of wood and single strength glass.

Engine and Drop Pits:

(7) Build engine pits to conform with standard plans, those in the four stalls adjoining machine shop to be made of length as shown on special plan, and three of these pits shall be built in connection with the drop pits to conform with special detail drawings. All steel and iron work for the drop pits and transferable bridges over same also including movable bridge in the drop pits shall be provided by the contractor and made to conform with details. The steel beams with rails for spans across drop pits including castings, bolts, plates, etc., as detailed, shall be provided by the contractor.

The building contractor shall provide any required holes or chases for piping, etc., in the drop pits. The piping for operation of the hydraulic jacks will be provided by the plumbing contractor. The hydraulic jacks will be furnished by the Railway Company f.o.b. at the site, the building contractor to unload and place same including necessary anchoring. Build well to receive jacks of concrete to conform with details.

(8) Properly locate and place "U" bolts for fastening of rail to the pit, using wooden templates which must be carefully lined up and held in place until the concrete surrounding the bolts has set. The "U" bolts and malleable iron washers to fit rail flanges shall be furnished by the contractor. The rails except across drop pits,



will be furnished and placed by the Railway Company.

(9) Provide tapered drain holes with cast iron strainers in side walls of engine pits and locate same as indicated on plans. Stringers and Caps, etc.

(10) The 12" x 14" stringers under rails in front of and across sewer shall be halved to timber under door and anchored to concrete sewer walls with 3/4" x 30" anchor bolts, the bolts to have cast washer under head and nut.

The cap on sewer walls to be 8" x 12" as shown and shall be anchored to sewer wall in same manner as specified above and as indicated on plans. Put on top of these caps to proper elevation so as to make top of planking over sewer even with crowned brick floor.

#### Floor

(11) The entire floor of roundhouse and in engine pits, except over sewer, shall be paved with brick as formerly specified and as detailed. Crown floor between pits 3" in the rear and about 1 1/2" in the front.

#### Smoke Jacks.

(12) The smoke jacks with counterweights, ropes and guys, one set for each roundhouse stall, of pattern as per standard plan No. 105, will be furnished by the Railway Company, f.o.b. at the site. The contractor shall unload and place the jacks with fixtures in complete working order in accordance with standard plans. The contractor shall furnish and place the jack levers with all ironwork for supporting same to roof and connecting same to smoke jack as given in detail on standard plan, Sheet 106. Care must be taken to have jack set to proper height from top of rail in roundhouse, as given in figures on plan, or as directed. Flash and counterflash around curbing under-jacks on the roof in satisfactory manner to conform with roofing specifications and to suit conditions.

#### Fire Walls.

(13) The fire walls on both sides of the four roundhouse stalls



joining machine shop shall be carried up 3 feet above roof, as shown on special plan. Provide brick ledges to receive joists, and anchor the joists to fire walls in same manner as for the other part of roundhouse.

#### Rear Wall.

(14) The rear wall of roundhouse above machine shop roof shall be built of wood. The wall to be supported on 10" x 12" girder located at same elevation as cross girders under machine shop lantern in the middle panel; and on double joists across the side panels. Wall to be built of 2" x 6" studs spaced 24" O.C. and covered on the outside with two layers 1" x 6" S I S & M merchantable fir and on the inside with 1 layer of the same material. Between the two outer layers place one layer of No.2 tarred felt and cover the entire exposed outside with No.24 galvanized corrugated iron. Flash thoroughly and make water tight at intersection with this wall and the machine shop and lantern roof and lantern walls.

#### Roof Boards.

(15) Roof boards on entire roundhouse and main roof of machine shop to be of 2" x 6" or 2" x 8" No.1 common fir S I S & M laid with the surfaced side down, half blind nailed and half face nailed. Use 20 d nails two to each board to each purlin.

Machine shop lantern roof to be of two layers 1" x 6" S I S & M merchantable fir, first course laid at right angles to the purlins and the second course diagonally. Nail with 8 penny and 10 penny nails, half blind and half face nail.

#### Lantern.

(16) Construct machine shop lantern to conform with general and detail plans. Cover sides with one layer of sheathing and ends with two layers of 1" x 6" S I S & M material and No.24 corrugated iron. Inside of lantern and reflectors to be ceiled up with 1" x 6" S I S & M merchantable fir and all corners and angles neatly finished with  $\frac{1}{2}$  rounds. Exterior trimmings around windows to be 1" thick No.2 clear fir. The crossbeam supporting lantern



at center to be trussed with iron rods to conform with details.

#### Lantern Sash.

(17) The lantern windows of machine shop and roundhouse shall be hung on center pivots to swing in at the top, and shall be provided with sash operating apparatus of the Lord Burnham Company's pattern, or equally good, so arranged that sashes can be operated from the ground floor and held in any desired position.

#### Gutter and Down Pipes:

(18) Gutter shall be provided in the front or inner circle of roundhouse. The gutter to be made of No.24" galvanized iron as shown in general on detail section. Fall of gutter not to be less than one inch in fifteen feet. Provide two down pipes for each section between fire walls and drain same into roundhouse sewer, through 4" cast iron pipes. The down pipes to be brought down on the inside close to the posts between large door and shall be securely anchored to the posts with suitable iron straps.

#### Machine Shop Floor.

(19) The entire machine shop floor to be 3" x 10" S I S 2 E planks spiked with 60d nails to 4" x 6" mudsills spaced 24" O.C. Provide 1" x 3 finishing strip around walls and foot of posts. Before laying the floor prepare the ground by filling with coarse sand or fine gravel applied in thin layers and wet tamp or roll each layer to a level and true surface at proper elevation to receive the floor sills, which shall be evenly and well bedded. The floor planks to be given one good coat of tar on the underside before laid.

#### Miscellaneous.

(20) The contractor shall not place the floors in roundhouse and machine shop before the plumbing contractor has placed and completed all his work on underground blow out piping and any other underground work. The plumbing contractor will do his own excavation for his part of the work, but the building contractor shall back fill the pipe trenches and wet tamp the ground, the work to



be done in such a manner as to insure against future settlement of ground after the floor is placed. The piping, however, shall not be covered up before they have been inspected and accepted by the Railway Company's engineer.

(21) The building contractor shall provide proper foundation or substantial bracketed platform for the pump operating the hydraulic drop pit jacks. Location to be as directed and pump platform or foundation shall be made to conform with details, which will be furnished by the Railway Company when required. The pump will be set and all piping, fittings, etc., provided and placed by the plumbing contractor. The pump will be furnished by the Railway Company.

(22) Rails in drop pits will be furnished by the Railway Company, the contractor shall furnish the necessary anchor bolts and flange washers for same and set the rails in place.



Turntable Pit and Turntable.

(23) Build turntable pit to conform with standard plan Sheet 87, Proposition No.1.

All material for the pit, except rails and fastenings for circular track, shall be provided by the contractor. The rails bent to proper curve, joint fastenings and spikes will be furnished by the Railway Company and shall be placed by the contractor. Provide 3" wrought iron pipes in center pier and circular foundation wall, and locate pipes as directed. The pipe in center pier will not have elbow connection at bend, but shall be bent to right angle to a radius of about 12". The anchor bolts in center pier shall be set to exact location using wooden template.

The stop castings, as detailed on standard sheet No.88, will be furnished by the Railway Company, the bolts and screws for fastening them and the placing of castings shall be provided by the contractor.

(24) The turntable will be furnished by the Railway Company f.o.b. at the site. The contractor shall unload set and adjust the table in proper and satisfactory working order including placing of ties. The contractor shall paint the turntable two coats in addition to the shop coat.



BOILER HOUSE (Boiler room, engine and dynamo room, and oil room including stack foundation.)

(25) ~~Three~~ 150 horse power horizontal tubular boilers will be installed by the Plumbing Contractor. The building contractor shall furnish and build the concrete foundations for these boilers in accordance with detail setting diagram to be furnished by the Railway Company.

(26) All piping in boiler house, breeching and stack to be furnished and placed by the plumbing contractor, the building contractor to provide necessary holes, chases, etc., for piping and do such repairs of building as will be required in connection with the plumber's work in same manner as formerly specified. Building contractor to provide concrete stack foundation.

(27) Pump pit walls and floor to be of concrete made of dimensions as shown on cross section and plan.

Provide  $1\frac{1}{2}$ " gas pipe railing 3'6" high around part of pit and iron platform and stairs with railing from pump pit to engine room in accordance with details. Platform and threads to be of cast iron with checked top.

(28) Floor in dynamo room to be 2" planks on 4" x 4" mud sills. Finished floor to be 1" x 3" SIS&M No.1 maple laid on 2" planks and corners to have  $\frac{1}{2}$ " round of maple. Provide one layer of No.2 tarred felt under finished floor.

(29) Boiler room floor to be of concrete "C", Floor in oil room to be of concrete "C" re-enforced with  $\frac{1}{2}$ " re-enforcement bars spaced as per plan. I-beams supporting floors to have  $\frac{3}{4}$ " x 10" x 12 cast iron plates under ends. Steel beams to be of shapes and weights as marked on drawings. Provide 30" x 30" sheet iron trap door and frame with hinges and lifting ring in floor to be made as per detail and be located as shown on plans. Build into cellar wall under trap door an iron ladder of  $\frac{3}{4}$ " bars. Ladder to be 18" wide and to project outside of masonry five inches. All concrete floors to be lined with  $\frac{1}{2}$ " thick cement mortar lining to be finished perfectly smooth and level.



(30) Cellar floor under oil room and in pump pit to be of concrete "C" lined with cement mortar in same manner as above specified. Floor in pump pit to be graded so as to drain towards sewer outlet. Drain pipe and traps, etc., to be provided by the contractor for buildings as formerly stated.

(31) Floors should not be placed in boiler room, dynamo room and oil room before boilers, machinery in dynamo room, and oil tanks in cellar are placed. Necessary openings must be left temporarily in walls for taking in boilers, oil tanks, or other machinery of dimensions too large to be taken through doors.

(32) The building contractor shall furnish and build concrete foundations for pumps in pump pit, engine, dynamo, air compressor, exciter and other machinery which may be required. These foundations will be paid for on basis of unit prices as specified in paragraph 17. Anchor bolts in such foundations shall be furnished and placed by the contractor and will be paid for on basis of unit price per pound of iron.

(33) Concrete stack foundation shall be built to conform with plan and anchor bolts for stack furnished and set by the contractor for buildings. Stack foundation and boiler foundations complete shall be included in the contract price of the building.

(34) Detail plans showing exact location of engine, dynamo, exciter, pumps, air compressor etc., giving spacing of anchor bolts, etc., will be furnished to the contractor from time to time as they may be required.

(35) All machinery in dynamo room and pump pit and oil tanks in cellar and oil room including all piping, valves, connections to boilers and pipe system will be provided and placed by the plumbing contractor, it being understood in all cases that the earth excavation for such work, if any required, shall be done by the plumbing contractor; all backfilling, tamping, repairs of walls, floors, etc., shall be done by the building contractor in a proper and satisfactory manner. All necessary holes in walls, floors



and roof where pipes are to be taken through shall be provided by the building contractor.

Roof boards, etc.

(36) Roof boards on main roof and lanterns to be as specified for roundhouse <sup>and machine shop.</sup> Ends of lantern to be covered with two layers of merchantable fir SIS&M No.24 corrugated iron.

Millwork.

(37) Doors, windows, lantern sash, transoms, coal shutters, etc., to be as per detail. Build coal bin in boiler room to conform with general drawings, coal bin posts to be anchored to floor and braced over bin wall as shown. Sliding door in exterior wall of boiler room to be hung with Allith Roller Bearing doorhangers No.3, using Allith door rail, brackets and fixtures complete, including one raised and one flush door handle. Also provide for this door extra heavy hinged hasp and pad lock.

Shutters.

(38) Provide for oil room, where marked on plan, one steel rolling shutter of the Jas. C. Wilson Manufacturing Company's double edge corrugated rolling steel shutter or the Kimmear pattern. The shutter shall be operated by the chain gear balance of the self-coiling principle and shall be galvanized by the true cold electro process. The slides for shutters to be securely anchored to the brick wall. Door to be applied so as to operate easy and to the Railway Company's satisfaction.

Fire Doors and Fire Shutters.

(39) Provide in exterior wall of oil room a fire door, complete with ironwork, as per detail standard plan Sheet No.101.

(40) For all windows in oil room provide wrought iron fire shutters of approved construction. The shutters to be hung on hinge lugs anchored into brick masonry and shall be provided with proper hasp, pin chain and staple. The staple to be anchored into wall.



(41) Provide one sliding fire door between engine room and boiler room to be made of three thicknesses of 1" x 6" matched fir and lined with I.C. charcoal tin in accordance with the Fire Underwriters' rules. Door to be provided with Allith fire door hangers and fixtures of same pattern as specified for the sliding fire doors in roundhouse.

#### Platform and Steps.

(42) Platform and steps to be built of No.1 common fir of satisfactory dimensions neatly put up and well nailed. Platform and steps to be of 2" material. All exposed surfaces to be surfaced.

(43) Each vent flue from oil cellar to have on 8" x 12" cast iron vent register with frame set in flues. Ventilator on roof over oil room to be 20" diameter of No.16 galvanized iron and provided with cast iron damper to be operated from floor with rope attachment.

#### Hot Well.

(44) Build hot well according to Standard Plan S-32-101. Walls and floor to be lined with  $\frac{1}{2}$  inch layer of cement mortar of proportion: one cement to two sand.

(45) Set in walls all necessary cast iron pipe thimbles to receive inlet and outlet pipes to hot well at locations as will be directed by the plumbing contractor.

(46) Provide scuttle in roof at location as directed and under scuttle set into masonry  $\frac{3}{4}$ " round iron steps spaced 18" centres under scuttle as shown.

(47) Provide and place 12" diameter No.20 Galvanized iron ventilator on roof as shown.

(48) Place  $\frac{1}{2}$ " corrugated bars in walls and bottom six inch centres, lap the bars at joints not less than four inches.

(49) Put in overflow pipe as mentioned under general specifications, paragraph 98.



#### PIPE TUNNEL.

(50) The pipe tunnel between boiler house, pump pit and fan room and branch tunnel to hot well shall be built according to location shown on general plan, the tunnel to be 5 feet wide and 6 feet high in the clear, of concrete "C", the thickness of material to be as per detail of cross sections. Bottom of tunnel to be given a slight grade so as to drain water into pump pit and the elevation of bottom at inlet to pump pit to be about 4" above pit floor. Where track crosses tunnel, thickness of walls and cover will be increased for a distance of 8 feet on either side of centre of track, as per special detail section. Inlet opening through pump pit and roundhouse walls to be of same cross section as tunnel. Terminate tunnel in a pit in roundhouse as shown on plan, and provide 1½" gas pipe railing around this pit.

(51) There will be about 6 pipe lines placed in the tunnel by the plumbing contractor. Five of these pipe lines will be supported on brackets on walls or hangers from ceiling. The contractor for the buildings shall furnish and place strong and substantial wrought iron hangers or supports for these pipe lines. These supports to be spaced not over 8 feet apart through the entire length of both main tunnel and branch tunnel to hot well, the support to be located at such elevations as to provide the proper grade for the different pipe lines, in accordance with detail plans and directions to be furnished by the plumbing contractor.



### STORE HOUSE.

(52) Roofing material will be the same as specified for round-house and machine shop.

(53) Floor in store room to be 3" planks SIS 2 E on 4" x 6" mud sills. In offices use 2" planks instead of 3" planks and lay on top of same a finished floor of 1" x 4" No.1 clear vertical grain fir with a layer of No.2 tarred felt between floors.

(54) All millwork to be as detailed and specified in general specifications.

(55) Sliding doors in store room to be hung with Allith Roller Bearing door hangers No.2 with rail and fixtures complete. Three of these doors to have hinged hasp with pin, chain and staple to be on inside, and one door to have hinged hasp with padlock chain and staple on outside. All sliding doors to have suitable wrought iron door pulls. Make doors, transoms and door pocket as detailed.

(56) All inside partitions to be built of 2" x 6" studs spaced 24" centre with top and bottom plate and one row of horizontal centre bracing. Partitions to be ceiled on both sides with 1" x 4" SISM&B No.2 clear fir. Ceiling overhead in office to be of same material. Protect all corners with 1 inch  $\frac{1}{2}$  round.

(57) Shelf in partition between office and store room to be 1-1/8" thick with brackets under shelf in store room and drawer in office. Drawer to be provided with Yale lock and pull. Sash over shelving to be counterweighted and made to slide up in partition. Doors in inside partitions to be B quality 4 panel O.C. moulded 1-3/4" thick. Provide doors with wrought iron butts three to each door and mortise locks with metal knobs of approved pattern and quality. Provide sliding sash <sup>over</sup> counter with car sash fastener and lift, and cupboard doors with hinges and catches, etc., complete.

(58) Build outside steps with platform of 2" plank substantially supported, braced and fastened.

(59) Provide racks in store of 1" surfaced common fir, strongly built and to conform with general and detail drawings.



(60) Build platform at end and track side of building supported on concrete blocking as shown on plan.

(61) The plumbing contractor will provide the necessary piping and heating coils in office, the building contractor to provide such openings as will be required for running pipes into building and close them properly up after the pipes are placed.



FUEL OIL CELLAR.

(62) Bottom and walls to be built according to plan of Concrete "C", reinforced with  $3/4$ " corrugated bars spaced as shown in detail section.

(63) Set in walls all necessary cast iron pipe thimbles to receive pipes at locations as shown or directed.

(64) Imbed in concrete on top of wall a  $4$ " x  $4$ " plate and anchor same to concrete with  $1/2$ " x  $18$ " bolts spaced approximately  $5'0$ " centers.

Roof joists to be  $2$ " x  $12$ " spaced  $2'$  o.c. covered with  $2$ " x  $10$ " SIS 1 E planks.

(65) Provide trap door in roof at location as directed and set into masonry iron steps of  $3/4$ " round bars spaced  $18$ " o.c. under trap door as shown.

(66) Nail  $1$ " x  $6$ " board to end of roof joists around cellar and cover roof and trap door with No. 24 galvanized iron with locked joints thoroughly soldered. Provide and set in place one  $6$ " diameter galvanized iron ventilator with hood. Roof to be given 2 coats of an approved brand of metallic paint.

(67) In cellar build foundations for tanks and set in concrete anchor bolts to receive anchor straps, bolts to be of dimensions and shape as detailed.

(68) Tanks and piping will be furnished and placed by the plumbing contractor and the building contractor shall not build the roof until tanks are in place. ?

*Steam heat coils.*



#### CINDER PITS.

(69) The cinder pits shall be built to conform with standard plan S-32-40, permanent structure, depth of pit 6'6" from base of cinder pit rail to top of rail in depressed track. The general layout showing length of pits and retaining walls, spacing of castings, etc., shall conform with special drawing showing longitudinal section and top view of pits.

(70) The cast iron standards, pattern B-1030 and flange washers pattern B-1031, including the hold down bolts for securing rail to standards will be furnished by the Railway Company, F.O.B. at site, also the rails on pit and material for depressed track. The depressed track will also be placed by the Railway Company. All other material and labor required for construction of the pits shall be provided by the contractor, including excavation, back-filling, placing of standards and securing pit rails to same. The cinder pit walls and floor shall be of concrete "A" and the retaining walls of concrete "C" reinforced throughout with New Style corrugated bars, as manufactured by St. Louis Expanded Metal Company, or equal in the opinion of the Railway Company. The reinforcement bars to be of sizes and shall be located and spaced, as per standard and general plan. The anchor bolts for standards must be carefully set, using wooden template, so as to insure the proper gauge (4'8 $\frac{1}{2}$ " ) and exact lining up of pit rails.

(71) The bottom one side and ends of pits to be paved with approved quality vitrified paving brick set on edge, close together, no broken bricks, bats or chips allowed in the work. The bricks to be set on a bed of clean sand well and thoroughly wet tamped and brought to proper line. The brick joints to be filled by sweeping fine sand over them until well filled and then the paved surfaces shall be grouted with thin cement mortar.

(72) Depression for depressed track shall be excavated to proper grade ready to receive the ties by the contractor. All work to be done in strict accordance with general and detail plans and directions and to the entire satisfaction of the Railway Co.



COAL DOCK.

(73) The coal dock, trestle and hoist house shall be built according to standard plans sheets 126 to 134.

(74) The foundation piers and wall to be of concrete "A". Neatly finish top of piers and wall with cement mortar and set dowels in to concrete 4" deep to receive posts.

(75) All timbers to be of dimensions as shown on plans and given in bill of material and to be best quality selected common fir. All notching and framing must be carefully and neatly done, to fit closely, and in all cases to conform with measurements as given on plans. In cases of doubt the contractor shall obtain necessary information from the Railway Company's engineer before proceeding with the work.

(76) All trough lining, hopper lining, stringer and cap protectors, etc., shall be of quality and grade specified on plans, and in bill of material and shall be securely fastened to wood work with wood screws, the holes for all screws to be countersunk to fit head of screws. The screws to be of sizes and spacing as shown on the plans.

The inclined trestle must be built to exact grade and curve as shown and given in detail on standard plan, Sheet 130.

(77) Bolts, dowels, spikes, lagscrews, rods, etc., shall be of dimensions as marked on plans. All bolts and rods to have standard cast washers under head and nut, if not otherwise shown.

(78) Furnish and set in place and adjust in complete working order 6 undercut gates with chutes, counterweights, pulleys, operating chains and fastenings. The fixtures to be those manufactured by the Link-Belt Company, Chicago, Illinois, and shall conform with the Railway Company's standard drawings.

(79) The Railway Company will furnish F.O.B. at the site of dock, the hoisting machinery and motor for pulling the loaded cars to top of dock, the contractor shall unload and set same in place in satisfactory working order in the hoist house.

All anchor bolts and other material required for setting



machinery shall be provided by the contractor. The water piping for fire protection will not be included in this contract, but will be provided by the plumbing contractor. Rails for track on trestle and dock will be furnished and placed by the Railway Company. All other material and labor required for the complete construction and finishing of the coal dock including hoist house and trestle shall be provided by the contractor. Bills of material for the dock furnished to the contractor shall be checked up by him, and he shall furnish any additional material required for proper completion of the structure.

(80) Roofing over the dock to be 1" x 10" No. 2 clear boards and 1" x 3 battens. Roof over hoist house to be 1" boards and best quality cedar shingles laid  $4\frac{1}{2}$ " to the weather, and nailed with galvanized shingle nails.



SAND HOUSE AND SAND SHED.

(81) The contractor shall furnish all labor and material for this structure except sand stoves, sand reservoir, sand tanks located on coal dock and the piping. The building to be constructed according to general and detail plans. Sand house to be 17'2" x 22'2" built of brick; wet sand bin to be 149'4" long with one half on each side of sand house. On one side of and next to sand house build a coal bin of 20 tons capacity as shown on plan. Sills, studs and roof construction to be carried out in a thorough and workmanlike manner; doweled, bolted and nailed together according to section and framing plans and the direction of the Railway Company's engineer. Provide all doors, windows with necessary hardware, pulleys, weights, locks for doors, etc., as per detail plan, and as directed.

(82) For foundation walls and walls around sand reservoir pit use concrete "A", for floor of sand house and pit concrete "C". Build flues as shown on plan and line same with 8" x 12" tile flue lining, the entire length of flue. Provide 6" thimble with stopper in flue.

Lintels over doors and windows to be 2-6" x 4" x 3/8" steel angles riveted together; provide cast iron window sills and sand stone sills for all doors of sizes as marked on plan.

(83) Space rafters as shown and cover same with 1" boards S I 8 Fir and Star A star cedar shingles laid 4 1/2" to the weather and nailed with galvanized nails.

(84) Build strong and substantial inclined wooden hopper over sand reservoir pit in the sand house. Make floor in hopper of 2" surfaced, thoroughly seasoned and kiln dried lumber. When piping are placed by the plumber the building contractor shall provide substantial bracing and supports for same both over sand house and along coal dock.

(85) Provide for the sand tanks strong and substantial platforms on brackets at end of coal dock for support of sand tanks. The platforms to be constructed in a manner as shown on drawings and as directed.



LAVATORY.

(86) The brick lavatory building to be constructed in same manner as formerly specified in general and detail specifications for similar class of structure.

(87) Foundation to be of concrete "A", floor of concrete "C" lined with cement mortar and slightly graded from all directions towards floor drain.

Walls to be of brick and roofing material pitch and gravel, same as for roundhouse.

(88) Ceil under rafters with 1" x 4" SISM&B, No.2 clear fir and protect all corners with quarter rounds.

Cast iron window sills may be used instead of cut stone, as shown, if so desired by the contractor.

(89) Provide 18" diameter ventilator on roof of the "Star" or "Globe" pattern made of No.16 galvanized iron and provided with damper and cord for operating and keeping same in position from the floor below. Provide necessary awning pulleys for guiding operating rope to the wall.

(90) Exterior door to be of first quality stock pattern 4 panel O.G. Door frame to be 1-3/4" x 8" rabbetted fir door with transom bar and stationary transom. Windows to conform with details. Interior trimmings for doors and windows to be plain made of No.2 clear finishing lumber.

(91) The plumbing fixtures: water closets with stalls, wash trays, urinals, floor drain and all piping will be provided by the plumbing contractor. The building contractor shall do all necessary patching after the plumber has finished his work. The floor shall not be laid before the underground piping and rough plumbing is done..



STANDPIPE PITS.

(93) The standpipe pits shall be built in accordance with standard sheet No. 145, the depth "P" to be 4'8" as specified on plan for pits located west of Spokane.

(94) The pits to be built of best approved quality hard burnt brick laid in cement mortar. Set thimble in end of pit to receive 4" tile drain and leave opening in opposite end for inlet pipe to stand pipe.

(95) Provide double wooden platform, cover and grate to conform with drawings. The trap door to be hinged with 12" extra heavy Tee hinges and to have heavy iron lifting ring with staple. Also provide and set in place the two supporting timbers for stand pipe in the pit. The stand pipe with pipe connection to tank will not be included in this contract. The contractor shall, however, do the necessary caulking around inlet pipe and any other required repairs to platform, etc., after the stand pipe is placed.



WATER TANK FOUNDATION.

(92) The contractor shall build the concrete foundation piers for the 100000 gallons capacity steel water tank, including the necessary bolts for the steel supporting frame of tank. The work to be done according to detail plans to be furnished hereafter and will be paid for on basis of unit prices of concrete per cubic yard, including excavation, backfilling and forms and anchor bolts set in place per pound, as per specifications Paragraph 17.



A D D E N D A

Changes in and Addenda to Specifications for Structures at Auburn,  
Washington.

-0-

(1) Paragraph 1 of general specifications; "A", "C" and "M" to be changed to read as follows:

(A) A 25-stall brick roundhouse of which 20 stalls are to be 90' deep and 5 stalls 116.5' deep including two drop pits.

(C) A brick machine shop 66'8" x 112' an annex to roundhouse including office 17' x 28' and blacksmith shop 22'2½" x 24' (Annexes to machine shop)

(M) Three brick stand pipe pits.

Above changes and additions have been incorporated in drawings. Add following structure "N" to paragraph 1.

(N) A frame storage, tools and yardmen's house 16'x 80' Plans of this structure have been added to the set of drawings.

(2) This paragraph to govern over Paragraph 92 of general specifications for interior painting:

Machine shop:

Posts and brick walls in machine shop shall be painted from floor and up one foot, 2 coats dark paint; balance of exposed wood and brick surfaces to be given two good coats of white wash.

Store Room:

All wood and brick surfaces in office of store house shall be painted two coats light lead. Store room part except doors and windows including casings not to be painted.

Boiler House:

Engine and dynamo room to be painted from floor and up 6 feet, 2 coats of dark paint, balance of all brick and wood surfaces to be painted two coats light lead. Paint boiler room lantern with reflectors, two coats of same paint. Balance of brick and wood surfaces in boiler room and oil room, except as specified in paragraph 89 of general specifications, shall not be painted. Floor of engine and dynamo room to be given two coats of oil. Interior wood and brick surfaces of roundhouse, sandhouse and sand shed except as specified in general specifications,



paragraph 89, shall not be painted. Black iron parts of fan engine, fan housing, hot air chamber, etc. in fan room to be given two coats of black asphaltum paint.

Changes and Additions to Roundhouse and Machine Shop:

(3) In permanent end wall of roundhouse shall be provided 9 windows of same pattern as the rear windows in roundhouse. See revised plan. Five stalls 116.5 feet deep shall be provided instead of originally 4 such stalls, leaving only 20 stalls 90 feet deep. The changes are shown on drawings.

(4) The iron smoke jacks and levers as specified in paragraph 12 of detail specifications will be omitted and the contractor shall in place of them provide stationary wooden smoke jacks, one for each stall; these jacks to be made of 1" x 6" SIS&M No. 2 clear dry fir substantially supported, braced and cleated, to conform with details. Inside and lower edges of the jacks shall be lathed with expanded metal lath securely fastened to wood with galvanized staples. The lath to be No. 24 gauge  $1\frac{1}{2}$ " diamond mesh. Plaster the entire lathed surface with  $\frac{1}{2}$ " thick layer of cement mortar composed of 1 cement to two sand. After thoroughly dry paint the plaster 2 coats asbestos paint. Each jack to be provided with No. 16 galvanized iron top hood to conform with detail of jack. Care must be taken to height of bottom of jacks the proper distance above top of rail in house as given on detail or as directed.

(5) A blacksmith shop approximately 22'x 24' shall be added as an annex to the end of machine shop.

In machine shop wall adjoining this building provide a fire sliding door instead of the two windows and single swinging door originally shown on plan. This sliding door to be hung with fire door hangers and fixtures complete as formerly specified for similar doors. The roofing material for blacksmith shop to be the same as specified for boiler house; the floor to be cinders. Provide and place on roof one 30" diameter "Burt" ventilator or other approved make, with damper, all to be made of No. 16 galvanized iron. Provide damper with operating attachment to be work-

Suburban  
Roundhouse



ed from floor. Otherwise this building shall be constructed in same manner as other brick structures; foundation of concrete, walls of brick, roof construction of wood, all to conform with general specifications and drawings. Doors and windows to be as detailed. Double swinging doors to be provided with extra heavy foot and spring head bolts, and with extra heavy hinged hasp and approved pad lock. No interior painting required except for mill-work.

(6) The concrete side walls of longitudinal pit in machine shop to be made 2'6" thick instead of 24" thick as originally shown on plan.

(7) For further explanation of the arrangement for operating device for lantern sash the following to be added to paragraph 17 of detail specifications:

In machine shop connect up 6 sashes to each operating drop shaft making 3 drops for each side of lantern.

In roundhouse not more than sashes over two stalls should be connected up to one operating drop shaft. The shaft to be run down along posts, and to have proper amount of bearings well secured to posts. Terminate shaft in wheel handle for operation about 5 feet from floor. The boiler house lantern sash to have operating shafts carried down along brick wall at convenient location.

(8) Under the faucets of pipes from fuel oil tank the brick floor shall be depressed to form a shallow sump to receive drips and preventing oil from running over and soak into the floor. The sump to be filled with cinders.

Store House:

(9) On track side in outside wall will be only one sliding door instead of two as was originally shown on plan. Instead of this sliding door shall be provided one window and one single door with transom. In store room opposite this door provide counter with shelving and drawer to conform with details. The front and top of counter and drawer to be made of clear fir, the top to be vertical grain well glued to-gether. Drawer to have Yale lock and



pull. On top of counter provide wire screen set in steel channels securely bolted together, to the counter and to wall. Hinged wire gate with lock shall be provided in the screen top. See detail of counter and screen.

(10) Additional partitions and door for small toilet room shall be provided in storehouse office. The shelf and sliding sash originally shown between office and store room have been cut out and the location of office doors slightly changed. Plumbing, fixtures and piping to be installed by the plumbing contractor and building contractor repair and trim up after the plumbing is done. Two sections of double rack back of counter have been cut out. All above changes are incorporated on store house drawings.

Railings:

(11) All high platforms, inclines and steps shall be provided with 3' high railing on all sides not facing tracks. Railing to be made of 4" x 4" posts, 2" x 4" top rail and 1" x 6" middle rail. Posts in no case to be spaced over 8 feet o.c. and they shall be securely and rigidly fastened to platform by means of angle iron straps or extended down along posts under platform and bolted to same. All railings to be painted 2 coats.

Stand Pipe Pits:

(12) Include one additional stand pipe pit, making three in all as specified in detail specifications, paragraphs 93 to 95.

Boiler House:

(13) The tunnel along fire wall under engine room floor has been slightly changed in location from that originally shown, and the thickness of concrete wall adjoining tunnel has been reduced from 2'4" to 24" for part above tunnel.

(14) The contractor shall furnish separate bid for construction of trestle for an elevated track for delivering coal from hopper bottom car into boiler house coal bin and include in same the difference in cost of providing vertical sliding shutters in boiler house wall in place of the horizontal sliding shutters for intake of coal. The work to be done according to plans



marked "Alternate drawings for boiler house". All material and labor for trestle and bumper, etc., but not the track on trestle shall be included in this work.

Changes in cinder pits

(15) The reinforced concrete retaining walls on both sides of depressed track have been changed and increased in length approximately 72 feet. The special cinder pit plan has been corrected to take care of these changes. The contractor shall cover the cost of the changes in his bill for the cinder pits.

Turntable Pit:

(16) The ties on the 85-ft. turntable and the pilot slide shall be provided and placed by the contractor and included in the cost of other work relating to the turntable and turntable pit as specified in paragraphs 23 and 24 of detail specifications.

Storage, Tools and Yardmen's House:

(17) Building to be constructed to conform with scale and detail drawings and general specifications.

(18) Use 3" plank blocking for foundations as shown. Wall sills to be lap jointed and spiked together and into blocking pieces. Posts under storage part to be doweled in addition to be nailed.

Floor of storage part to be 2"x 10" SIS 2 E fir planks and of oil room, eating room and office of 1"x 4" SIS&M fir flooring all to be nailed to 4" x 4" mud sills carefully and thoroughly bedded and spaced 24" o.c.

(19) The exterior walls, except part of store room shown open, shall be boarded up with 1" x 8" drop siding. All corners and around openings to be properly trimmed with 1" finishing material.

(20) The interior walls and ceiling of office, eating room and tool and oil room to be ceiled with 1" x 4" SIS&M No.3 clear fir; roof boards to be 1"x 6" SIS&M merchantable fir.



(21) Provide benches in eating room of 2" surfaced planks secured to strong supports.

Bins for nails, bolts, etc. shall be provided in fuel and oil room where indicated on plan. They shall be constructed in detail as directed or as detailed hereafter. In storage room provide three sections of 2" plank shelving spaced as indicated and substantially supported. Provide partitions or extra supports of shelves as directed if required.

(22) Windows to be hung and counterweighted and provided with lifts and fasteners. Sash to be 1-3/4" thick.

All doors to be 1-3/4" thick 4 panel o.c. moulded 1st quality stock doors. Each door to be provided with approved mortise lock, metal knob and trimmings. Hang doors on 3 pieces 5" x 5" wrought iron butts to each door. Casings and trimmings around doors and windows to be 1" plain fir finishing material. Protect all corners with 1" quarter round.

(23) Roofing material for this building to be the same as specified for boiler house or other equally good approved brand of steep roof preparation applied in accordance with the manufacturer's specifications and to the satisfaction of the Railway Company. The roof to be guaranteed by the contractor for a period of ten years under same conditions as specified for roundhouse roof.

(24) Paint all exterior wood surfaces 3 coats. Paint all doors, windows, frames and trimmings inside 2 coats.