Northern Pacific Railway Company. Engineering Department Records.

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Version 3
August 20, 2018

Saint Paul, January 17th, 1925.

Mr. C. C. Kyle,
General Storekeeper

Dear Sir-

Will you please arrange to hurry material ordered on requisition ED-1165 covering electrical material for Auburn Well, placements as follows:

H-36604
B-36591
ST-36592
GSK-17845

Yours truly,

Chief Engineer.

REG-h

Seattle, Washington,
January 15th, 1925.

ARC Reqn # 164, Well
Strainer for Auburn
Well ED 47-24 SD

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

Dear Sir:

Referring to my letter to you of November 5th,1924 and your letter of January 12th,1925 relative to shortage of companion flange and bolts on GSK Invoice #32191.

The companion flange was received about the middle of December and I neglected to advise you.

File on same may now be closed.

Yours truly

A. R. Cook

ANB

OFFICE OF
CHIEF ENGINEER
JAN
19
1925
NOR. PAC. RY.
ST. PAUL, MINN.

Seattle, Washington,
January 14th, 1925.

Re: Material ordered for
AFE 396-24 ED 47-24: Auburn
Well. ED Reqn # 1165

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

Dear Sir:

Will you please arrange to hurry material ordered on your Reqn # ED - 1165 covering Electrical material ordered for use in connection with the above mentioned AFE, placements as follows:-

H-36604
B-36591
ST -36592
GSK-17845

Yours truly

A. R. Good

Cy AFS
WRA

ANB

OFFICE OF CHIEF ENGINEER JAN 1925 NOR. PAC. RY. ST. PAUL, MINN.

St. Paul, Minn., Jan. 12, 1925.

Mr. A. R. Cook,
Asst. Chief Engineer,
Seattle, Wash.

Dear Sir:

Referring to your letter of November 5th, in regard to Cook strainer and companion flange on your requisition #164. Sometime ago I requested to have the companion flange and bolts traced, and have not obtained any results as yet, possibly the same has been received.

Please advise.

Yours truly,

REG:wp

Chief Engineer

St.Paul,Minn.,Jan. 9th, 1925

Desk #4

Mr.H.E.Stevens,

Chief Engineer

Dear Sir:-

Referring to your letter of Jan. 7th, in connection with Cook well strainer on GSK- 13787. The A.D. Cook Company now have tracer on items of companion flanges with bolts and nuts and will advise as soon as possible. However, in connection with above, I note that the A.D.Cook Co's invoice of Oct. 16th, amt. $62.36 has been certified by you as material received for November account and no doubt all material has been received.

Yours truly,

General Storekeeper

H-o

OFFICE OF
CHIEF ENGINEER
JAN
9
1925
NOR. PAC. RY.
ST. PAUL, MINN.

St. Paul, Minn., Jan. 7, 1925.

Mr. C. C. Kyle,
General Storekeeper.

Dear Sir:

Please refer to your letter of November 29th, Desk 4, in regard to Cook well strainer on ED-918, GSK-13787.

Can you now advise if companion flanges with bolts and nuts were actually shipped from the factory?

Yours truly,

REG:wp

Chief Engineer.

6303

St. Paul, Minn., Dec. 22, 1924.

Mr. A. R. Cook,
Asst. Chief Engineer,
Seattle, Wash.

Dear Sir:

Herewith copy of order on the Allan G. Cary Company for pump on GSK-15865, ED-1091, your No. 196, covering pump for Auburn, Washington.

Yours truly,

Chief Engineer

WEG:wp

encl.

Saint Paul, December 18, 1924.

6303

Mr. R. J. Elliott:

I am returning bids received with your letter of December 10, covering pumps and motors for Auburn water station.

Bids for the motors compare as follows:

Fairbanks Morse & Company	$172.07
Westinghouse Elect. & Mfg. Co. Prop.#2	174.00
" " " " " #1	193.89
Western Electric Company	175.75
General Electric Company	175.77
N. W. Electric Equip. Co. Prop.#1	184.15
" " " " " #2	196.15

The Westinghouse Elect. & Mfg. Company's bid, Prop. #1, $193.89, is recommended by Mr. Reed, Electrical Engineer, account of the insulation of this motor against dampness, a feature which is particularly desirable for a pump pit installation.

The bids for the pumps compare as follows:

Alan G. Cary Company	5" pump	$386.35
Buffalo Steam Pump Co.	4" "	307.46
" " " "	5" "	311.54
Fairbanks Morse & Co.	4" "	312.70
R. B. Whitacre & Co.	4" "	333.00
Commonwealth Electric Co. (DeLaval Steam Turbine Co.)	5" "	360.35
" " " "	6" "	381.10
Geo. M. Kenyon Co.	4" "	368.00
" " "	5" "	388.16
Platt Iron Works	5" "	373.96
Worthington Pump & Mach. Corp.	5" "	376.53
Rumsey Pump Company	5" "	413.00
Allis Chalmers Mfg. Co.	4" "	415.00
Robinson Cary & Sands Co.	4" "	427.00
" " " " "	5" "	453.00

I recommend the order be given to the low bidder, the Alan G. Cary Company, for 5" pump, although any of the other 5" pumps will be satisfactory so far as the Engineering Department are concerned.

The motor should be shipped to the pump manufacturer for mounting.

Encl.

Chief Engineer.

Saint Paul, December 17th, 1924.

Mr. H. E. Stevens,

Chief Engineer.

I am handing you herewith bids received from Mr. Elliott covering centrifugal pump and motor ordered on ED requisition 1091, GSK-15865 for Auburn water station.

These bids were received during your recent absence. I told Mr. Gemmell that I would make up the schedule which is attached. The requisition called for separate bids for the motor and for the pump manufacturer to set up the motor to be furnished by the Railway Company. In sending out the bids Mr. Elliott asked the manufacturers to submit a separate bid for the pump and motor complete.

The large sheet is comparison of bids from the pump manufacturers. The last line is the total cost for the pump and motor. The next to the last line shows the total cost of the pump only. The circled figures below the totals show the relative standing based on prices. The small sheet covers the bids for motor only. These prices were obtained from electric companies. The pump manufacturers want from $184.00 to $303.00 for General Electric or Westinghouse motor whereas we have received prices direct from the manufacturers of $176.00 for General Electric motor and $194.00 for a Westinghouse motor, and we can save a little money by buying the motor separately.

The lowest bid received for the pump alone is from Alan G. Cary & Company who figured on a 5 inch centrifugal pump made by the Union Steam Pump Company. These manufacturers have been in the pump game a long time and I know of no reason why we should not avail ourselves of the price. They guarantee 70% efficiency under the

conditions given in the requisition. The Goulds Pump Company claim 72½% efficiency but they want $102.00 more for their pump. The American Pump Company claim 75% efficiency for their pump but their price is $47.00 more than Cary's. Fairbanks-Morse claim 73% efficiency for their pump but they are also higher in price. Several of the manufacturers have bid on 4 inch pumps claiming a little better efficiency on 600 gallons per minute. However, their prices are more and the cost of the current at Auburn is extremely low so that I do not think we can capitalize 1 or 2 percent in efficiency as variations in actual practice may wipe out such claims. Fairbanks-Morse propositions Nos. 1 and 2 for pump and motor complete are the cheapest but they figured on a 20 horsepower motor only whereas we called for a 25 horsepower motor to take care of increased volume that will be pumped at lower heads and to avoid any possible heating of the motor when pumping for long periods. I see no reason why we should not accept the proposition of Alan G. Cary & Company based on a Union Steam Pump Company's 5 inch centrifugal pump class B-5 at a price of $280.00 f.o.b. Battle Creek, Michigan.

For the motor the most favorable proposition is a Fairbanks-Morse 25 horsepower motor sleeve bearing, price $158.19, f.o.b. Indinapolis. I took up with Mr. Reed as to the motor he desired us to purchase and quoted him the various prices. It is his recommendation that we purchase the Westinghouse type CS motor with special moisture proof insulation at a cost of $184.49 f.o.b. East Pittsburg. It would be necessary for the Westinghouse Company to ship the motor to Battle Creek for mounting by the pump manufacturer.

Bernard Blum
Engr. Mtce. of Way.

BB-O
encl

Saint Paul, December 16th, 1924.

6303

OFFICE CHIEF ENGR. DEC 16 1924 NORTHERN PACIFIC RY. ST. PAUL, MINN.

Mr. H. E. Stevens,

Chief Engineer.

Referring to the available money for the Auburn pumping plant:

In checking up the AFE I find that the estimate is quite liberal covering the well. As you know, Mr. Cook figured on four 6 inch wells each 100 feet deep. The estimate contains the following items for the wells:

Casing	$480.00
Drive shoes	80.00
Drilling wells	1600.00
4 well screens	130.00
Miscl. including exploratory work and testing of preliminary well	1400.00

This totals $3,690.00. In addition there is an item of $800.00 for various things including some of the work that was done under this contract. The total of the voucher for Mr. Lawson is $3,654.00. I am therefore inclined to think that the AFE is ample. In addition the estimate allows $1,000.00 for pump, motor, float switch and setting up on the foundation. The bare motor and pump will cost us about $500.00 so that there is more than enough money in this item to take care of all the needs. I believe that the total cost of the work will not exceed the $9,032.00 authorized under AFE 396-24.

Bernard Blum
Engr. Mtce. of Way.

BB-O

6303

Saint Paul, December 13th, 1924.

Mr. A. R. Cook:

Your letter of the 10th, file 1003-18, about material for the Auburn wells:

Bids for the pump and motor have been received and I am now making up schedule of the various propositions received. In all some twelve manufacturers have quoted prices and most of them have given two propositions so it will probably take a couple days to make decision. Just as soon as pump is decided upon I will have certified setting plan obtained from the successful bidder and send to you so that you can make necessary corrections to the pump house plan.

BERNARD BLUM.
Engr. Mtce. of Way.

BB-O
Copy Mr Stevens

OFFICE OF CHIEF ENGR. DEC 11 1924 NORTHERN PACIFIC RY. ST. PAUL, MINN.

St. Paul, Minnesota.

Dec. 11th, 1924.

Desk 2.

Mr. H. E. Stevens,

Chief Engineer.

Dear Sir:

Referring further to my letter of December tenth submitting bids received on ED requisition No. 1091, GSK-15865.

I attach hereto the following bids received since, which please consider together with those now in your possession.

Fairbanks Morse & Co. - Dec. 10th.

Northwestern Elec.Equip.Co. Dec. 9th.

Yours truly,

Purchasing Agent.

LC/MR
Encl.

St. Paul, Minnesota.
Dec. 10th, 1924.
Desk 2.

Mr. H. E. Stevens,
Chief Engineer.

Dear Sir:

Herewith bids received on ED requisition 1091, GSK-15865:

On Pump with Motor

Allis Chalmers Mfg. Co.	Dec. 8th.
Buffalo Steam Pump Co.	Dec. 9th.
Alan G. Cary & Company.	Dec. 4th.
Commonwealth Electric Co.	Dec. 8th.
DeLaval Steam Turbine Co.	Dec. 6th.
Geo. M. Kenyon Company.	Dec. 3rd.
Platt Iron Works.	Dec. 6th.
Robinson, Cary & Sands Co.	Dec. 9th.
Rumsey Pump Company.	Dec. 4th.
R. B. Whitacre & Co. Inc.	Dec. 4th,
Worthington Pump & Mach. Corp.	Dec. 9th.

On Motor separately.

General Electric Co.	Dec. 3rd.
Western Elec. Co.	Dec. 6th.
Westinghouse Elec & Mfg. Co.	Dec. 3rd.

Will you please have the bids examined and advise me your recommendation?

Yours truly,

R. E. Elliott
Purchasing Agent.

LC/MR
Encl.

OFFICE OF
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Schedule of Bids covering Motor for Centrifugal Pump Rubicon Wn

Requisition ED 1091 BK 15865	General Electric Co	Westinghouse Elect & Mfg Co Propn 1	Westinghouse Elect & Mfg Co Propn 2	Western Electric Co.	N W Electric Eqpt Co Propn 1	N W Electric Eqpt Co Propn 2	Central Electric Co	Fairbanks Morse & Co
Induction Motor	Frame 303	✓	✓	✓	Frame 303	✓	✓	✓
Squirrel cage type	✓	✓	✓	✓	✓		✓	
H.P. 25	✓	✓	✓	✓	✓	✓	✓	✓
1800 R.P.M	✓	✓	✓	✓	✓	✓	✓	✓
3 phase, 60 cycle, 220 volts	✓	✓	✓	✓	✓	✓	✓	✓
40 deg rated	✓	✓	✓	✓	✓	✓	✓	✓
Special moisture proof insulation	✓	✓	Standard insulation	Special Moisture Proof Insulation	Standard 1001 Insulation	Special moisture proof insulation	✓	✓
Without pulley or sliding base	✓	✓	✓	✓	✓			
Westinghouse Type C S	Type K.T.	Type C.S.	Type C.S.	G.E. Type K T	G.E. Type K T	✓	Lincoln	Fairbanks Class Brass Motor
Price	175 77	185 49	174 -	175 75	184 15	196 15	226 95	158.19
F.O.B Point	Minneapolis	East Pittsburg Pa	Minneapolis	St Paul	Minneapolis	St Paul	Cleveland	Indianapolis
Weight	650#	500#	500#				600#	
Freight	—	1.68 cwt 8 40					1.6 cwt 9 75	13.88
Discount	—						10% (45 4)	
Delivery	Immediate	8 Weeks			Immediate		2 Weeks	
Total	175 77	→ 193 89	174 -	175 75	184 15	196 15	235 13	171.07
	(4)	(6)	(2)	(3)	(5)	(7)	(8)	(1)

✓

Schedule of Bids covering Pump for Auburn Water Station

Requisition ES 1091 GK 15865	Allis-Chalmers Mfg Co	Buffalo Steam Pump Co Propn 1	Buffalo Steam Pump Co Propn 2	Alan B Cary & Co (Union Steam Pump Co) Prop 1	Alan B Cary & Co (Union Steam Pump Co) Propn 2	Commonwealth Electric Co (De Laval Steam Turbine Co) Propn 1	Commonwealth Electric Co (De Laval Steam Turbine Co) Propn 2
	Type "S"	Class "S"		Class BS	Class BS		
Single Stage, Double Suction	✓	✓	✓	✓	✓	✓	✓
Split case Centrifugal Pump	✓	✓	✓	✓	✓	✓	✓
Size 5"	4"	5"	4"	5"	5"	5"	6"
G.P.M. 600 gallons	600 gallons	600 gallons	600 gallons	600 gallons	600 gallons	600 gallons	600 gallons
Direct connection to 25 H.P.	✓	✓	✓	✓	✓	✓	✓
Motor 1750 RPM full load	✓	✓	✓	✓	✓	✓	✓
Efficiency	67%	67%	71%	70%	70%	68%	69%
Total Lift 84 ft	84 ft	84 ft	84 ft	84 ft	84 ft	84 ft	84 ft
Bronze fitted including impeller and shaft sleeves	✓	✓	✓	✓	✓	✓	✓
Westinghouse Electric Motor Type CS or Equivalent	Allis Chalmers Type AR	Westinghouse	Westinghouse	Westinghouse Type CS	General Electric Type KT	General Electric Type KT or Westinghouse Type CS	Westinghouse Type CS or G.E. Type KT
25 H.P. Squirrel cage	✓	✓	✓	✓	✓	✓	✓
3 phase, 60 cycles 220 volts	✓	✓	✓	✓	✓	✓	✓
Moisture proof impregnation				✓	✓		
Remarks	Increases add 20 -		Increases add 20 00	(Hand starter for motor $85.00 extra)	(Hand starter for motor $65.00 extra)	Motor to be mounted at Factory (Deduct of Expense of ...)	Motor to be mounted at Factory if requested
Price of Pump	395 -	297 -	275 -	280 -	280 -	345 -	365 -
F.O.B. Point	St Paul	Buffalo NY	Buffalo NY	Battle Creek Mich	Battle Creek Mich	Trenton N.J.	Trenton N.J.
Price of Motor	183 57	229 -	229 -	215 -	(In stock at Chicago) 200 -	206 -	306 -
F.O.B. Point	St Paul	East Pittsburg Pa 2.25	East Pittsburg Pa 2.25	Battle Creek Mich	Battle Creek Mich	Trenton N.J.	Trenton N.J.
Weight	Motor 610# Pump 1050#	Motor 500# Pump 1050#	Motor 500# Pump 900#	Pump 1000# Motor 500#	Pump 1000# Motor 650#	Pump 900# Motor West. 500# GE 650#	Pump 950# Motor West. 500# GE 650#
Freight	—	1.38½ cwt 21 47	1.38½ cwt 19 39	1.19½ cwt 17 93	1.19½ cwt 19 72	1.69½ cwt 26 27	1.69½ cwt 27 12
Discount				2% Disc (11 60)	2% (10 90)		
Pump will require		19 B.H.P	18	18.2 BHP	18.2 BHP	18.7 BHP	18.5 BHP
Delivery	15 days			Pump 1 week, Motor 8 weeks	Immediate	5 10 weeks	5 Weeks
Total Pump only	415 00 (15)	381 54 (3)	307 46 (2)	286 35 (1)	286 35 (1)	360 25 (6)	381 10 (10)
Total Pump and Motor	598 57 (12)	549 72 (8)	545 64 (7)	501 33 (4)	488 82 (3)	577 77 (9)	598 12 (11)

Requisition ES 1091 GK 15865	De Laval Steam Pump Co Propn 1	De Laval Steam Pump Co Propn 2	George M Kenyon Co (Goulds Mfg Co) Propn 1 (Fig 3085)	George M Kenyon Co (Goulds Mfg Co) Propn 2 (Fig 3075)	Platt Iron Works	Rumsey Pump Co	Robinson Carr & Sands Co Propn 1
					Platte No 5 A		Cameron Type LV
Single Stage, Double Suction	✓	✓	✓	✓	✓	✓	✓
Split case Centrifugal Pump	✓	✓	✓	✓	✓	✓	✓
Size 5"	6"	6"	4"	5"	5"	5"	4"
G.P.M. 600 gallons	600 gallons	600 gallons	600 gallons	600 gallons	600 gallons 25 HP	600 gallons	600 gallons
Direct connection to 25 H.P.	✓	✓	✓	✓		✓	✓
Motor 1750 RPM full load	✓	✓	✓	✓	✓	✓	✓
Efficiency	70%	70%	70%	72½%	64%	62% to 65%	69%
Total Lift 84 ft	84 ft	84 ft	84 ft	84 ft	84 ft	84 ft	84 ft
Bronze fitted including impeller and shaft sleeves	✓	✓	✓	✓	✓	✓	✓
Westinghouse Electric Motor Type CS or Equivalent	(To be purchased by Ry Co)		(To be purchased by Ry Co)		General Electric with hand starter	General Electric with hand starter	General Electric or Westinghouse with hand starter
25 H.P. Squirrel cage					✓	✓	✓
3 phase, 60 cycles 220 volts					✓	✓	✓
Moisture proof impregnation							
Remarks	(Includes services of Supt for erecting) Motor to be delivered to 70 B works (For Pittsburg to Trenton N.J.)	Pump in stock Seattle, Mounting motor $25.00	Increases add 20 -		(If Westinghouse Motor required add $13.00; Deduct for Hand starter $65.00)	Deduct for Hand Starter $[illegible]	Deduct for Hand Starter $65.00; Increases add 20 -
Price of Pump	380 -	410 -	330 -	370 -	358 -	385 -	390 -
F.O.B. Point	St Paul	Auburn Wn	Seneca Falls NY	Seneca Falls NY	Dayton Ohio	Seneca Falls	Phillipsburg N.J.
Price of Motor	—	—			303 -	271 -	265 -
F.O.B. Point	Trenton N.J.				Dayton Ohio	Seneca Falls	Phillipsburg N.J.
Weight	Motor 500# Pump 950#	Pump 950#	Pump 1270#	Pump 1275#	Motor 650# Pump 1800#	Motor 650# Pump 1950#	Motor 750# Pump 1050#
Freight	1.69½ cwt 3 32 / 8 48	Less frt St Paul to Auburn (6 25)	1 42½ cwt 18 10	1 42½ cwt 18 16	1.33 cwt 24 61	1 42½ cwt 37 05	1.63½ cwt 29 43
Discount							
Pump will require	18.1 BHP	18.1 BHP	18	17.4	21		18.5
Delivery	4 10 weeks	Immediate	2 Weeks	2 Weeks	3 Weeks	—	2 to 4 Weeks
Total Pump only	391 80 (13)	429 75 (17)	368 00 (7)	388 16 (12)	373 96 (8)	412 80 (14)	427 17 (16)
Total Pump and Motor	—	—	—	—	620 61 (13)	628 05 (14)	639 43 (15)

Requisition ES 1091 GK 15865	Robinson & Sands Co Propn 2	R.B. Whitacre & Co (American Pump)	Worthington Pump & Mchy Corp	Fairbanks Morse & Co Propn 1	Fairbanks Morse & Co Propn 2	Fairbanks Morse & Co Propn 3	Fairbanks Morse & Co Propn 4
	Cameron Type LV	Type S-DSM	Class "OS"	Fig 800 NE	Fig 800 NE	Fig 600 NE	Fig 800 NE
Single Stage, Double Suction	✓	✓	✓	✓	✓	✓	✓
Split case Centrifugal Pump	✓	✓	✓	✓	✓	✓	
Size 5"	5"	4"	5"	4"	4"	4"	5"
G.P.M. 600 gallons	600 gallons	600 gallons	600 gallons	600 gallons 20 HP	600 gallons 20 HP	600 gallons 20 HP	600 gallons 25 HP
Direct connection to 25 H.P.	✓	✓	✓				
Motor 1750 RPM full load	✓	✓	✓				
Efficiency	65%	75%	69%	73%	73%	73%	73%
Total Lift 84 ft	84 ft	84 ft	84 ft	85 ft	85 ft	85 ft	85 ft
Bronze fitted including impeller and shaft sleeves	✓	✓	✓	✓	✓	✓	✓
Westinghouse Electric Motor Type CS or Equivalent	General Electric or Westinghouse with hand starter	General Electric without starting Equip	General Electric with hand starter	Type "B" sleeve bearing motor	Type "H" ball bearing motor	Ry Co to furnish Motor	Type "B" sleeve bearing motor
25 H.P. Squirrel cage	✓	✓	✓	✓	✓	✓	✓
3 phase, 60 cycles 220 volts	✓	✓	✓	✓	✓	✓	✓
Moisture proof impregnation							
Remarks	Deduct for Hand Starter $65.00	Increases add $20.00	Deduct for Hand Starter $65.00			Motor to be mounted at Factory	
Price of Pump	433 -	313 -	366 -	312 70	312 70	300 -	367 50
F.O.B. Point	Phillipsburg N.J.	St Paul Minn	Harrison N.J.	St Paul Minn	St Paul Minn	Three Rivers Mich	Three Rivers Mich
Price of Motor	265 -	197 -	270 -	137 05	150 90	—	158 19
F.O.B. Point	Phillipsburg N.J.	St Paul	Harrison N.J.	Indianapolis	Indianapolis	—	Indianapolis
Weight	Motor 750# Pump 1750#	Pump 1450# Motor 500#	Pump 1700# Motor 700#	Pump 1065# Motor 800# 13 88	Pump 1065 Motor 800# 13 88	Pump 1065#	Pump 1515# Motor 850#
Freight	1.63½ cwt 32 70		1.69½ cwt 40 68	—	—	1.19½ cwt 12 73	1.19½ cwt 19 -
Discount			5% Dis (18 30)				
Pump will require	20						
Delivery	2 to 4 Weeks	3 Weeks	4 Weeks	2 to 3 Weeks	2 to 3 Weeks	2 to 3 Weeks	2 to 3 Weeks
Total Pump only	453 43 (18)	333 00 (5)	376 52 (9)	312 70 (4)	312 70 (4)	312 73 (4)	385 60 (11)
Total Pump and Motor	665 70 (16)	530 - (5)	593 38 (10)	463 63 (1)	477 48 (2)	—	544 69 (6)

6303

ON LINE - Duluth, December 3rd, 1924.

OFFICE OF CHIEF ENGINEER DEC 4 192[illegible] N.P. RY.

Mr. H. E. Stevens,

Chief Engineer.

Herewith requisition prepared by the Mechanical Department covering electrical work in connection with the installation of centrifugal pump for new water supply at Auburn, AFE 396-24.

This requisition was prepared by Mr. Endicott in accordance with my letter of November 11th to him. I am sending three copies of the requisition to Mr. Cook for his files.

Bernard Blum

Engr. Mtce. of Way.

BB-O
encl.

Copy A R Cook (3 copies of reqn.)

A F Stotler

6303

Saint Paul, December 1, 1924.

Mr. Bernard Blum:

Your letter of November 29 about test of new wells at Auburn.

I wish you would handle this matter through to a conclusion with Mr. Cook, making certain that installation is made in accordance with the plans you have outlined to him.

Chief Engineer.

HES-ar

6303 H10

St.Paul,Minn.,Nov. 29th,1924

Desk #4

Mr. H.E.Stevens,

Chief Engineer

Dear Sir:-

Referring to your letter of Nov. 10th in connection with Cook well strainer on ED- 918, GSK- 13787.Purchasing Agent now advises me that the above company are tracing this shipment and will advise promptly upon receipt of further information.

Yours truly,

General Storekeeper

H-o

ON LINE - Carlton, November 29th, 1924.

Mr. H. E. Stevens,

Chief Engineer.

Attached report from Mr. Cook covering new wells at Auburn, Washington:

Test was made with the contractor's 5" centrifugal pump as I outlined in my letter of the 24th written at Staples. The 4" suction pipes were extended down to the bottom of each well so as to take care of any sand that might come in through the slots and draw such sand out through the pump. Test No. 1 shows that they got practically 700 gallons per minute so that we are quite safe in using a 600 gallon pump such as I requisitioned from Seattle. The test required 350 gallons per minute be drawn through each of the suction pipes. The head loss in feet due to friction in the 4" suction pipes was 12 feet on well No. 2 and 14 feet on well No. 1. Had 6" drop pipes been used, the friction loss would have amounted to about 5 feet and 6 feet respectively, and they might have been able to throw more water.

Test No. 2 would indicate that the above surmise is correct as with well No. 2 only in use they got but 482 gallons per minute even though the water dropped only 4 feet, which would show that there was plenty of water available but the friction loss in drawing 482 gallons through the 4" drop pipe prevented more water than this reaching the pump. 482 gallons of water through the 4" pipe would occasion about 24 feet head loss which is about the limit for a centrifugal pump.

Test No. 3 shows that well No. 1, which gets water from a lower level, is not as good as well No. 2, and it may prove desirable ultimately to slot the casing at the 75 foot level. However, it will probably improve with pumping.

The plan of the layout, of which I sent you print several days ago, will show how the ultimate layout will reduce the suction head loss by employing 6" pipes with a 5" foot valve. The contractor's test used 4" foot valve with 4" suction pipe. These tests, together with the totally inadequate supply that was obtained under the scheme that was tried out when I arrive at Auburn, proves conclusively the necessity of large wells and adequate mains.

I believe that well No. 2 is easily good for 1000 gallons per minute.

You will note that in tests Nos. 2 and 3 with only one well being pumped from, that the water was lowered in the other well, showing the desirability of having the wells a sufficient distance apart. Furthermore, these tests indicate that there is a connection between the two water strata. This connection, of course, might be along side of the casings.

Analyses of the two wells indicate good water. Mr. Burnham's analysis of well No. 1 showed total solids of little over 4 grains per gallon. Mr. Greiner's analysis of well No. 2 showed a little over 6 grains total solids per gallon, the hardness being in the neighborhood of 4 grains per gallon.

Edward Blum
Engr. Mtce. of Way.

BB-O
encl.

6303

ARC 8-92

#✓1877

E.F.Lawson,
C/O A.R.Cook,
Seattle,Washington

One Thousand Five Hundred Thirty and 92/100 Dollars---------- 1530.92-

Asst.Chief Engineer XXXXXXX

November 26th,1924. <u>Estimate # 4 and Final.</u>

In Payment of: All labor, services, Material, (except that portion to be furnished by the Railway Company) superintendence, use of tools and equipment for drilling and casing one or more 12" wells not exceeding four in number and not exceeding 100' deep, at Terminal Yard, Auburn,Washington, as per terms of Contract dated July 11th,1924.

Detail Attached:-
Amount of this Voucher:..........$1530.92
++++++++

Payment Due:
December 26th,1924.

<u>Charge:</u>
Division Accounts,
Engineering Department,
~~Capital Expenditures Suspense,~~
AFE 396-24 IEB 18 1295.00
Accounting Department,
Open Accounts,
E.F.Lawson,
Account Contract: <u>235.92</u>
Amount of Voucher:.........$1530.92

B

Statement of Account.

ARC Voucher 8-92
November 28th, 1924.

M.F.Lawson,
Seattle, Wash.

Estimate # 4 and Final, Nov. 1924

++

AFR 306-24 RD 47-24 Auburn Pumping Plant.

Drilling & Casing 12" Well per Lin.Ft. 172.5 LF	8.50 LF	1466.25
Testing Well, pulling casing, tools & Equipment & 2 men per hour. 403 hours	5.00 hr	2015.00
Force Account:		173.06
		3654.31

Less Previous Payments:

Date	Mat#	ARC #	RD#	Amt.	
9-2-24	1	8-76		489.60	
10-2-24	2	8-81		608.36	
11-3-24	3	8-87		1025.43	2123.39

Amount of this Voucher:.....$1530.92

++++++++

Force Account this Month:- Blank.

B

at Fargo 6303

Mr Stevens

Herewith print of plan of Auburn new pump installation just received from Seattle that should have accompanied my recent letter to you forwarding copy of pump and motor requisition

11/24 B.B

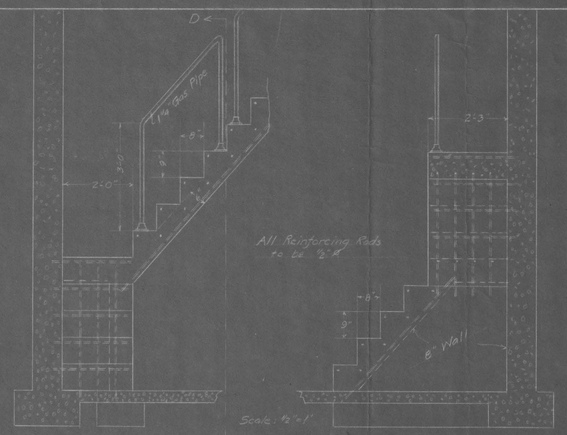
Mr Rogers any comments

RB 11/26

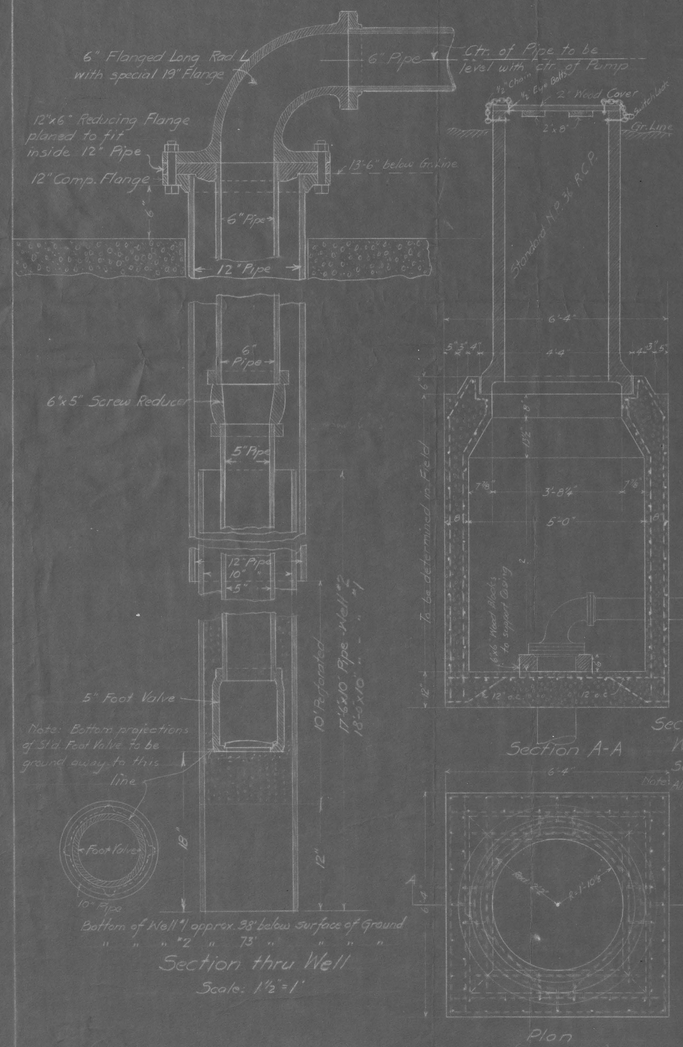
Mr. Stevens

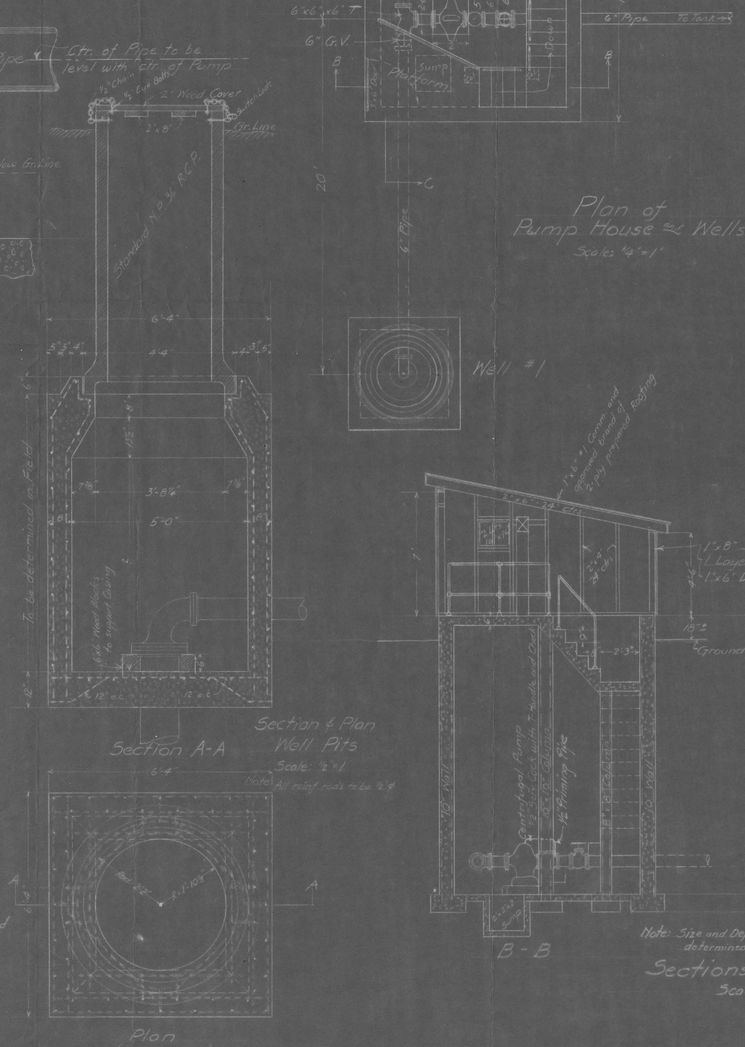
The arrangement looks allright. ~~For~~ I notice requisition for pump calls for 6" suction and 5" discharge: I believe a 4" pump at the speed given will be the most efficient. This can be decided when the bids come in, as I think manufacturers will figure on a 4" pump.

12/2 - R.H. Rouk

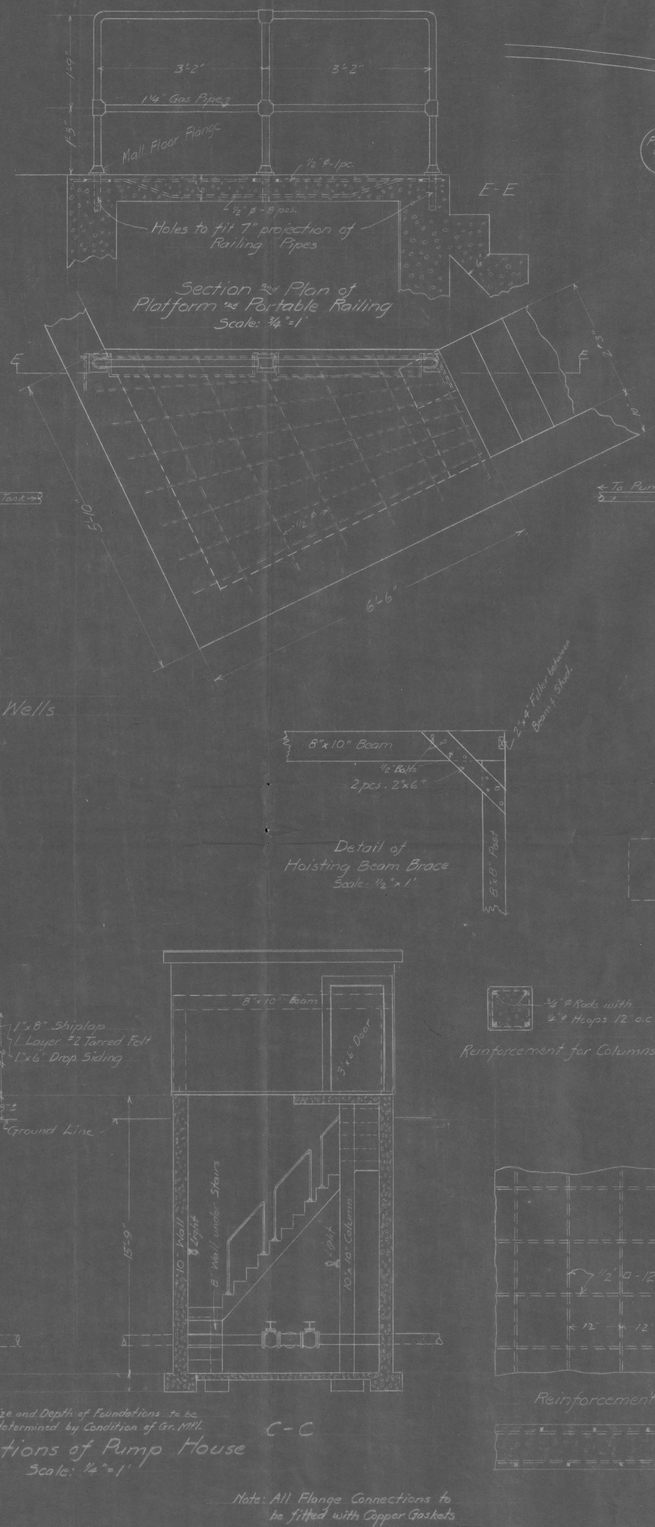


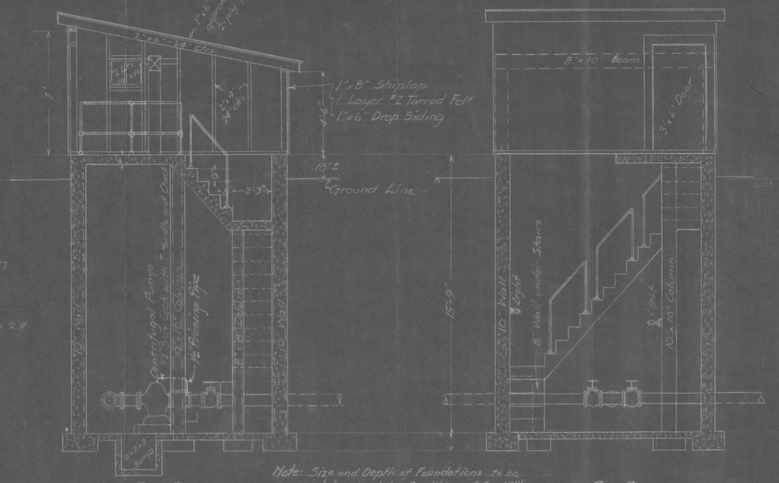
Details of Stairway





Plan of Pump House and Wells
Scale: ¼"=1'





Note: All Flange Connections to be fitted with Copper Gaskets

N. P. Ry.
Seattle Div. Seattle Terminals
Plans of
Proposed Pumping Plant
for
Auburn Freight Terminal
Auburn, Wash.
Office of Asst. Chief Engr. - Seattle, Wash.
Scale as shown — Nov. 15- 1924

ON LINE - Staples, November 24th, 1924.

Mr. H. E. Stevens, 6303

Chief Engineer.

Your letter of the 21st relative to Mr. Cook's report covering progress of wells at Auburn for the week ending November 15th:

Prior to my arrival on the coast, Mr. Cook had figured on a 4"x4"x6" tee on the suction end of the pump, the 4-inch connections being drop pipes inside of the 12-inch wells. He must have submitted a requisition some weeks ago for all of the piping as this 4-inch suction pipe, foot valves and fittings were on hand. The use of the 4-inch suction pipe was one of the criticisms I had of his design as one well with a 4-inch drop pipe for suction would not be sufficient to supply 600 gallons per minute. Requisition is to be submitted for larger suction pipe. However, in making the test with contractor's centrifugal pump, and also for cleaning out the well with air, we used this 4-inch suction pipe as it was the only material available. This material hosever, is to be returned to stock and used elsewhere. The Cook screens have also been salvaged and I presume turned into the storekeeper by this time.

Engr. Mtce. of Way.

BB-O

Re: Water supply at
Auburn, Wash.

Seattle, Wash.,
November 21, 1924.

1003-18

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

Dear Sir:-

The following is final report covering test of new wells at Auburn, Wash:

Well No. 1 - depth 97.7 feet. Foot valve 4 inches, suction 92 feet from surface of ground.

Well No. 2 - depth 78.0 feet. Foot valve 4 inches, suction 75 feet from surface of ground.

Both suctions connected with 5-inch centrifugal pump, set at an elevation of 10.7 feet below surface. Six-inch discharge pipe running to an elevation of 16 feet above the surface; 25 H.P. motor run at 1150 RPM, the pump running 1050 RPM.

TEST NO. 1 - Both wells connected with pump. Filled a 10,000-gal. engine tank in 14 min. 20 sec. showing delivery of 698 gals. per minute.

Well No. 1 was lowered 13.5 feet. Well No. 2 was lowered 3.7 feet. Water in both wells was 16 feet below the surface when pump started.

TEST NO. 2 - Suction in Well No. 1 was closed. Well No. 2 pumped independently. A 10,000-gal. engine tender was filled in 20 minutes, 45 seconds, showing a production of 482 gals. per minute.

Water in Well No. 2, being pumped, was lowered 4.0 feet. Water in Well No. 1, which was not being pumped, fell 0.5 feet.

The foregoing tests were made on November 19. A further test was made on November 20.

TEST NO. 3 - Well No. 2 was disconnected and Well No. 1 pumped independently of Well No. 2.

A 10,000-gal. engine tank was filled in 28 minutes, at the rate of 357 gals. per minute. The water in Well No. 1 dropped 16.5 feet and the water in Well No. 2, which was not being pumped, dropped 0.5 feet.

From the best information available we have a capacity in the two wells of 700 gals. per minute, which it is anticipated will improve and it has already improved thru operation with air lift removing sand.

The Contractor is now clearing up and will remove his outfit from the grounds.

Yours truly,

A. R. Cook

ARC:L

6303

Saint Paul, November 21, 1924.

Mr. Bernard Blum:

Mr. Cook's report covering progress on wells at Auburn for the week ending November 15, is as follows:

"Completed installation of the 10" screen in well #2 and cleaned it out with air lift using a "W" engine to furnish air and a home made air jet, a 4" discharge was used. In cleaning the well it is estimated that 500 gals. per minute were obtained and the water surface dropped only 18" in the casing. Installed a similar 10" screen in well #1 and have commenced cleaning this well. On commencing, about 400 gals per minute were obtained and water surface dropped 15ft. After a little in excess of two hours operation of the air lift the flow was increased to 500 gals. per minute and the water surface dropped only 11-ft. Expect to continue cleaning until the water clears up and then install the 4" suction lines and connect both wells to the temporary pump and get an accurate test on the capacity of the wells. Force 2 men."

I do not understand the remark about 4" suction. Was it your intention to replace the 4" pipe and well point?

Chief Engineer.

HES-ar

ON LINE - Yellowstone Division,

November 21st, 1924.

6303

Mr. H. E. Stevens,

Chief Engineer.

Your letter of the 17th relative to Mr. Cook's letter of the 13th to you about Auburn wells and pump:

A centrifugal pump installation requires that the pump be specially designed for the amount of water to be handled and the lift including all factors, such as pipe resistance, static head, etc. Without a definite trial to determine the suction lift and the amount of water available, an assumption has to be made so as to select the proper diameter of impeller wheel. In discussing this phase with Mr. Herbert, Seattle agent for the DeLaval Steam Turbine Company, he told me that if he received the order and it was found desirable in actual practice to change the diameter of impeller, they would do it free of charge. Mr. Herbert furnished Mr. Cook with all the information he had as to centrifugal pumps and he informed me that they keep a stock of parts on hand. For these reasons, I think it would be desirable to give some consideration to the DeLaval proposition. On account of his courtesy I noted specially on the requisition that bid from the DeLaval Steam Turbine Company should come from the Seattle agent. However, different manufacturers have certain standards in the manufacture of the 5 inch and 6 inch pump that might cause some other make to be a little more efficient for the exact conditions that we have and which I tried to show on the requisition when I prepared it. I would be glad to look over the bids for the pumps when received and if there is not too much difference I would be

glad to give special consideration to the DeLaval Company.

I have noted Mr. Cook's report on the wells and think it would be better if I discussed the matter with you later. I have, however, found out that the theory of conservation of matter has limited us in the past and I do not know of any way to beat that game.

Bernard Blum
Engr. Mtce. of Way.

BB-O

ON LINE - Billings, November 18th, 1924.

6303

Mr. A. R. Cook:

Mr. A. F. Stotler:

In regard to the new water supply at Auburn:

We took sample of the present gravity supply and a sample from well No. 2 after it was cleaned out. The complete analysis has not been made but following is comparison of the waters:

Present Supply	Total solids - 4.49	grains per gallon.
	Hardness - 1.60	" " "
Auburn New Well	Total solids - 6.13	" " "
	Hardness - 3.30	" " "

While the new well does not show up quite as good as the present supply, both of them are so low in mineral content that either one will make a satisfactory supply.

BERNARD BLUM.
Engr. Mtce. of Way.

BB-O

Copy - Mr Stevens
Mr Craver
Mr Bartles

6303

Saint Paul, November 17, 1934.

Mr. Bernard Blum:

I am attaching copy of Mr. Cook's letter of the 13th, about well at Auburn.

Is there anything in the remarks about the De Laval Steam Turbine Company which merit any special consideration?

I call your particular attention to the second paragraph on page two; this being something new in the matter of water conservation.

Chief Engineer.

HES-ar

Encl.

6303

ON LINE - Livingston, November 15th, 1924.

Mr. H. E. Stevens,

Chief Engineer.

In regard to the development of well No. 1 at Auburn - 96 feet deep:

I have a wire from Mr. Adams that on Friday they started cleaning the well with air and the water dropped 15 feet in the casing and produced 400 gallons. After they had pumped two hours the water dropped 11 feet and produced 500 gallons per minute. He will continue cleaning the well with air pressure. This indicates that they are rapidly developing the well and I hope that with the continued cleaning they can produce 600 gallons per minute.

Bernard Blum

Engr. Mtce. of Way.

BB-O

Re: Water station
Auburn, Wash.

Seattle, Wash.,
November 13, 1924.

1003-18

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

Dear Sir:-

Acknowledging your favor of November 6 and supplementing my letter of November 11 forwarding to you Mr. Blum's requisition, my number 196, for one centrifugal pump, motor and attachments.

I note that Mr. Blum has written to Mr. Endicott regarding electrical fittings and attachments.

Referring to the second paragraph of my letter in regard to Mr. Herbert, Seattle Agent for the De Laval Steam Turbine Company. I have since had a talk with Mr. Herbert and find that I was misinformed about the installation. He does not install the equipment but will supervise it and furnish necessary plans and measurements for foundation, also a reasonable amount of service after pump is started and during its early days, without additional expense to the Railway Company. He further advises that he carries a complete stock of pump repair parts in Seattle.

Referring to the third paragraph of your letter, in regard to the second well being placed 39 feet from the first well. The plan of the arrangement for the well submitted was made up on the theory that it was not probable that we would be able to get sufficient water from one well, and the plan provided for four wells spaced on 40-ft. centers on the theory that they would draw water from an area equal to a well 160 feet in diameter. This well was located 39 feet instead of 40 feet on account of track interference, as we were unable to get assistance to throw the track at the time the drilling was started, and the further fact that the Contractor in advance of starting drilling, excavated a hole about 3 feet square, to a considerable depth before spudding in. As first designed the wells were to have a 6-inch casing but it was found that a foot valve would be necessary, no matter what kind of a pump was used. A 6-inch casing was not large enough to admit the foot valve of a 4-inch suction and to provide

sufficient space round the flange of the foot valve to permit the free passage of water, a 12-inch casing was found necessary, and pursuant to verbal understanding that the matter be tested out, we put down one 12-inch hole 96 feet. The material in the last 15 or 20 feet of this hole was good coarse round gravel, very little fine sand. The pump was set out and the well pumped but the water did not hold and soon went down to a level about 27 feet below the surface of the ground, when the pump ceased to function. The Cook Strainer was then put on and the casing pulled up 9 feet. The performance of the pump was the same as before the casing was pulled, namely, the well was practically pumped out and it took about 15 minutes to pump the well out and also about 15 minutes for the water to come back to its original level when pumping was started so that the screen was evidently working freely. We then started the second well and went to a depth of 76 feet. There was apparently good water-bearing material but considerable fine sand. Suction was intro duced and the casing pulled up about 9 feet. The pump was then started with both wells functioning. Air discharge pipe was full but well No. 1 soon pumped down sothat we were drawing water and a large amount of fine sand and silt from well No. 2, with the discharge of the pump running about half full and the water in well No. 2 not lowered more than two or three feet. Although we are getting out considerable silt and fine sand, seemingly the fine sand was packing around the screen. The matter was taken up with the Inspector and the Contractor to discuss ways and means, both of them recommending the introduction of a perforated pipe into the last 10 feet of the well. This matter was under discussion when your telegram regarding Mr. Blum was received. Mr. Blum was then called in and the matter turned over to him.

A 4-inch suction was selected as it was thought that a suction of larger capacity would soon exhaust the water so that the pumping would be intermittent, whereas with a smaller suction it could be continuous.

After the installation of the 10-inch perforated casing in the bottom of well No. 2, the air lift which had been designed on the job was again installed and after working about a day and a half the water has become clear, the Inspector estimating that he was getting about 500 gals. per minute. I think that this is probably in excess of the actual amount and Mr. Herbert, of the De Laval Company, thinks that it can be split in two with safety, but during the operation the water in the well was not lowered over 18 inches.

The same arrangement is being tried out on well No. 1 and it is expected that the air lift will be started up this afternoon but there does not appear to be any reason to expect any more water than we had in the first instance inasmuch as the pump was taking out all water that reached the screen and lowering the water in the well to a point where it would cease to function, which at the elevation could not be a great deal more than 27 feet below the surface.

On removing the Cook screen some sand was found inside the screen but the slots were not clogged with sand.

The air lift which we have been using has been of great aid in cleaning out the wells, it handling the solid material that could not be handled with the pump.

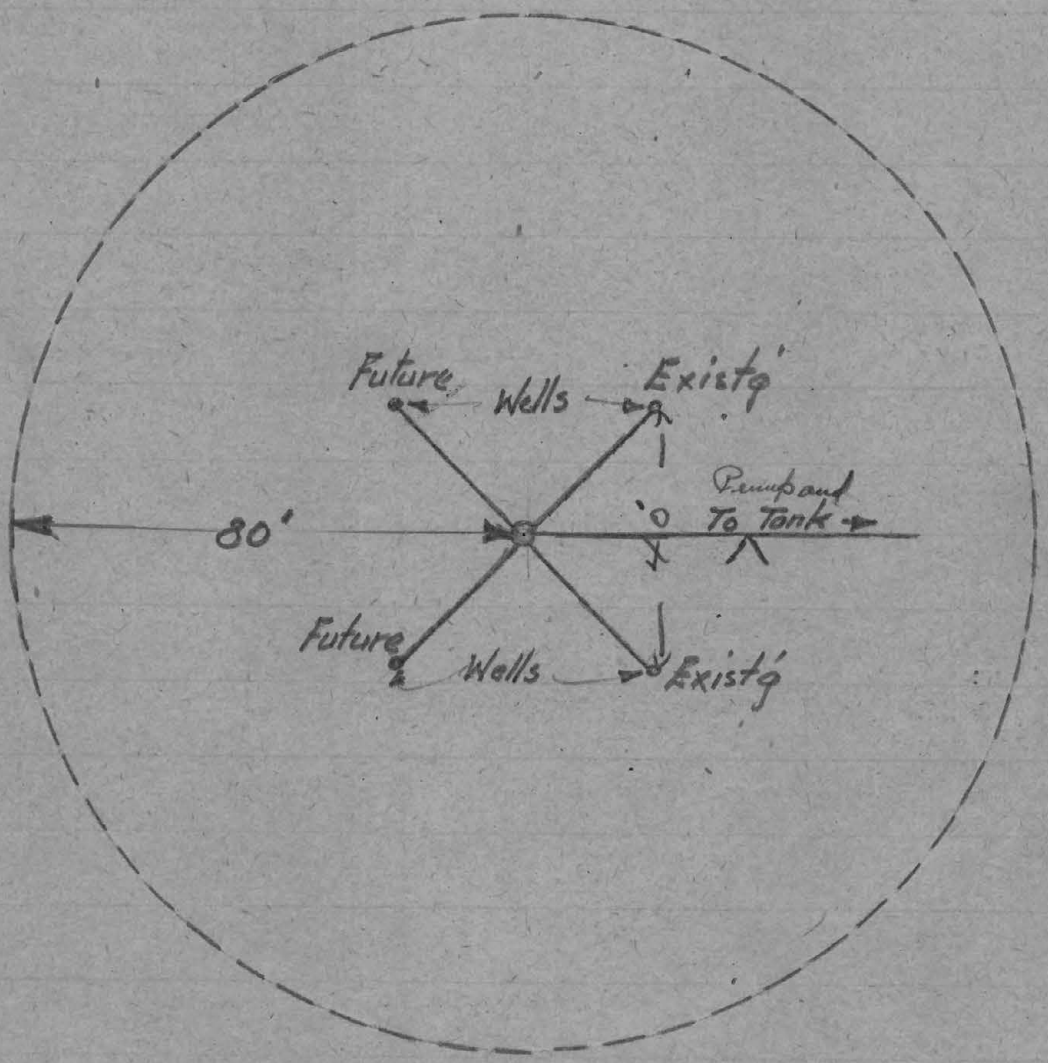
The 12-inch casing is in such shape that should it at any time in the future be found desirable to sink the well to a greater depth, the 12-inch casing can be used for that purpose, whereas had it been torn to pieces by slotting tools, its future usefulness would have been destroyed.

The arrangements of the well are not the first that have been put down in such a manner by a large number. The wells for the original water supply of Brooklyn N.Y. were similarly grouped. In 1887 I put down four 6-inch points at the Grand Crossing Terminal on the Burlington, and up to the time of Mr. Purdy's death, according to advice from him, those wells were still functioning and supplying all water required at that time.

Yours truly,

A. P. Cook

ARC:L
Encl.



Auburn Wells
and
Area Drawn on for Water.

FORM 1386

Telegram—Be Brief

Time Filed

M.

6303

4cfq Seattle nov 12 24 H E Stevens Stpaul

S 24 Recd as we were ready to leave went over plans yesterday and checking progress today think it all right to leave tonight and requested prints of plans beforwarded to me at Spokane if necessary could return here for day later on putting down slotted pipe today on second well not so much water as in shallow well but think it will develope capacity of Pumped X 68

B Blum

1245a 13

FORM 1386

Telegram—Be Brief

Time Filed

M.

6303

St Paul November 12 1924

Bernard Blum

Car 1529

Seattle

X-66 Glad to know plan worked out successfully Think you had better remain until plans for pumping installation, etc., are completed and thoroughly understood. S-24

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

430 CF P

Seattle Nov 11 1924

H E Stevens

StPaul

Completed cleaning out well No 2 with air getting clean water and large supply without lowering the water will put in slotted pipe for well No 1 tomorrow making tests on both wells later on agreed on changes in plan of layout and draftsman making new design believe with slotted pipe in well No 1 will have two good independent supplies made reqn today for pump and motor will try to leave here tomorrow or Thursday X-66

B Blum

1111pm

Regierungsbibliothek

ON LINE - Seattle, November 11th, 1924.

Mr. G. F. Endicott,

Mechanical Engineer.

6303

OFFICE OF CHIEF ENGINEER NOV 15

I am sending you herewith print of plan showing proposed installation of centrifugal pump for new water supply at Auburn.

There is being completed two 12 inch wells and it is desired to install an automatically operated centrifugal pump. I am also enclosing copy of requisition for the pump,which is being submitted today. I presume that you would prefer to have the motor purchased separately by the Railway Company and set on the pump base by the pump manufacturer in accordance with previous practice. This pump pit and house will be placed beside the steel water tank and is only a short distance from the power house. Supervision will be given by the plant engineer. It is desired to install an automatic starting and cut-off device operated by float switch in the steel tank. This will require an automatic controller and float switch and a controller equipped with overload relay and no voltage release. The installation figures out that we could get by with a 20 horse-power motor but on account of more or less continuous service that this pump will have, I think that we should have a 25 horsepower motor. The increase in cost is but slight. It will have to be an 1800 RPM motor running at 1750 at full load so as to enable us to use the most efficient type of centrifugal pump. A 1200 RPM pump for this size is not efficient. I presume that you have all the necessary electrical data covering Auburn and I would be glad if you would prepare the requisition covering the ~~motor~~, electric wiring, controller, float switch, etc., so as to make the complete

installation.

Will you kindly give this your early attention as it is desired to rush the installation all possible.

There has been included on requistion #196 the motor for which I would be glad if you would furnish the Purchasing Department specifications to cover. I think it should be a 40 degree C motor with special water proof protection.

BERNARD BLUM.
Engr. Mtce. of Way.

BB-O
encl

Copy Mr Stevens
Mr Cook
Mr Stotler

Plan with follow

Seattle, Wash. November 11th, 1924 ARC 196

A. F. Stotler, Dist. Engr., Auburn, Washington.

1. 1 Single Stage, right hand double suction horizontal split case centrifugal pump on bed plate with flexible coupling arranged for direct connection to 25 HP motor. Pump to be bronze fitted including impeller and shaft sleeves. Pump to deliver 600 gallons per minute. Pump to be designed for fresh cold water for intermittent service. Discharge head 66 feet, suction lift 10 feet, friction head 8 feet, total lift 84 feet. Pump to have 6 inch suction and 5 inch discharge. Head as shown is maximum, will vary 10 feet. Pump to be designed for motor at 1750 RPM at full load.
(Motor to be furnished by Railway Company and shipped to factory for applying to pump base by pump manufacturer.)

Manufacturers to submit bids, giving full details of propositions and guaranteed efficiency. Successful bidder to furnish data sheet showing brake horsepower and efficiency for variations in head and capacity.

Obtain bids from:
DeLaval Steam Turbine Co.,
L. C. Smith Bldg., Seattle, Wash.
Goulds Mfg. Co.,
Geo. M. Kenyon Co., St.Paul, Minn., Agents.
Fairbanks Morse Co.
Worthington Pump Co.
Alan Cary, St.Paul

Bids to be sent to Engineering Department for recommendations.

2. 1 Motor for above pump, N.P. Mechanical Dept. Specifications, (25 HP Westinghouse or equivalent, 1750 RPM under load, A.C. current, 3 phase, 60 cycle, 220 volt.)

Delivery as soon as possible.

Material necessary for use in connection with AFE 396-24 ED 47-24: Auburn Pumping Plant.

Cy HES GFE PM AFS CJF WRA AFE Job File BB

Chief Engineer Asst. Chief Engineer.

ON LINE - November 11th, 1924.

Seattle, Washington.

OFFICE OF CHIEF ENGINEER
NOV 15 1924
RECEIVED

6303

Mr. H. E. Stevens,

Chief Engineer.

I am attaching copy of my wire X-66 which I sent you today about the Auburn wells.

Well No. 2, which is the shallow one, was cleaned out quite thoroughly with air pressure until the water came up quite clear. The well was cleaned out by intermittently blowing out and considerable sand and silt was removed. I believe that we have a first class well and while we did not definitely measure the quantity of water, Mr. Adams - the Inspector, and myself roughly judged that we were getting at least 500 gallons per minute. Even at this rate the water was not lowered in the casing to exceed 18 inches and I am quite sure that we can depend on full 600 gallon supply from this well.

I prepared a requisition today for the pump and motor, copy of which I will send you under separate cover. It was written up in Mr. Cook's office and I assume that he has signed it and sent it forward. I believe that I have given all the data necessary for the manufacturers to figure on it and called for 600 gallons per minute. A No. 5 pump such as this can be fixed to give greater capacity if it is needed later on. I did not care to go beyond 600 gallons per minute on account of the pipe sizes which are limited by the 12 inch casing.

In the meantime we decided to fix up well No. 1 - 96 feet, similar to well No. 2. With a 4 inch drop pipe and Cook screen they were unable to get an adequate supply, and tomorrow we will pull out this 4 inch pipe and fix up this well similar to what we did on well No. 2. As this well is sunk to a lower stratum I cannot predict that

we will get as good results as we had from well No. 2, but I feel quite sure that with the large slotted pipe we will be able to get 500 or 600 gallons per minute and thus have two independent wells of ample capacity to supply the proposed pump. Such an installation should assure us an uninterrupted supply and will enable any necessary cleaning out work or renewal of foot valves, etc., to be done on either well without running short of water.

I agree with the conclusion reached in your letter of the 6th that one 12 inch well should supply all the water we need at Auburn but I think it is worth the additional expense to have such good insurance as a second well would give and as long as we have spent all the money that we have on the 96 foot well we should spend a few additional dollars [redacted] and be certain of an adequate supply.

Mr. Cook's draftsman is redesigning the pumping layout so as to bring the pump down to a lower level and avoid excessive suction lift. We will also enlarge the pump well as I believe the original size is a little too small to house the machinery.

As soon as the new plant is completed a bill of material will be drawn off for the piping and separate requisition submitted to cover. The 4 inch piping originally ordered for suction lines is too small. However, that material can always be used to good advantage on the railway.

Bernard Blum
Engr. Mtce. of Way.

BB-O encl.

FORM 1386

Telegram—Be Brief

Time Filed

M.

Seattle Nov 11 1924

H E Stevens
StPaul

Completed cleaning out well No. 2 with air getting clean water and large supply without lowering the water. Will put in slotted pipe for well No. 1 tomorrow. Making tests on both wells later on Agreed on changes in plan of layout and draftsman making new design Believe with slotted pipe in well No. 1 will have two good independent supplies Made requisition today for pump and motor Will try to leave here tomorrow or Thursday X-66

B Blum

Re: Water station at
Auburn, Wash.

6303

Seattle, Wash.,
November 11, 1924.

1003-18

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

Dear Sir:-

I am enclosing to you herewith my Reqn. No. 196 for one Centrifugal Pump and motor for the Auburn water station, made up as per form submitted by Mr. Blum.

I trust that Mr. Herbert, Seattle Agent of the De Laval Steam Turbine Company, may be given an opportunity to bid on this installation, pump and motor complete, installed and connected up in place. I also understand that Mr. Herbert will give service for a reasonable length of time following the installation of the pump and its operation, the Railway Company to provide the foundation, pipe and fittings.

Yours truly,

A. R. Cook

ARC:L
Encl.

FORM 1386

Telegram—Be Brief

Time Filed

M.

13cfq

6303

Seattle Nov 10 24

H E Stevens

Stpaul

Have put in slotted pipe well number two 76 feet deep and blowing out today with air considerable fine material cleaned out and getting possibly 500 gallons per minute water lowers foot and half expect to start testing with large centrifugal pump tomorrow evidently a first class supply will do the same to well number one X 65 -

B Blum

1245a 11

St. Paul, Minn., Nov. 10, 1924.

Mr. C. C. Kyle:

Referring to Cook well strainer on ED-918, GSK-13787:

This was shipped by freight from Lawrenceberg, Ind., and upon its arrival at St. Paul I had it forwarded by express. Assistant Chief Engineer Cook now advises that the well strainer was received, but that the companion flange ordered on the same requisition has not been received. Possibly this was overlooked when the strainer was expressed from St. Paul, however, I wish you would ascertain if the companion flange with bolts and nuts was actually shipped from the factory, for if not, we should either receive credit for the flange or have same shipped without further charge.

Chief Engineer.

WEG:wp

FORM 1386

Telegram—Be Brief

Time Filed

M.

164 of an

6303

Seattle Nov 6 1924

H E Stevens

ST PAUL

S-12 Casing pulled four inch screen and suction installed at Auburn, pumped yesterday afternoon more water than in first well, have turned well over to Mr Blum

L-12.

A R Cook

140PM

FORM 1366

Telegram—Be Brief

Time Filed

M.

St Paul November 6 1924

Bernard Blum

Car 1529

Seattle

Your letter 30th about Auburn well I have instructed Mr. Cook not to pull casing but to slot and carry out balance of your instructions. Wish you would remain in Seattle and see that this work is done properly and well thoroughly tested. Am writing. S-13

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

St Paul November 6 1934

A R Cook

Seattle

Do not pull casings or install four inch screen in second well at Auburn. Slot casing at water bearing strata, clean out well and test as recommended by Mr. Blum. Mr. Blum will remain in Seattle to assist in carrying out the plan recommended. S-12

H E Stevens

Saint Paul, November 6, 1924.

6303

Mr. A. R. Cook:

I am attaching copy of letter to Mr. Blum about the Auburn wells.

This matter has been in our hands since early last March and we have not yet gotten an adequate supply of water. I therefore requested Mr. Blum to give the matter special attention on his arrival at Seattle, and he has written me a full report of the status which indicates the conditions are more unsatisfactory than I had supposed.

I do not understand why the two 12" wells should have been placed but 39' apart, or why the 12" casing was pulled instead of slotting it. If 4" pipe is used all the way to the surface of the ground we might as well have drilled a 4" hole and saved a lot of money. The results you have obtained on the first well indicate the plan you tried out is not satisfactory, and therefore I want you to try the plan suggested by Mr. Blum for the second well.

He will remain in Seattle long enough to get the matter lined up and the well tested; and will also assist you in planning and ordering equipment.

Please see that his instructions are carried out.

Chief Engineer.

HES-ar

cc-Mr. Bernard Blum

6303

Saint Paul, November 6, 1934.

Mr. Bernard Blum: (On Line)

Your letter of October 30 about well at Auburn.

There has been a great deal of discussion about this matter, and early last summer I turned it over to Mr. Bratager to handle. Personally I was not aware that Mr. Cook contemplated using 4" pipe the entire length of the well. Certainly this should not have been done and I have today wired him to slot the 13" casing and try out the plan recommended in your letter.

I wish you would remain in Seattle in order to supervise the work and see that such changes in plans as are found necessary to meet the conditions are made as the work proceeds.

I had rather expected from the results obtained by the City in their well that one 13" well would be sufficient for our requirements; in fact, sometime ago I asked Mr. Cook to check the matter up again before starting this second well. It seems to me one 13" well properly constructed ought to supply all the water we need at Auburn.

We will put in the centrifugal pump as you recommend, and while you are waiting for the well to be completed I wish you would work out with Mr. Cook the detailed design for this installation and make the requisition for the equipment.

Chief Engineer.

HES-ar

cc-Mr. A. R. Cook.

Seattle, Washington,
November 5th, 1924.

6303

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

Dear Sir:

I am today passing along with ARC Entry S-177, Invoice of A.D.Cook, dated October 16th,1924 GSK Inv. # 32191, covering Cook's strainer and companion flange ordered on ARC Requ # 164.

You will note I have taken the full amount of the invoice, $62.36 into account and charged same to AFE 396-24, however the companion flange with necessary bolts and nuts has not been received to date.

This material, I understand was shipped by freight from Lawrenceberg, Ind., and as it was very urgent that we receive the strainer for the purpose of testing the second well at Auburn, the strainer was forwarded from St.Paul by express, and evidently the companion flange was overlooked when the strainer was shipped from St.Paul, however I wish you would please ascertain if the companion flange with bolts and nuts was actually shipped from the factory, for if not, we should either receive credit for the flange or have same shipped without further charge.

The invoice has been taken into October accounts, since the strainer has been received and used.

Yours truly

A. R. Cook

Cy: CJF

ANB

Re: Well at Auburn,Wn. 6303

Seattle, Wash.,
October 31, 1924.

1003-18

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

Dear Sir:-

The 4-inch Cook brass well strainer, my requisition 164 of September 26, 1924, received this morning. The companion flange specified in the requisition was not attached to the strainer and has not been received. We are purchasing one locally.

Yours truly,
R. P. Cook

ARC:L

ON LINE - Seattle, October 30th. 1924.

OFFICE OF ENGINEER NOV 4 1924 NORTHERN PACIFIC RY.

6303

Mr. H. E. Stevens,

Chief Engineer.

Referring to your telegram of the 21st, S-24, relative to new drilled wells for Auburn water station:

We looked over the situation Tuesday afternoon with Mr. Stotler and the Foreman of Water Service. Later I discussed the wells with Assistant Engineer Adams who has had charge of the inspection work on these two wells. The situation is as follows:

Two wells have been drilled both of which are 12" in diameter and are located 39 feet apart. No. 1 well, furtherest from the main line, is drilled 96 feet below surface of the ground. A water bearing stratum was encountered at a depth of 65 to 79 feet and from a stratum 91 to 96 feet below ground. Between elevations 79 and 91 feet below ground there was some water encountered but more or less clay in the gravel and the gravel had a reddish tinge. The water bearing strata contains a fairly coarse clean looking gravel according to the sample collected by Mr. Adams. There is some fine sand in the gravel but I think that will clear up with pumping.

Well No. 2 which is nearest to the roundhouse was drilled 76½ feet or to the bottom of the upper water bearing stratum in well No. 1. The surface of the ground is a little higher than well No. 1 and the water bearing stratum lies from 66 to 76½ feet below the surface of the ground. Water stands in well No. 1, 17 feet 6 inches below the ground surface. The casing has been cut off 13½ feet below the ground surface and a pit has been excavated around the

well to a depth of 15 feet below the surface. A pit has been dug at well No. 2 to a depth of 14 feet below the surface. Casing of well No. 2 has been cut off to about 17 feet below the surface.

Well No. 1 was tested by using a centrifugal pump that had a rated capacity of 500 gallons per minute, but the data is a little questionable as it was an old pump and they did not seem to have definite data on the proper speed for rotating it. However, they set it down in the pit and pumped for about 30 seconds when the suction broke due to the water lowering in the well beyond the suction limit. They then added about 100 gallons of water per minute into the well through a hose from the storage tank and then worked the centrifugal pump drawing out about 400 gallons per minute, or about 300 gallons of water coming from the well itself. After that the well was blown out with air thereby getting rid of considerable sand. They then took a 4-inch ~~Johnson~~ Cook well screen 10 feet long which had been previously ordered and screwed it on the bottom of a 4 inch drop pipe with a foot valve at the top of the screen. This screen and drop pipe were lowered into the 12 inch casing of well No. 1 with the bottom of the screen resting in the bottom of the well. The 12 inch casing was then pulled 9 feet 6 inches thereby allowing the lower 9½ feet of water bearing gravel to cave in against the 4-inch ~~Johnson~~ Cook screen. A further test was then made. The centrifugal pump was applied again, the pump being set 11 feet below the surface of the ground, and the water was lowered to 34 feet below the surface of the ground when the suction broke. The centrifugal pump was 5-inch and it worked about a minute. This was longer than when the well was

tested before pulling back the casing.

I could not understand why they should drill a 12 inch hole and then put in a 4 inch screen on the end of a drop pipe. I asked Mr. Stotler the reason for it and he disclaimed any responsibility. He stated that Mr. Cook had directed that this be done. We were all of the opinion, including one of the well drillers, that with the character of water bearing gravel encountered all that would have been necessary would have been to slot the 12 inch casing at the two water bearing strata. After that the well could be cleaned out with air so as to leave the coarse gravel around the outside of the slots. We believe that this method would give ample water supply and undoubtedly would supply a 500 or 600 gallon per minute pump similar to what the city are getting from their well.

Well No. 2 was tested with the same pump as well No. 1, with the casing at the bottom of the well. No definite measure of capacity was made but it was the opinion of the well driller's foreman and of Mr. Adams that this well has a little better capacity than well No. 1. They have been waiting for the arrival of the second Cook screen which is ordered 4 inch in diameter, 10 feet long. This screen is coming by express and was to arrive today and be installed similar to well No. 1.

I am attaching a pencil sketch showing how the present layout of well No1 and how well No. 2 will be finished.

Yesterday I discussed the situation with Mr. Cook so as to try and find out why he should have drilled a 12 inch well and

finished it up as a 4 inch well. Mr. Cook's position is that he wanted a 10 inch casing so as to be able to get a 4 inch foot valve into the well and that he figured that a 4 inch pipe with a 4 inch screen on the bottom would get all the underground water there was available. He maintained that this size screen with the coarse gravel would permit just as much water to get into the pipe as a larger diameter screen would. He maintained that 4 inch suction pipe to the pump would give them all the water that they wanted and therefore it would be unnecessary to use anything larger than a 4 inch screen. It seems to us that such a position is untenable. We all know that the larger the drilled well the greater the supply. Mr. Cook's position assumes that the water will pass through the surrounding gravel and into the 4 inch pipe as fast as the pump elevates it whether the pump is operating at 100 gallons per minute or 500 gallons per minute. Our position is that we have spent the money for drilling two 12 inch wells and we should develop the full capacity of two such holes. It is certain that with the layout as now planned we have nothing but two 4 inch holes. It is probably a matter of judgment whether a Cook screen should be used or the casing slotted. Mr. Cook stated that he is opposed to slotting the casing as it weakens it and might cause trouble in pulling the casing later on and he figures that a brass screen will last forever. We do know however, that brass screens do fail due to corrosion. We are willing to go along with a Cook screen but hardly feel that it is necessary to incur the expense involved. However, if a screen is used it should be a 12 inch screen and should be at least 10 feet long. The No. 50 slot would appear to be all right. Well

No. 1 will never develop the water available in the stratum 65 to 79 feet unless the casing is slotted. I discussed the matter further with Mr. Cook today but he will not change his views. Mr. Stotler informs me that the well driller has not a slotting machine but can get one from Tacoma. Mr. Stotler agreed with us that the full 12 inch well should be utilized and the pipe slotted. It seems to us entirely wrong to leave the wells as Mr. Cook plans, but we are unable to remedy the matter.

In regard to the pumping machinery. As you know, I have been rather partial to the use of triplex pumps over centrifugal pump installations. A triplex pumps has admittedly greater efficiency than the centrifugal pump for such service as this. I discussed this with two local pump salesmen who sell centrifugal pumps and they admitted the advantages of the triplex pump which include better suction lift, no loss in efficiency with change of head, etc., but felt that for this installation we could hardly justify paying about $2000.00 additional for a triplex pump. We have figured up the annual costs including interest, depreciation and power consumption. The saving in current with the triplex pump just about pays the interest on the additional cost of a triplex pump so that we are probably not justified in investing the additional money in the heavy pump as we cannot show a net saving in spending the additional money. I am willing therefore to go along with their recommendation for a centrifugal pump installation. This situation seems to be well adapted for a centrifugal pump. It will require a smaller pit than for a large triplex pump. An automatic electric control can be installed which will start up the pump and turn it off automatically.

A centrifugal pump is better adapted for automatic starting as a squirrel cage motor can be used without any danger of burning out the motor and no bypass is required. The supply can therefore be maintained automatically and on account of the proximity to the power house the necessary attention can be given to the machinery by the plant engineer. On account of lack of ice difficulties at Auburn there seems to be no reason at all why an automatic float switch cannot be used successfully. There is some question as to how far the water will lower with the pump working at 500 gallons per minute, but if both wells are completed properly and connected with the suction of the pump, I believe that they will give an ample supply and the water will not lower more than 15 feet. The centrifugal pump should therefore be ordered with a total lift of about 86 or 87 feet direct connected to a squirrel cage motor. The pump should be single stage, double suction. I think it would be advisable to have a 6 inch pump with 6 inch suction and 6 inch discharge although a 5 inch pump can be obtained to give the required capacity. I would like to see a capacity of 600 gallons per minute for a terminal the size of Auburn. This would require full 20 horsepower and it would probably be best to use a 25 horsepower motor so as to be sure of having enough power in case the suction lift increased and to take care of any decrease in efficiency of the layout. We believe that there should be installed 6 inch drop pipes into the wells with foot valves placed about 30 feet below the pit floor. This on the assumption that the wells are finished up as recommended above. By connecting up the suction of the pump with both wells by means of 6 inch drop pipes, there would be an ample

supply and a minimum amount of friction loss. The bottom of the pump pit should be placed about 16 feet below the ground surface.

It is our opinion that after the casing is slotted or 12 inch screens are placed that the wells should be thoroughly cleaned out by air pressure thereby getting rid of the fine sand as quickly as possible. The city found by experience that this was necessary and after the wells were air cleaned no further trouble was experienced.

It seems desirable that you give this matter your careful consideration and decide on the scheme that should be carried out. Mr. Stotler has just informed me that the well driller is going ahead and install the 4 inch screen in well No. 2 similar to the well No. 1 installation.

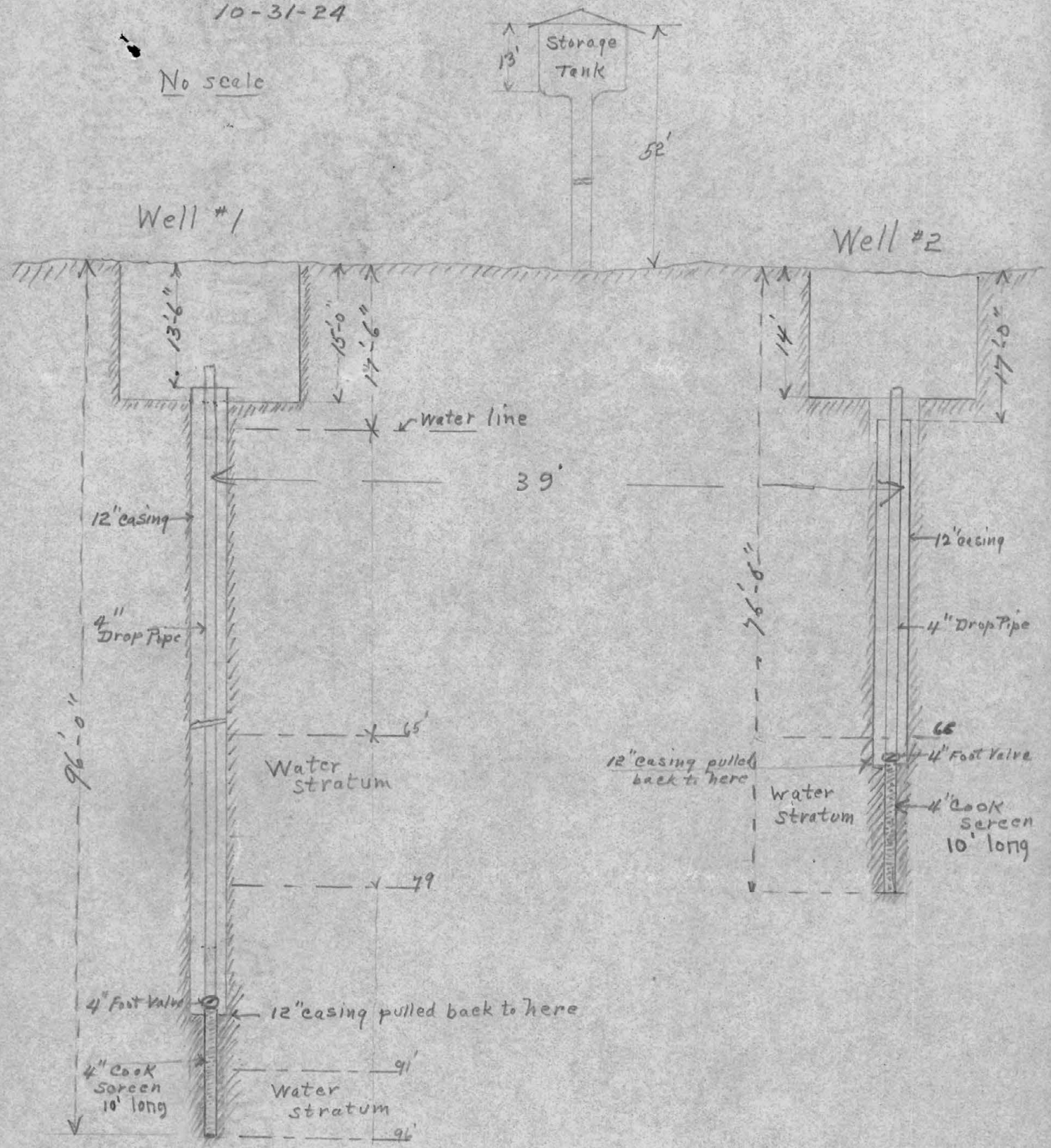
Edward Blum
Engr. Mtce. of Way.

BB-O

Auburn Wells

10-31-24

No scale



FORM 1386

Telegram—Be Brief

Time Filed

M.

St. Paul, Minn., Oct. 27, 1924.

6303

A. R. Cook

Seattle, Wash.

L-25 Cook strainer from St. Paul by express today M-11

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

St. Paul, Minn., Oct. 23, 1924.

A R Cook

Seattle Wash

L-25 Freight shipment not yet past St. Paul will try to intercept and express. M-9

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

10[illegible] cf an

Seattle Oct 22 1924 H E Stevens

ST PAUL

M-6 strainer not received as yet advise how shipped and have traced L-25.

A R Cook

149PM

By freight CB&Q —
1 4 1/4" Cook well screen 10' long =
Not passed St Paul 10/23 — Mr Traveler will
intercept — after car located [illegible] 10/23

S-1014

6303

Mr.H.E.Stevens:-

Referring to your letter of Oct.11th, regarding Cook's well strainer on ED-918, GSK-13787.

The A.D.Cook Inc., shipped the above mentioned material due on GSK-13797 Oct.16th.

C.C.K.

10/21/24

L.

FORM 1386

Telegram—Be Brief

Time Filed

M.

COPY

St. Paul October 21 1924

Bernard Blum
Care Car 1629
Spokane

Have wired Cook that you would call on him for any assistance you may need Think you had better have Stotler accompany you over the more important points on Seattle and Tacoma Divisions Please make special report on new wells at Auburn recommending type of equipment which should be installed. S-24

H E Stevens

FORM 1386

NORTHERN PACIFIC YELLOWSTONE PARK LINE

Telegram—Be Brief

Time Filed

M.

551 cf x

6303

Seattle Oct 17 1924

HEStevens

StPaul

Please send me plan for installing triplex pumps Auburn water station or send me data from which I can make up plan understand from your letter June 13th that you will not permit use of centrifugal pumps first designed L-22

158p

ARCook

Memo.
Plan made by Mr. Cook
provides for centrifugal pumps
to handle 600 gal pr. minute o.k.
12/3- AMR

AMR
Received
10/18

FORM 1386

Telegram—Be Brief

Time Filed

M.

6303

St. Paul, Minn., Oct. 17, 1924

A R Cook

Seattle, Wash

L-21 Well strainer was shipped from Lawrenceburg, Indiana October 16th. M-6

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

16cfq

Seattle Oct 15 24

H E Stevens

Stpaul

If Cook well Strainer for Auburn not already shipped please forward by express as soon as possible am awaiting its arrival for combined test of the two wells L-21

A R Cook

1245a 16

Had Purch. Dept wire to express. 10/16

but they found it was shipped by freight 10/16 — 10/17

PRINCETON
OCT
19

S- 1014

Mr. R. J. Elliott:

Kindly hurry all possible Cook's well strainer due on GSK- 13787, advising promptly when shipment goes forward.

C.C.K.

10-13-24

k

cy H.E.Stevens: Refers to your letter Oct. 11th

Saint Paul, October 11th, 1924.

Mr. C. C. Kyle,
General Storekeeper

Dear Sir-

Will you please hurry Cook's well strainer on ED-918, CSK-13787, advising when shipment may be expected.

Yours truly,

Chief Engineer.

REG-h

cc Mr. R.J. Elliott

6307-

Saint Paul, October 11th, 1924.

Mr. A. R. Cook,
Asst. Chief Engineer

Dear Sir-

Referring to your letter of August 18th in regard to water used by the Great Northern at Auburn; in which you ask certain information for the purpose of basing a fixed charge for the water that the Great Northern is using:

This matter appears to have been settled by interchange of letters between Mr. Rapelje and Mr. Jenks. I enclose copy of Mr. Rapelje's letter of June 12th and Mr. Jenks reply of August 28th.

Yours truly,

Chief Engineer.

REG-h
encl

Saint Paul, October 10, 1924.

6303

Mr. A. R. Cook:

Your report of the 7th about progress in the construction of Auburn pump plant.

I note you were unable to get a satisfactory test with the centrifugal pump, but you fail to give any data as to what results were obtained, or what the situation is at present in connection with the drilling of this well.

Will you please make special report on this item.

file

Chief Engineer.

HES-ar

FORM 1386

Telegram—Be Brief

Time Filed

M.

18cfq

Seattle oct 10 1924 H E Stevens

Stp aul

Hurry cooks well strainer my reqn 164 advise W 4

A R Cook

1241a 11

SD. 718

GRK 13787

OFFICE OF
CHIEF
OCT

Mr. Gemmell:

According to Mr. Stout records the water station at Auburn cost $27137.00

The amount of A T & for new pumping plant is $9032.00

It would seem that it is not necessary to devote any time to investigating this matter further at this time, as under date of June 12, 1924, Mr. Rapelje suggested to the Great Northern that a charge of 25 cents a trunk be made, and Mr. Jarke accepted under date of Aug 28, 1924.

H. A. Cobbs 10/9/24

Mr Gibbs — I did not have chance to look this up. Will you please do so.

N. S. L. 8/23

Saint Paul, October 9th, 1924.

6303

Mr. A. R. Cook,
Asst. Chief Engineer

Dear Sir-

Referring to your voucher ARC-S-81 in favor of E.F. Lawson for well at Auburn:

I have revised the voucher work order and extra bill and Form 1924 as per copies enclosed, and return the copies which accompanied your voucher.

Your work order you will note is a general order to "Furnish such material as directed" and is not such an order in writing for extra work as is contemplated by the contract. It would require to be supplemented by another order in writing to cover what was actually directed to be furnished and so is unnecessary and ineffective.

Blanket work orders should not be issued. Such orders should specify exactly the work to be done or material to be furnished.

Yours truly,

Chief Engineer.

FORM 1366

Telegram—Be Brief

Time Filed

M.

6303

221 cf an

Seattle Oct 1/24

H E Stevens

STPAUL

S 73 In order to Obtain necessary amount of water will have to have another well, installing strainer pulling casing and will make final test tomorrow Put in this requisition so there would not be any further delay awaiting arrival of material Think strainer with slots as ordered will be satisfactory L-1.

A R Cook

256PM

REB
Oct 6 [illegible]

FORM 1386

Telegram—Be Brief

Time Filed

M.

St Paul September 30 1924

A R Cook

Seattle

X 164

Your requisition for additional well strainer Auburn. Have you installed and tested out the strainer provided for the first well? If not this should be done as it may be desirable to change the size of slots. Have you determined definitely that second well is necessary? S-73

H E Stevens

Form 821 6303 2-14-24 1M RP

NORTHERN PACIFIC RAILWAY CO.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 29637

St. Paul, Minn., Sept. 25th 1924

To Mr. A. F. Statler, Dist. Engineer,

ANALYSIS OF WATER

Sent in by A. F. Statler Station Auburn, Wash.

Test Request No. Source of Supply Well Driven in Terminal Yard about 1/2 mile S.E. of Station

		Grains Per U. S. Gallon	
Incrusting Solids Producing Scale	Oxides of Silica, Iron, and Aluminum	-	
	Calcium Carbonate	1.66	
	Magnesium Carbonate	0.91	
	Calcium Sulphate	-	
	Magnesium Sulphate	-	
	Calcium Chloride	-	
	Magnesium Chloride	-	
	TOTAL INCRUSTING SOLIDS		2.57
Non-Incrusting Solids Producing Foaming	Alkali Carbonates	0.16	
	Alkali Sulphates	1.02	
	Alkali Chlorides	0.19	
	Alkali Nitrates	Trace	
	TOTAL NON-INCRUSTING SOLIDS		1.37
	TOTAL MINERAL SOLIDS		3.94

REMARKS:

Incrusting Rating - Good
Foaming Rating - Good

DW(1)

CC--HES(3)

H. G. BURNHAM.

Engineer of Tests.

FORM 1386

Telegram—Be Brief

Time Filed

M.

St. Paul, Minn., Sept. 25, 1924. 6303

A R Cook

Seattle, Wash

W-12 Expressed from St. Paul this morning M-45

H E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

6303

8-161

107c

Seattle Sept 24 1924 H E Stevensm

Stpaul

Your wire 1.8 11

Accelerate re Cook Strainer for Auburn well. Has this been shipped from Lawrenceberg advise W-12

A R Cook

344a 25

G.N.K. 9822

To be Expressed from St Paul this am 9/25

Re: Auburn Well.

Seattle, Wash.,
Sept. 18, 1924.

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

Dear Sir:-

In compliance with your letter of August 22nd regarding samples of strata formation thru which the first well has been driven.

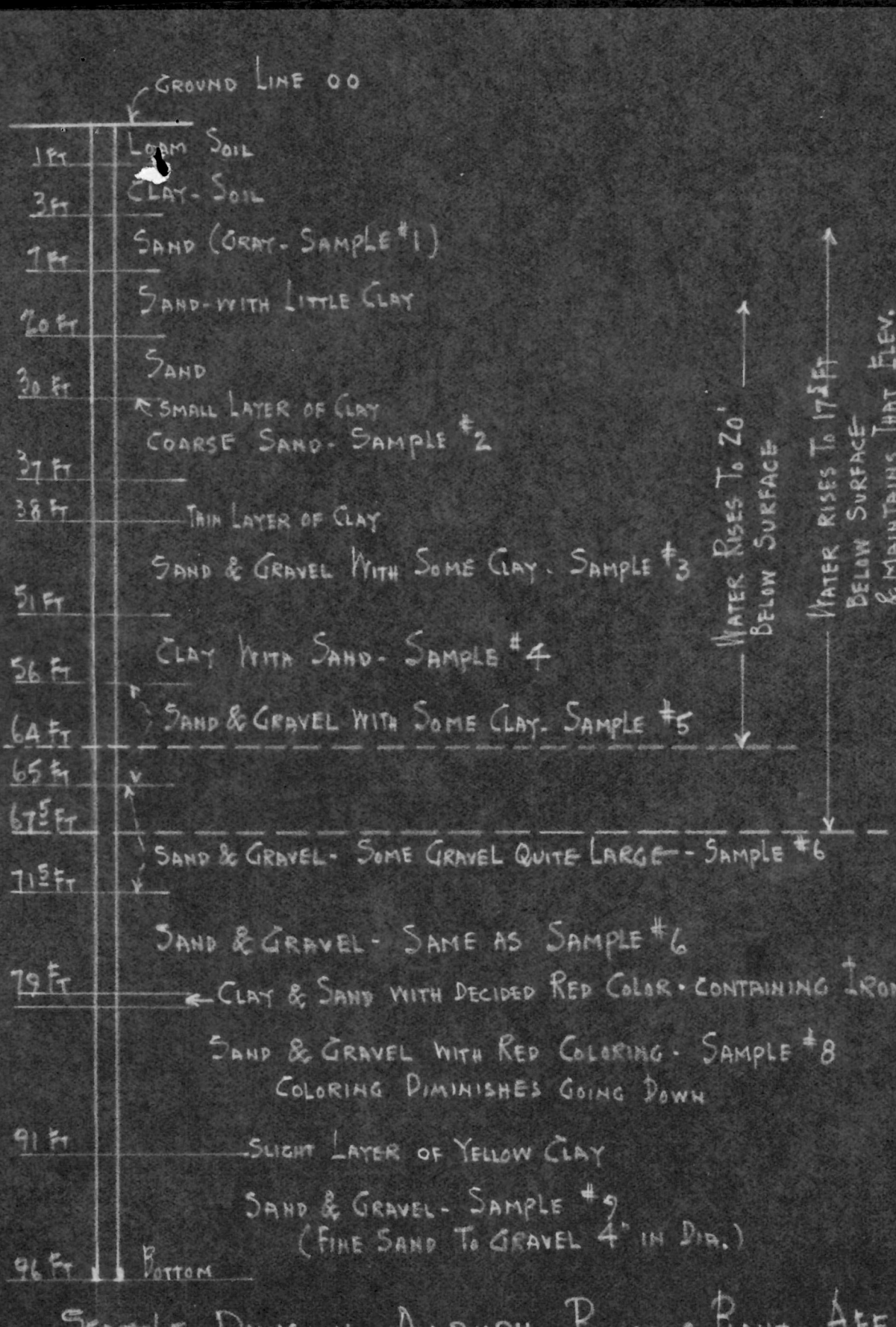
I am sending you today by express, samples of all the formation encountered from 0 to 96 feet. I am also sending you pencil sketch showing more in detail as to conditions.

Yours truly,

A. R. Cook

MJW:C

I have samples
Rec'd



Seattle Division – Auburn - Pumping Plant - AFE 396-24

Material Encountered In Driving Well.

FORM 1386

Telegram—Be Brief

Time Filed

M.

St. Paul, Minn., Sept. 18, 1924

6303

A R Cook

Seattle, Wash

W-8 Strainer has been ordered shipped by express from Lawrenceberg, Indiana. M-39

M E Stevens

FORM 1386

Telegram—Be Brief

Time Filed

M.

18[redacted] cf an

Seattle Sept 17/24 H E Stevens

ST PAUL

My W-3 and L-6 regarding cook Strainer for Auburn Well Advise when and how shipped contractor held up waiting arrival of same

W-8

A R Cook

228PM

St. Paul, Minn., Sept. 15, 1924.

Mr. R. J. Elliott:

Referring to well strainer fittings on GSK-9822, I advised Mr. Kyle September 12th the kind of strainer to be furnished, and I understand he has written to you today giving that information.

Will you please arrange to have the screen and fittings rushed by express as we are holding the well driller at Auburn, waiting arrival of screen for final test of the well.

Please advise from what point shipment will be made.

Chief Engineer.

REG:wp

Lawrence & Mc

FORM 1386

Telegram—Be Brief

Time Filed

M.

86 [illegible] an

Seattle Sept 13/24 6303 H E Stevens

ST PAUL

My telegram W-3 cook strainer for Auburn well Please rush Screen and fittings by express Am holding well driller waiting arrival of screen for final test L-6

A R Cook

130PM

6303

Saint Paul, September 12, 1924.

Mr. C. C. Kyle-

Referring to your letter of August 19th about slots to be furnished in brass tube well strainer, GSK-9822, Auburn:

We have just obtained samples of the material in the water bearing stratum and find we will require "slot No. 50" as the proper size opening.

Kindly hurry delivery all possible.

Chief Engineer.

SJB-h

FORM 1386

Telegram—Be Brief

Time Filed

M.

130 \f an

Seattle Sept 12 1924 H E Stevens

ST PAUL

ED 674 CSK 9822

See your letter August 22 and My reqn. No ONE HUNDRED SIX dated July tenth CSK Ninety eight twenty two re Cook Well Strainer for Auburn Well From samples obtained have decided on Slot number fifty as propoer size opening Please hurry delivery

A R Cook

215

6303

Saint Paul, August 22, 1924.

Mr. A. R. Cook:

Herewith copy of A. D. Cook's Strainer bulletin No. 30-E, on page four of which you will note various slot openings for Cook screens.

The proper size of slot depends upon the character of material in which the screen will be placed, and this cannot be determined until the well has been drilled.

I note from your last weekly report that drilling will be started this week. Will you please secure samples of sand and gravel from the water bearing stratum, examine same, and also forward samples to me together with your recommendations as to size of slot which should be used.

I suggest you correct the description of well as carried in your weekly report.

Chief Engineer.

HES-ar

Encl.

Saint Paul, August 22, 1924.

Mr. C. C. Kyle:

Your letter of the 19th about size of slot to be furnished in brass tube well strainer, GSK-9823, Auburn.

The proper size of slot cannot be determined until we have obtained samples from the water bearing stratum of the well as drilled.

Drilling of the well was commenced this week and I hope to be able to give you this information in about ten days.

Chief Engineer.

HES-ar

Saint Paul, August 21st, 1924.

OFFICE OF CHIEF ENGR. AUG 22 1924 NOR. PAC. RY. ST. PAUL

Mr. H. E. Stevens,

Chief Engineer.

In regard to attached from Mr. Kyle about size of slot openings for Cook screens for the Auburn wells:

The size of slots shown on the last page of the catalog depends on the size of sand and gravel through which the water comes. I would suggest that you wire Mr. A. R. Cook to send in samples of the material encountered at the water bearing places and from this we can decide the proper slot number. I would suggest that these samples be sent in for each of the wells.

Bernard Blum
Engr. Mtce. of Way.

BB-O

St.Paul,Minn.,August 19th,1924

GSK- 9822

Mr.H.E.Stevens,

Chief Engineer

Dear Sir:-

Referring to GSK- 9822, your ED- 674, item of Cook's brass tube well strainer. I am enclosing, herewith, copy of A.D.Cook's Strainer bulletin No. 30 E, on page 4 of which you will note is shown the various slot openings, and wish you would kindly advise the size slot preferred for the strainer on the above requisition.

Yours truly,

General Storekeeper

H-o

For Auburn.

Re:Water used at Auburn
standpipe.

Seattle, Wash.,
August 18, 1924.

1003

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

Dear Sir:-

There is a difference of opinion between the local officials of the Northern Pacific Railway and the Great Northern Railway regarding the charges against the Great Northern for water used by the latter Company from our standpipe at Auburn, Wash.

The General Superintendent has asked me to make up an estimate of the probable cost or value of the Auburn water supply, for data on which to base a fixed charge against the Great Northern for the water which it is using.

There is nothing in our files showing the cost of the station, even the cost of the pipe line leading from the pipe to the standpipe. It does not seem to me that an estimate would be a proper basis on which to fix a charge for the water, that such a unit should be more substantial than a mere estimate.

If the data is available in your files, will you please send it to me at your earliest convenience.

Yours truly,

A. R. Cook

ARC:L

6303

Saint Paul, August 6th, 1924.

Mr. R. H. Relf,
Assistant Secretary

Dear Sir-

Herewith executed contract dated the 11th of July 1924 with E. F. Lawson for drilling well at Auburn, together with Mr. Donnelly's letter of August 1st authorizing me to execute. The amount involved is approximately $2000.00. No bond has been required.

Yours truly,

Chief Engineer.

REG-gh
encl

Saint Paul, August 6th, 1924.

Mr. A. R. Cook,
Asst. Chief Engineer

Dear Sir-

Herewith for delivery copy of contract with E.F. Lawson dated July 11, 1924 covering drilling well at Auburn.

Yours truly,

Chief Engineer.

REG-h
encl

Saint Paul, August 4, 1924.

File 1227.

OFFICE CHIEF ENGR. AUG 5 1924 NOR. PAC. RY. ST. PAUL, MINN.

Mr. H. E. Stevens:

Referring to your letter of July 29th and previous correspondence, in regard to drilling well at Auburn:

I am handing you herewith contract between the Northern Pacific Railway and E. F. Lawson, covering the drilling of this well at an estimated cost of $2000.00. Mr. Donnelly's letter next attached authorized its execution by you, Mr. Donnelly's letter to be filed with Mr. Relf.

J M Rapelje

Copy - Mr. R. H. Relf.

RES
Countersigned & forwarded
11/B
8/6

6203

Saint Paul, July 29, 1924.

Mr. J. M. Rapelje:

Your inquiry of the 22nd about contract with Mr. Lawson for drilling well at Auburn.

Subsequent to sending out request for bids, Mr. Cook ascertained that neither Mr. Peterson nor Mr. Salter were entirely satisfactory as contractors. I had the matter up with Mr. Cook before awarding contract, and on receipt of your inquiry I asked him to furnish complete details, which he has done as per copy of his letter of the 26th, next attached.

The small difference in bids does not justify taking chances in awarding contract to a party not thoroughly reliable.

ChiefEngineer.

HES-ar

Encl.

Re: Well at Auburn,
Wash.

OFFICE OF CHIEF ENGINEER
JUL 29 1924
NORTHERN PACIFIC RY.
ST. PAUL, MINN.

Seattle, Wash.,
July 26, 1924.

1003-18

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

Dear Sir:-

Acknowledging your telegram of July 25 in re contract for the Auburn well or wells.

My reasons for recommending Mr. Lawson are as follows:

I had heard that Mr. Peterson was liable to lay down on the job if he got into difficulties. Furthermore, he was loath to bid in the first instance and had I known his reputation before I finally persuaded him to bid, I would not have used any such endeavor.

Mr. Salter, whose bid was the same as that submitted by Mr. Lawson, I thought did not act just right with the City of Auburn, in the matter of the last well which he drove for that municipality. In drilling this well, he struck a log and endeavored to go thru it, had trouble with the casing and finally wound up with a smaller well, after discontinuing work for some time, pending an arrangement with the City. It seemed to me that he should have moved and started the well at some adjacent point, which is the usual practice.

Referring to Mr. Lawson, I have known him a great many years and know him to be a man of experience in drilling, both for water and for prospecting purposes, and I have never known him to welch on a contract or an agreement and venture to say that he will not on this particular contract. It is up to him to excavate the well in size and depth covered by the agreement, at the prices named in the contract. If he meets with difficulties, it is his misfortune.

Referring to the matter of bond for Mr. Lawson, in making up his bid he did not take into account the

giving of a bond as he never had done so, but said that if we wanted him to furnish a bond for such a small job, we would have to pay for it. Knowing Mr. Lawson's reputation I did not insist on the bond. It is my opinion that we have not made a mistake in awarding the work to Mr. Lawson.

Referring to the time of starting the work. During the interval between the submission of the bid and the awarding of the contract, Mr. Lawson had taken a contract with the Frye Packing Company to drill a well for that Company on the tideflats at Seattle and advised when he signed the contract that he could not start work until he had finished the Frye Company well, unless he was successful in buying another outfit, which he was endeavoring to purchase from some party in Eastern Washington. He expected, however, that he would be able to start the Auburn well on or before August 1.

Yours truly,

A. R. Cook

ARC:L

FORM 1386

Telegram—Be Brief

Time Filed

M.

6203

St Paul July 25 1924

A R Cook

Seattle

Further inquiry has been made as to why Auburn well was awarded to Lawson when he was not low bidder Please give me full explanation S-24

H E Stevens

Saint Paul, July 22nd, 1924-b

File 1227

Mr. H. E. Stevens:

Referring to your letter of July 18th, enclosing proposed contract with E. F. Lawson for drilling a well at Auburn:

In this connection it is noted that the bid of Wm. E. Peterson was $8 per lineal foot, whereas the quotation of the other two bidders was $8.50 per foot. It is also noted that the charge for pulling casing, installing pump, etc. is quoted by Mr. Peterson at $25 per eight-hour day, whereas the other bidders quoted $5 per hour.

Before submitting this contract to Mr. Donnelly for approval, I would like to have a little more information with reference to the reason for not assigning the work to Mr. Peterson, in view of the fact that he was asked to bid and submitted the lowest of the bids received.

Will you please advise?

J M Rapelje

OFFICE OF
CHIEF ENGINEER
JUL
23
192[illegible]
NOR[illegible]
ST. P[illegible]

6303

Saint Paul, July 18, 1924.

Mr. J. M. Rapelje:

Herewith for execution on the part of the Railway Company, contraqt between the Northern Pacific and E. F. Lawson covering drilling well at Auburn.

Bids received for this work compared as follows:

	For all labor, material and equipment for drilling wells, per lineal foot	Pulling casing, installing pump, testing, etc.,
Wm. E. Petersen	$8.00	$35.00 per 8 hour day
J. W. Salter	8.50	5.00 per hour
C. F. Lawson	8.50	5.00 per hour

Our present information indicates that one 12" well 100' deep will be sufficient. On the basis of Mr. Lawson's bid, this will cost about $2,000. AFE estimate is on the basis of four 6" wells, estimated cost $3450.

There is but little difference in the quotations made by the three bidders, and Mr. Cook recommended acceptance of Mr. Lawson's bid, advising that he was thoroughly reliable and exceptionally well equipped to handle the work to the best advantage.

Chief Engineer.

HES-ar

Encl.

Re: Drilling wells at Auburn

OFFICE OF CHIEF ENGINEER JUL 18 1924 NOR. PAC. RY. ST. PAUL

Seattle, Wash.,
July 15, 1924.

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

Dear Sir:-

I enclose herewith in duplicate form of contract dated July 11th, 1924 with E. F. Lawson for drilling wells at Terminal Yard, Auburn, which was awarded in compliance with your telegram S-20 of June 13th.

Will you please have contract executed on the part of the Railway Company and return one copy for use of the Contractor.

I am encloseing an additional copy of the contract for your files.

As Mr. Lawson is a reliable contractor no Bond will be required in connection with this work.

Yours truly,

A. R. Dean

MJW:C
encl.

6383

Saint Paul, July 7th, 1924.

Mr. A. R. Cook-

This is to confirm my wire of even date about Auburn well, reading as follows:

> "In view of data given in your letter June 21st about Auburn well think your location near water tank about right. Pumping machinery will depend upon actual water levels obtained by tests after well is down and pumping carried out a sufficient length of time to determine same. Upon receipt of this information subject should be checked up further. Assume you have necessary equipment for test pumping."

When the well has been thoroughly tested, please advise what the water level will be with reference to the ground line when pumping to maximum capacity so we may determine upon proper pumping machinery.

Chief Engineer.

SJB-h

FORM 1386

Telegram—Be Brief

Time Filed

M.

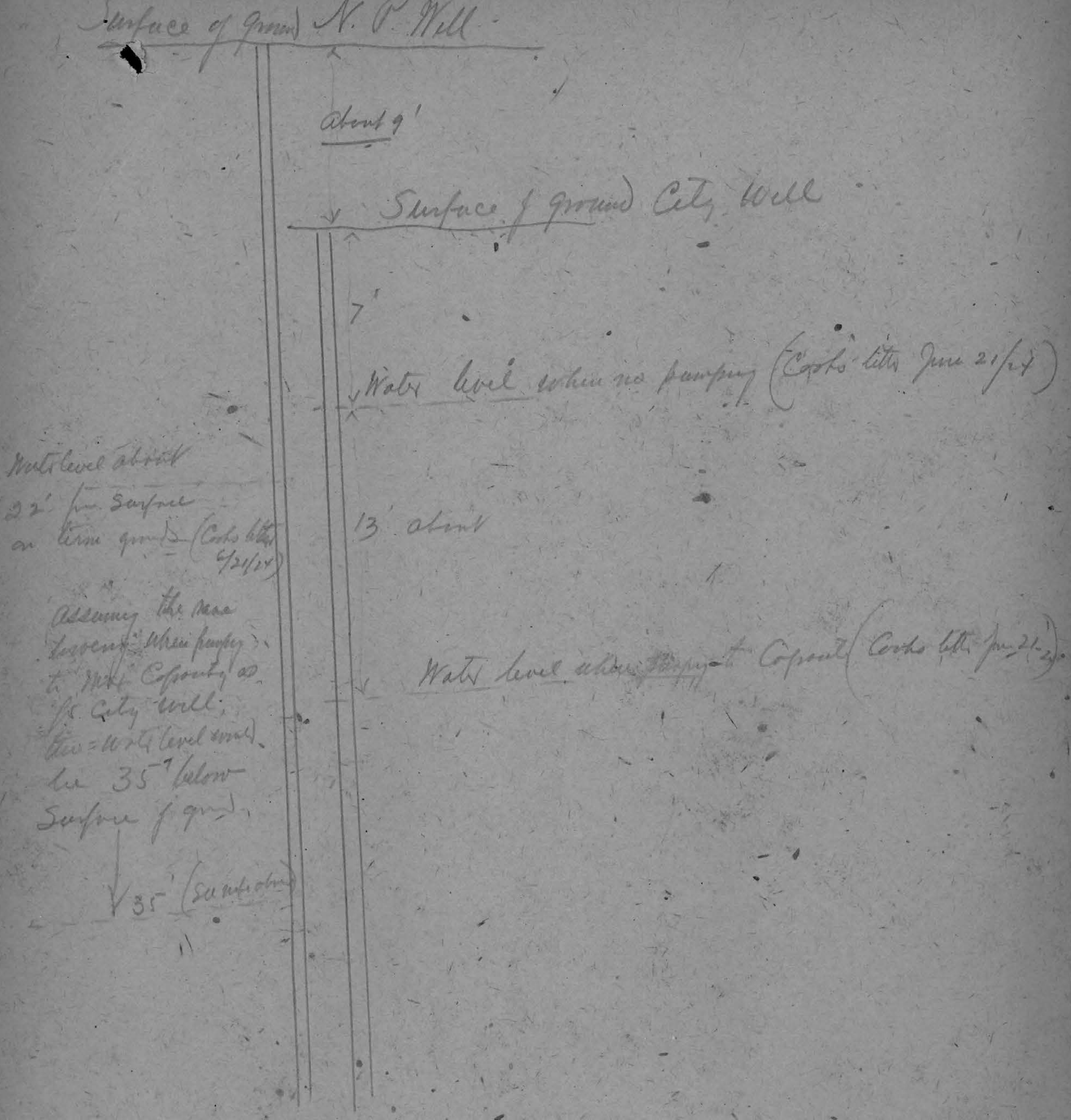
St. Paul, July 7th, 1924.

ARCook- Seattle

In view of data given in your letter June 21 about Auburn well think your location near water tank about right. Pumping machinery will depend upon actual water levels obtained by ~~xxxxxxxx~~ tests after well is down and pumping carried out a sufficient length of time to determine same. Upon receipt of this information subject should be checked up further. Assume you have necessary equipment for test pumping. M-3.

H.E.Stevens.

SJB:H
850a


Surface of ground N. P. Well
about 9'
Surface of ground City Well
7'
Water level when no pumping (Cooks letter June 21/24)
13' about
Water level when pumping to Capacity (Cooks letter June 21-24)
Water level about 22' from Surface on
the ground (Cooks letter 6/21/24)
Assuming the same lowering when pumping to max Capacity as for City well; then water level would be 35' below Surface of ground.
35' (sum of above)

Re; Auburn water supply.

6303

Seattle, Wash.,
June 21, 1924.

1003-18

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

Dear Sir:-

Replying to your favors of June 13 and 14, in re well and pump at the Auburn Terminals.

You are starting in this matter just where I started in the first instance, Mr. Stotler taking the suggestion up with the Master Mechanic and Roundhouse Foreman, investigating conditions at the pumphouse and advising that there was not sufficient room in the power house for the additional equipment. At that time I was considering the location of the wells under the large platform at the end of the store building, but on account of probably encountering quicksand before reaching water-bearing gravel, it was thought advisable to keep the wells away from the building. Then on account of there not being sufficient room in the power house for the equipment, the wells and pumphouse were relocated outside of all tracks and away from all buildings, the idea being that the pump would be automatically equipped thru the means of a float in the tank, also under the supervision of the man in charge of the power house, which arrangement was satisfactory to the Foreman and Master Mechanic.

On account of the existence of quicksand below the sub-soil, there is considerable oscillating under traffic and probably it would be a bad idea to have the suction pipe and well located under the track as possibly there would be some difficulty in keeping the suction tight and it would be an inconvenient arrangement providing it was necessary to clean the well out from time to time, and if additional wells were constructed, they could not be grouped economically and to my mind scientifically.

In August 1923 we sent a sample of the water from the City well to Mr. Burnham for analysis. He reported on the water under his report No. 26294, dated Saint Paul, August 24, 1923, with three copies of the report to you. In this report he advises under remarks, that the water should be rated as good boiler supply water, from both scale-forming and foaming standpoints.

Later on we senthim samples of water from the section house well, which is a drive-well, and from a drive-

well put in for the use of terminal employes, Mr. Burnham reporting on the section house well under No. 27257 with three copies to you, and stating, under remarks, that encrusting rating was good and foam rating good but that the water contained 2.33 grains per gallon of alkali nitrates, which was liable to cause corrosive trouble.

He reported on the drive-well for the South End Yard Office under No. 27256, under remarks advising that the water was good under encrusting and foaming rating.

Referring to the fluctuations of the water in the City well. The Superintendent of the Auburn City water supply states that the water at its natural level comes within 7 ft. of the surface of the ground in Auburn Village. The elevation of the ground at the City well is about 9 ft. lower than the ground on the proposed location of the wells on the Terminal grounds. The water would probably stand somewhat higher at the Terminal grounds than at the City but probably not as near the surface as at the City wells, at least our experience with the drive-well indicates that the surface of the water at the Terminal grounds is about 22 ft. from the surface of the ground. On pumping the City wells to the full capacity of the pumps, the water drops to about 20 ft. below the surface of the ground, holding that level, immediately arising to the original level as soon as pumping is stopped.

What do you think of my idea of using a Cook strainer, drawing the casing to the top of the strainer, leaving it free and unconfined in the water-bearing gravel?

On receipt of the blueprints referred to in your letter of June 13, Mr. Stotler made a further investigation of conditions in the power house. I am attaching hereto a copy of his report of June 19, also a copy of his report of June 18, in which analysis of the City water, which he obtained from the Water Supt. at Aubuen, is given. You will note that the analysis which was made by the local representative of the U. S. Department of Health, covers merely its quality as a water for domestic use.

I am returning to you under another cover, two of the blueprints which you sent to me, one a section of the terminal plat, the other a plan of the power house, on which Mr. Stotler has shown in yellow the location of the existing pumps and appurtenances, with notation as to the area which is practically filled with pipes.

Two prints #336-22

I recommended that this work be awarded to Mr. Lawson, as I have known him a great many years and have known him to be a good reliable man, extremely well qualified for the purpose.

ARC:L
Encl.

Yours truly,

A. R. Cook

Seattle, Washington
June 19, 1924

Mr. A. R. Cook
Asst. Chief Engineer
Building

Re: Proposed installation of wells
Auburn Terminals, Seattle, Div.

Dear Sir:

Referring to the Chief Engineer's plan of locating pump in pit of Auburn Power House as outlined red on the print which you handed to me on the 17th inst.

Check of location was made of the equipment in the pit and changes are outlined in yellow on print which I am returning. You will note that the placing of the pump will take up all space. When it is necessary to repair pistons in the fire pump and washout pump there will be one set of pistons in each pump, which is indicated by "X", which cannot be removed. This condition existed at time I made my former investigation and in talking the matter over with Roundhouse Foreman advised that the placing of the pump as proposed would interfer in his opinion with the operation of the plant on account of taking up all space. You will note that there is very little clearance shown beyond the space outlined for the pump.

In regard to locating well in center of track between power house and store house, in taking matter up with Mr. McFee, Roundhouse Foreman, advised that see no objection in that unloading and loading could be done on the opposite side of store house where track parallels platform and leads into machine shop.

Yours truly,

AES/W

District Engineer

Seattle, Washington,
June 18, 1924.

Mr. A. R. Cook,
Asst. Chief Engineer,
Seattle.

Re: Proposed Well Auburn Terminal

Dear Sir:

Herewith data secured from Water Department, Auburn, covering wells drilled:

1st Installation:

2-5" Wells spaced 25' center, depth 75'.
Water raises to 9' of surface of ground. Continuous pumping lowers water 20' or 29' from surface of ground. Water raises instantaneously when pump is shut off. Capacity of two wells 250 gals. per minute.

Test of water by State Board of Health.

Laboratory No.____ Sample Taken_____
Source New wells.
Result B. Coli group 0 - per 100 CC
Total 37° C Bacteria 6 - per CC
" 20° C " 13 - per CC

This water does conform with U.S. Bacteriological standard for drinking water.

2nd Installation - One well

63' of 12"
12' of 10" - Total depth 75'
Water raises and lowers when pump is operated continuously, same as for 2-5" wells. Capacity 530 gals. per minute with pump and 650 gals. per minute with air lift.
Test of water by State Board of Health.

Laboratory No. 409, Sample taken 5/7/24
Source - New well
Result B Coli Group 0 per 100 CC
Total 37° C Bacteria 0 per CC
" 20° C " 775 per CC

This water does conform with U.S.Bacteriolo ical standard for drinking water.

6-18-24

Mr. Cook - Re. Proposed Well - Auburn Terminal -- Page 2.

Analysis completed 5/10/24 - - A. U. Simpson, Chief Laboratory.

Remarks: Very Good Water.

Yours truly,

District Engineer.

2013

Saint Paul, June 14, 1934.

Mr. A. R. Cook:

In the second paragraph on the second page of my letter to you yesterday, about well at Auburn, I note an omission that changes the meaning of the paragraph.

This paragraph should read as follows:

> "I am inclined to think one well will be sufficient but this cannot definitely be determined, nor can the type <u>of pump</u> be determined until we have completed the well and run an adequate test."

H. E. Stevens

HES-ar

2013

Saint Paul, June 13, 1934.

Mr. A. R. Cook:

I have just wired you as per attached copy about awarding contract for drilling well at Auburn to C. F. Lawson.

I assume you are of the opinion that the extra cost per foot drilled would be more than counterbalanced by the excess cost per day bid by Wm. E. Petersen, or that perhaps Mr. Lawson is better equipped. If the parties are equally well equipped the recommendation seems to me somewhat questionable, as we will be paying Mr. Lawson $50.00 extra for drilling the 100' which would amount to more than the difference if two days are used in testing.

We have again gone into the matter of type and location of pump and location of wells, and there is no question but what the triplex type of pump should be installed if tests of the well develop that water can be maintained within the suction level of the triplex or centrifugal pump.

It also appears that there will be sufficient room to place a triplex pump in the pump pit of the Auburn power house.

I am attaching Mr. Bratager's letter of June 11, giving three alternate suggested locations for pump in the power house pump pit. We do not, of course, have exact details of the installation as made in this power plant and I wish you would have the plans checked up by actual field measurements and advise which of the three locations will be the more satisfactory.

It seems to me the first well could be placed directly under the track between the power house and the storehouse. We ought to be able to spare such portion of

this track for such time as is required for the drilling and after the well is drilled it will, of course, be covered in and track replaced.

A second well if needed could be located across the platform as shown on the general plan.

I am inclined to think one well will be sufficient but this cannot definitely be determined, nor can the type of pump be determined until we have completed the well and run an adequate test.

I wish you would furnish me with the test data obtained from the City well. It is my understanding the water lowered substantially when the well was pumped at the rate of 500 gallons per minute.

No work should be done on drilling the well until we have further data as to location of pump in the pump pit of our power house and the results obtained by the City in the test of their well.

Dictated

Chief Engineer.

HES-ar

Encls.

FORM 1386

Telegram—Be Brief

Time Filed

M.

St Paul June 13 1924

A R Cook

Seattle

your letter seventh well at Auburn O K to award contract to Lawson but do not permit him to start any work until you receive my letter of this date S-20

H E Stevens

2013

Saint Paul, June 12th, 1924.

Mr. H. E. Stevens-

Referring to attached papers about bids for 12" wells at Auburn:

The price of a 12" well drilled at Rapelje in 1918 was $6.00 per foot exclusive of casing. Compared with this, the price of $8.50 per foot for the Auburn well would appear reasonable.

The AFE estimate for the well items at Auburn, covering 400 lineal feet of 6" standard well casing, four drive shoes, four 10' brass well screens and driving and placing of casing, totals approximately $2450.00.

Assuming that one 12" well 100 ft. deep will be sufficient, the cost of drilling on basis of the bid of C.F. Lawson, which is recommended for acceptance by Mr. Cook, would be approximately for the corresponding items $2000.00.

S. Bratager
Asst. Chief Engineer.

SJB-h
encl

Seattle Terminal Line AFE #396,
Auburn Water Supply.

AFE Estimate for well items.

	Lab.	Matl
400 lin ft 6" Standard well casing		$480
Four - 6" Drive shoes		80
Four - 10' brass well screens		130
Drive and place 400 ft well casing	1600	
10% f. Supls	160	
	$1760	$690

Bids for one or more 12" wells.

1760
690
2450

Assuming that one 12" well 100' deep would be sufficient the cost of drilling on basis of the bid of C. F. Lawson which is recommd for acceptance by Mr Cork would be

	Labor	Matl
100 ft of 12" well, exclusive of casing @ 8.50	$850	
100 ft of 12" Casing @ $2.87 per ft		287
Placing of well screen and pulling for testing and for testing well say 72 hours @ 5.00	360	
One - 10 ft brass well screen		350
One drive shoe for 12" pipe		67
	1210	704

1210
704
1914
121
2035

10% of Labor

2 men - 8 : 16

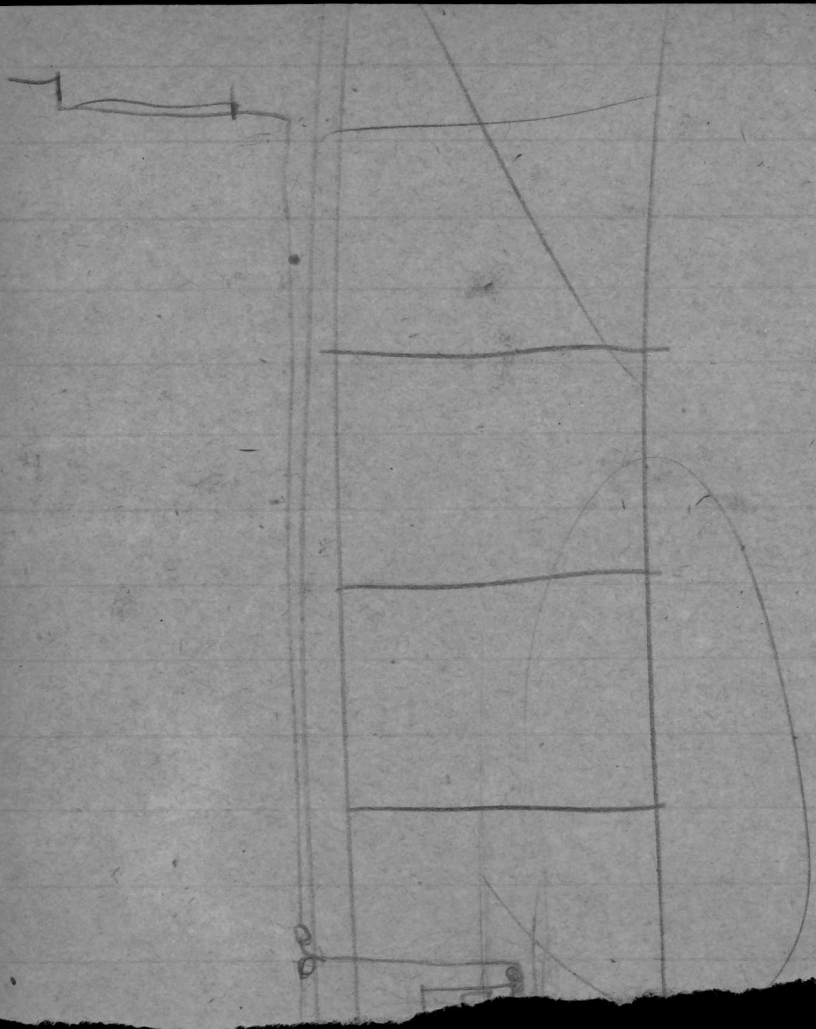
$$\begin{array}{r} 48 \\ 8 \\ \hline 56 \\ 60 \end{array}$$

SPB

These prices appear high
to me

What is the amount in est for
will and how will it
come out on these figures

J. S.
9/11



year		Diameter		Drilling per ft	Screen per ft	Testing per hour	
1912	Ladoga	12"		4 50			
1915	Woodworth	12"		3 75	18 00	200	Prices include casing to screen
1917	Willow	12"		5-75	35 00	250	" " " "
1918	Rapelje	12"	100'	6 00	35 00	250	add $3 per ft if casing furnished by contractor and 25¢ if furnished by Ry Co
			200	5 50			
			300	5 00			
			400	4 50			
			500	4 00			
1918	Rapelje	10"	100	5 50	30 00	200	" " " " " " " " "
			200	5 00			
			300	4 50			
			400	3 00			
1920	Dawson	20"		14 50		350	Add $ 12½ per ft for pipe (20") and $ 3.00 for (12)"
	Auburn - Bid	12"		8 50		500	Casing to be furnished by Ry Co

6303

Saint Paul, June 11th, 1924.

~~2013~~

Mr. H. E. Stevens-

Replying to your letter of June 5 inquiring if we have definite information about size and arrangement of pump pit in the Auburn Power House for use in working up a plan for installation of the Auburn water supply:

We have the plan of the pump pit which shows also the pipe layout. The plan, however, is ten years old and the layout should, I think, be checked in the field.

I hand you herewith three prints of the plan, which has been extended to show the adjacent store house location and the track between the power house and the store house. On each of the prints has been shown in red alternate locations of the proposed 10½x12, Figure 690, single acting Rumsey triplex plunger pump, which is recommended for installation.

The maximum floor space of the pump, without fittings, is 4' 2⅝" x 10', which information was furnished us by the local agent.

A suggested location of the well is indicated in the center of the track between the two buildings. I think, however, there should be a tee placed on the top of the well instead of the elbow shown and the pipe extended up to the track level and capped in order to make it possible to clean the well out if it should be found necessary at any time. 336-22

I attach also a print of a section of the station plat showing a suggested location for an additional well, if such should become necessary in the future.

After checking up the pit and existing pipe layout in same, would suggest Mr. Cook revise the suggested pump and well locations

REG
Prints filed -
#336-22
Jno. B.
J.M.

to best meet existing conditions.

From the information available here it would appear as if it would be possible to place the Rumsey pump in the existing pit. The elevation to which the pump should be placed will, however, depend upon what the test of the well will show.

Asst. Chief Engineer.

SJB-h
encl

Re: Water station at
Auburn, Wash.

2013

Seattle, Wash.,
June 7, 1924.

1003-1-4

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

Dear Sir:-

I am handing to you herewith proposals from W. E. Peterson, J. W. Salter and C. F. Lawson for drilling the well or wells at Auburn, Wash.

None of these men were equipped to go into the matter as set forth in the specifications and have covered all work outside of drilling and placing casing as "Extra Work."

I recommend that we award the contract to Mr. C. F. Lawson of Seattle, Wash.

Yours truly,

A. R. Cook

ARC:L
Encl.

Summary of bids for drilling and casing one or more 12 inch wells, not exceeding four in numbers, and not exceeding 100 feet in depth, at Terminal Yard, Auburn, Washington, Seattle

	Wm. E. Petersen	J.W. Salter	C.F. Lawson
For all labor, material (except casing, cement, sand and gravel, which will be furnished by the Railway Company) and equipment for drilling wells, per lineal foot.	8.00	8.50	8.50
Extra work such as pulling casing, installing pump, testing etc, time of two men and machine.	25.00 per 8hr.day	5.00 per hour	5.00 per hour

Office of Asst. Chief Engineer,
Seattle, Washington,
June 6th, 1924.

RECEIVED
MAY 31 1924
SEATTLE, WASH.

Stevens Hotel,
Seattle, Washington.
May 31, 1924.

Assistant Chief Engineer,
Northern Pacific Railway Company,
917 L. C. Smith Bldg.
Seattle, Washington.

Dear Sir:

I would furnish well drilling machine, all necessary tools and equipment, labor and fuel - in fact everything required except the casing, cement, sand and gravel; and would drill one to four 12" wells at your yards at Auburn, exact location to be designated by you, for the sum of Eight dollars 50/100 ($8.50) per foot from surface to bottom of well; wells not to exceed 100 feet in depth. However, if you should desire to go deeper, and it is practical under the circumstances, as may be found, I would continue to as much greater depth as you may wish to go at the same rate per foot, providing this is practicable.

When water is reached, if you should desire to have perforated point, screen or other device placed in the well to keep out sand and gravel and facilitate the flow of water, I would do this work as per your instructions as far as possible for the sum of Five Dollars ($5.00) per hour for drilling machine and two men, I of course furnishing fuel, &c. during this time.

This rate would apply to setting in pump column, using drilling machine for pumping, &c., you of course

to furnish pump, column and pump rods, screen, &c.

After tests are made, if you should desire to put in the cement as shown in plan, I would dig pit and place this cement as per your instructions, charging you only the actual cost of labor for doing same.

Work would be commenced as soon as work now on hand can be completed and would be pushed to completion as rapidly as practicable.

Respectfully submitted,

E. F. Lawson

E. F. LAWSON

Form 103 5-26-23 1M RP

NORTHERN PACIFIC RAILWAY COMPANY

PROPOSAL

For drilling and casing one or more 12-inch wells, not exceeding four in number, and not exceeding 100 feet in depth.

Location Terminal Yard, Auburn, Wash. Division Seattle.

The undersigned hereby propose , and, if this proposal is accepted, agree to enter into a written contract, if required, with the Northern Pacific Railway Company, to do all the work for which prices are named herein, according to the plans and directions of the Engineer for said Company, in conformity with the specifications made for said work and attached hereto, upon the terms and conditions of the contract to be prepared therefor, and within the time specified.

The following prices include all labor, material and equipment of every description necessary for the construction of the work, with the exception of casing, cement, sand and gravel,

which will be furnished by the Railway Company. on cars at siding near the work.

For all labor, material (except casing, cement, sand and gravel, which will be furnished by the Railway Company) and equipment for drilling wells, per lineal foot - - - - - - - - - - $ 8 50/xx

The work is to be commenced immediately after the award of contract and pursued energetically to completion.

No free transportation will be furnished in connection with this contract.

All extra work such as pulling casing, installing pump, testing etc to be paid for at the rate of $5 per hour. That includes the labor of two men and machine.

Puget Sound Drilling Co
J M Baker

—A—

The Railway Company reserves the right to reject any and all bids, and, at its option, to require a satisfactory bond from the Contractor for the faithful performance of the work.

All proposals to be sealed, marked bid for drilling well at Terminal Yard, Auburn, Washington.

and addressed to the Assistant Chief Engineer of the Northern Pacific Railway Company, ~~Saint Paul, Minnesota~~ Seattle, Washington

Bids will be received until 12 o'clock noon Saturday, May 31st, 1924.

Signature of Proposer Puget Well Drilling Co
J M Watts

Address 2012 L C Smith Bldg

Date May 27-24

RECEIVED
JUN 6 1924
Office of ... Asst. Engr.
SEATTLE, WASH.

Seattle, Washington
June 6, 1924.

Northern Pacific Railway Company
Engineering Department
917 L. C. Smith Building
Seattle

Gentlemen:

As to drilling wells at your terminal yard at Auburn in King County, Washington, I will offer to do the work on the following basis:

I will furnish the well drilling machinery and two men with it and will drill any number of wells you want from one to four, each to be twelve inch well, and each to be not over 100 feet deep; will drill the wells and put in the casing at $8.00 per lineal foot drilled, you to furnish the casing and drive-shoes. I will do any other work along my line in addition to drilling the wells and putting in the casing on this basis: I will furnish the well drilling equipment and two men and you furnish all the other necessary material and you pay me at the rate of $25.00 per day of eight hours.

I will be in position to go to work on your job about the 23rd of this month or probably earlier, or as soon as I finish the job I am on now.

Very truly yours,

Wm. E. Petersen

Saint Paul, June 5, 1924.

Mr. S. J. Bratager:

Regarding attached. Have we definite information about size and arrangement of pump pit at the power house at Auburn?

I think we will have to work up a plan for the installation of the Auburn water supply, and wish you would advise what additional information you will need for that purpose.

Chief Engineer.

HES-ar

Encl.

Saint Paul, June 4th, 1924.

OFFICE OF CHIEF ENGINEER JUN 4 1924 NOR. PAC. RY. ST. PAUL, MINN.

Mr. H. E. Stevens,

Chief Engineer.

Your notation on attached file in regard to new water station at Auburn, Washington:

The principal comment I have to make is to call your attention to the comparative estimate dated May 20th. For the Rumsey triplex pump the statement is made that the pump shown has a rated capacity of 604 gallons at 35 RPM. This is correct according to the catalog of the Rumsey Pump Company. It states further that water delivery at 75 percent efficiency, 453 gallons will be delivered per minute. This statement is so far from the facts that I am calling it to your special attention. Either the person that made that statement did not know what pump efficiency means or else there is an attempt made to cloud the issue. If it was thought that pump efficiency meant the amount of water that the pump would actually deliver as compared with theoretical displacement, why was not the centrifugal pump figured in the same manner and the amount of water delivered for that pump shown to be 500 gallons times 68 percent efficiency. Of course efficiency means the ratio of the work performed by the pump with relation to the power delivered at the driving shaft and has nothing to do in a triplex pump with the amount of water delivered. The Rumsey triplex pump figured on in this comparison is not the best one for such service. I have taken the matter up with Mr. Alan G. Cary the local representative of the Rumsey pumps and have obtained from him a bid on a Rumsey Figure 690, single acting, triplex, plunger

pump, size 10½ x 12. Such a pump will deliver 600 gallons of water per minute at 45 RPM. A triplex pump to deliver 500 gallons per minute in comparison with a DeLaval centrifugal pump could of course be purchased at a less price, but it seems to me that for an important engine terminal a water supply pump should not be less than 600 gallons per minute. Mr. Cary's bid on such a pump complete with 20 horsepower motor is $2515.00 instead of $3095.00 as shown on the attached papers. The efficiency of such a triplex pump will be 77 percent. Furthermore, there is no reason why a triplex pump should lower in efficiency with usage. That is one of the arguments in favor of the triplex pump. Furthermore, the efficiency of the triplex pump is not closely related with the speed or head against which the water is pumped so that such a pump can always be depended on to deliver its full measure of work.

The statement is made that 300,000 gallons of water is the present need. I have ascertained from the Electrical Department that power is costing us 1.8¢ per kilowatt hour at Auburn. I have computed the cost of pumping 300,000 gallons of water per day against a head of 84 feet shown by the papers, with a triplex at 77 percent efficiency and centrifugal pump at 68 percent efficiency. It will require nearly 102 kilowatt hours per day with a triplex pump and over 115 kilowatt hours per day for the centrifugal pump. This amounts to 24¢ difference per day for power or $87.60 per year. At 6 percent interest this will justify an additional cost of $1460.00 for the triplex pump, which is approximately the difference in cost of the two kinds of pumps. In other words, the saving in power

by the use of a triplex pump justifies the additional first cost. Furthermore, it seems to me that a triplex pump is the better unit for the following reasons:

The centrifugal pump operates with 1800 revolution motor as compared with a 1200 revolution motor for the triplex pump. The life of the lower speed motor is naturally greater than for the higher speed motor. A centrifugal pump will take a 25 horsepower motor as compared with 20 horsepower for the triplex pump. As Mr. Cook states the pump salesman informed him, a centrifugal pump has to be primed before it will work. This of course is one of the basic principles of a centrifugal pump. A centrifugal pump will not work as well with a high suction lift as a triplex pump will. The centrifugal people have specified that the suction lift including friction is to be not greater than 15 feet. 20 feet with a triplex pump is not at all out of reason, and this is very important in a drilled well where the water level is lowered to a considerable extent.

The estimate attached to the file shows comparison of annual costs. The comparison is hardly fair in eliminating the cost of the motors. Furthermore, the depreciation and obsolescence for the triplex pump is shown as too high. We have at Northtown a large triplex pump installed in 1910. This handles all the water for the Northtown terminal. The Supervisor recently informed me that since the pump was installed they have not spent over $10.00 on repairs. While the pump is 14 years old, I believe it is good for another 25 years. Our experience with centrifugal pumps has

not been entirely satisfactory. Several years ago Mr. Yager made a test of the centrifugal pumps at Dilworth. The efficiency was found to be 45 percent and the only way that this can be discovered is by an actual test. For example, the priming might be lost on a centrifugal pump and unless it were noted at the discharge end, the pump and motor would continue to revolve without doing any work. This cannot happen with a triplex pump.

As a matter of fact, it seems to me that it would be wrong to order any pump for this place until the wells have been put down and a test carried on for some hours to determine the water level after pumping at the rate of 500 or 600 gallons per minute. If the water level lowers too much, neither type of pump is proper and you will have to go to a deep well cylinder. Mr. Brown of the Mechanical Department tells me that there is plenty of room in the pump pit at the power house to install either kind of a pump, and the question is raised - why build a pump house where the machinery will receive little or no attention?

On the plan the wells are shown to be 40 feet apart. This will give a rather limited ground area tributary to each well. Why not put them at least 100 feet apart or even 150 feet?

Bernard Blum
Engr. Mtce. of Way.

BB-O

encl.

Re: Water station at
Auburn, Wash.

OFFICE OF CHIEF ENGINEER MAY 28 1924

Seattle, Wash.,
May 23, 1924.

1003-1-4

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

Dear Sir:-

Acknowledging your letter of May 12, written at Seattle, in regard to the water station at Auburn, Wn.

Pursuant to the second paragraph of your letter, we have gone into the matter more in detail for your particular information. In working up this project Mr. Stotler has conferred with Mr. R.M.Crosby, the Round House Foreman, the Master Mechanic and the Pumpman, and we are all in favor of the centrifugal pump.

Referring to the size of the well and the manner in which it is proposed to install the suction, it does not confine its draft either to a 6-inch or a 12-inch well. In talking with the Agent for the centrifugal pump I ascertained that it was necessary to keep the pump primed and it was therefore necessary to install a foot-valve, which made necessary the installation of a 10-inch casing. However, I am asking for bids on the basis of a 12-inch well, one or more wells, not exceeding four in number, and not exceeding 100 ft. in depth.

I am enclosing herewith copy of a report made up by Assistant Engineer Freeman, together with the De Laval Steam Turbine catalog, with specifications filled out by the local Agent. Also an estimate of the comparative cost and efficiency of the Rumsey 11x14 triplex pump, as compared with the centrifugal pump.

I am unable to ascertain the size of the triplex pump but am assuming that it will require a pump-house and pit considerably larger than that which we had contemplated, which will probably still further increase the cost of installation, apparently without any compensating features. I find out, thru its local agency, that the Fairbanks-Morse Company handle the Rumsey triplex pump. The Agent here says that they will not guarantee an efficiency in excess of 75%. I would think, from the construction of the pump, that the efficiency would decrease materially account of the gear drives.

I am enclosing to you under another cover plans which we have gotten up, providing for the pump house, centrifugal pump and motor, also the well, and would call your attention particularly to that part of the drawing showing the proposed method of installing the suction.

Yours truly,

A. R. Cook

ARC:L
Encl.

AUBURN WATER STATION
AUBURN, WASH.

In view of the fact that the 12-inch well recently completed by the Town of Auburn, Wash. tested out to 650 gallons per minute, it may be possible that one 12-inch well for the Terminal will be sufficient - at least for the present needs. This can only be determined by sinking a 12-inch well and testing its capacity.

I have compared costs of a Triplex Pump against that of three different capacities of Centrifugal Pumps, as well as maintenance costs between them, and such costs run very much in favor of the Centrifugal. The difference in both "first costs" and maintenance costs does not justify the expenditure of $2000.00 or more in favor of the Triplex. The Triplex weighs some 10,000 lbs., as against the different styles of Centrifugals as shown in statement - varying from 900 lbs. to 1655 lbs., and such difference in weights is also a factor as affecting costs of installation - and removal. The Triplex requires a larger suction and discharge line. Of less consequence, but also tending towards increased costs, is the large foundation block required to hold the Triplex, since the soil is alluvial in nature. The next size Triplex above pump used here as an illustration would cost approximately $600.00 more, though a combination may be effected to increase the flow of water somewhat by increasing the R.P.M.

Since it is expected that the flow line in the proposed well will be about 10 ft. below the surface, it had been planned to place the pumphouse floor as close to this water level as possible, to take advantage of whatever gain in the suction lift is possible. The size of pumphouse planned for the Centrifugal is 8.7 ft. by 10.7 ft. (inside) and this area will have to be increased about 25 percent. to accommodate the Triplex and motor with an increased cost of about $200.00.

I note that exception is taken to the use of a centrifugal pump, reason being given that such a pump will not operate satisfactorily under a varying head as will occur at Auburn. I attach a blueprint showing a characteristic for two 6-inch pumps. You will note in the case of the pumps operating with a combined suction and discharge, head of 82 ft. producing 675 gals. per minute and a variation of 15 ft. in head does not reduce the efficiency by more than one percent. For the particular purpose in mind at Auburn, the impellers can be adjusted to suit the particular case. I think the present day centrifugal can be designed to hold the 68 percent. efficiency with not more than one percent. loss, for a variation of 15 ft. Since the pump is to operate automatically, it was planned to set the float switch to operate at a reduction of 10 ft. of water from a full tank.

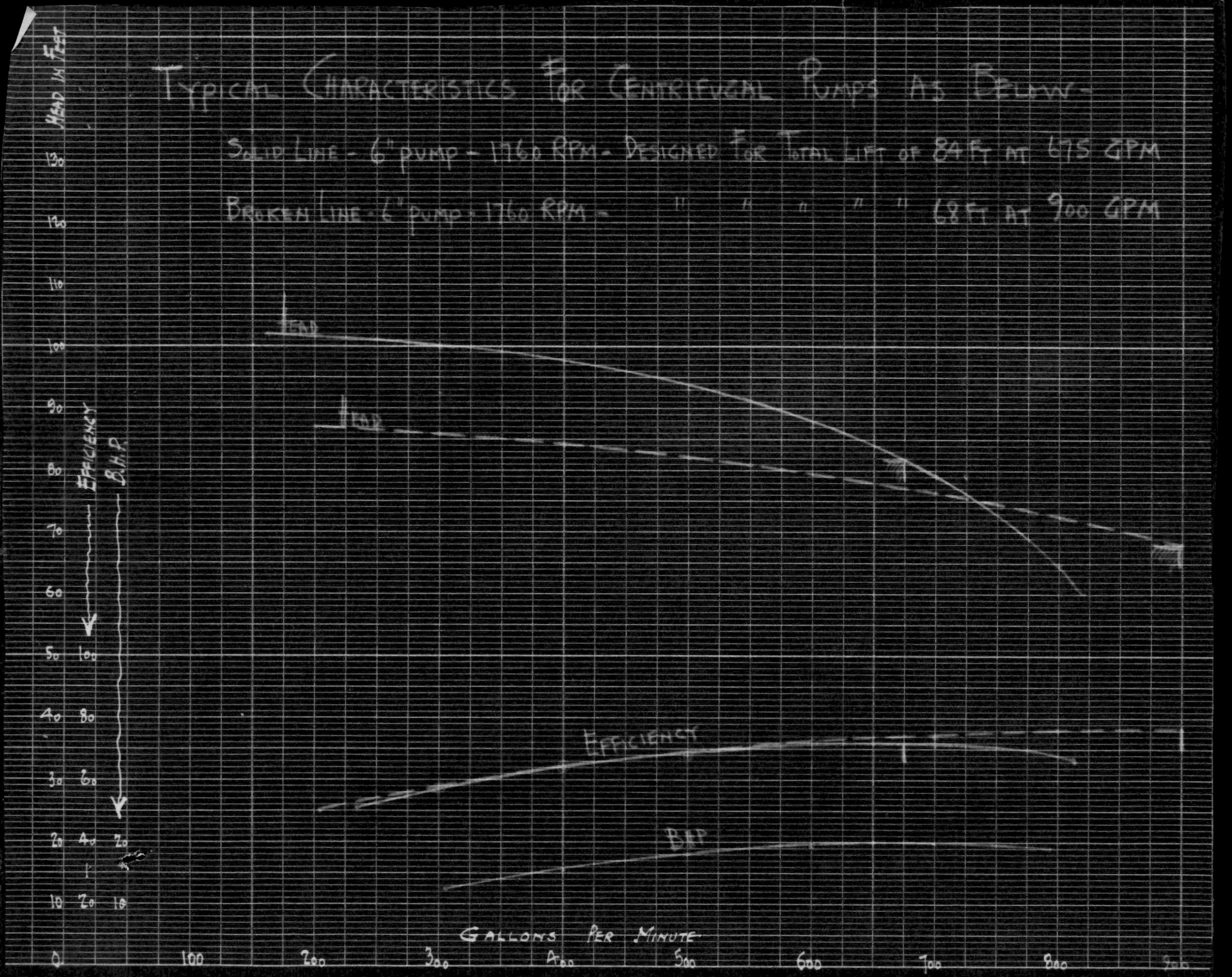
I may add further that the pump operating the two 125 gallons a minute, each, wells at the Town of Auburn pumping plant, have been in operation since about 1917 and have given such satisfaction that a Centrifugal was ordered for the new 12-inch well. The old wells were pumped by a 250 gallons a minute Centrifugal with 3-inch suction - 3-inch discharge against a 100-lb. pressure and is of the single side suction, 2-stage type. The new pump handles 550 gals. per minute with 5-inch suction and 5-inch discharge against a 100-lb. pressure, or 231-ft. head, and a 20-ft. suction, and is, of necessity, also a 2-stage pump.

In view of the above, it seems that the Centrifugal type should be looked into more than superficially before deciding on a Triplex installation.

Typical Characteristics for Centrifugal Pumps as Follows -

Solid Line - 6" pump - 1760 RPM - Designed for Total Lift of 84 Ft at 675 GPM

Broken Line - 6" pump - 1760 RPM - " " " " " " 68 Ft at 900 GPM



COMPARISON OF COSTS OF A RUMSEY SINGLE ACTING TRIPLEX PLUNGER PUMP WITH A DE LAVAL CENTRIFUGAL PUMP - BOTH OPERATED BY AN ELECTRIC MOTOR

- - - - - -

Cost of a Rumsey 11 x 14 pump for pressures ranging from 55# to 90# - elevations ranging from 130 ft. to 210 ft. Suction pipe 12", Discharge 10" -
Cost f.o.b. St. Paul $2670.00

Working efficiency not greater than 75%.
Efficiency when new for a short period 80%.
Rated capacity 604 gallons at 35 RPM.
Water delivery at 75% efficiency 453 gallons per minute.
Weight of pump approximately 10 000#.

A theoretical 15 HP motor will operate this pump - but for the continuous intermittent service a 20 HP is used.
Costs f.o.b. St. Paul of a 20 HP motor with automatic float control 425.00

Total Cost of Pump & Motor f.o.b. St. Paul $3095.00

COSTS OF DE LAVAL DOUBLE SUCTION, SINGLE STAGE, PUMPS AS BELOW

	6" Suction 6" Discharge	6" Suction 6" Discharge	4" Suction 4" Discharge
RPM	1200	1750	1750
Water delivered	500 GPM	500 GPM	500 GPM
Gage head - including suction lift	84	84	84
Efficiency	65%	68%	68%
Theoretical BHP	16.3	15.6	15.6
Weight of pump	1655#	950#	900#
* Cost of pump (See explanation below)	$575.	$465.	$450.
Cost of 20HP motor with automatic float switch	$425.	$375.	$375.
Ultimate capacity of pump by slight change in impellers - but requiring motor change as shown	1400 GPM 40 HP - Cost $672.	1100 GPM 30 HP - Cost $550.	700 GPM 22 HP - Cost $525.
Total cost of pump & motor for present needs (300 000 gal. per 12 hrs. out of 24 required)	$1000.	$840.	$825.
Ultimate cost a/c increased size of motor allowing 75% salvage on first motor	$1354.	$1109.	$1069.

All prices f.o.b. St. Paul
* Includes cost of mounting, assembling and direct connection of electric motor but does not include motor itself.

COMPARISON OF ANNUAL PUMP MAINTENANCE COSTS (Motor left out)

	Triplex	6" 1200 RPM	6" 1750 RPM	4" 1750 RPM
Interest @ 6%	$160.	$35.	$28.	$27.
Depreciation and Obselescence	178.	38.	31.	30.
Repairs on pump	25.	16.	16.	16.
	$363.	$89.	$75.	$73.

Office of District Engineer
Seattle, Washington
May 20, 1924

9013

On Line, At Seattle,

May 13, 1924.

Mr. A. R. Cook:

As per our conversa ion today, I wish you would give further consideration to the number and size of wells to be put down for the Auburn water supply. If, as you now understand, the City have obtained a flow of five to six hundred gallons per minute from their 13" well, there would not appear to be any necessity for putting down four 6" wells. In Mr. Blum's letter of March 19, he suggested that we consider two 13" wells instead of four 6" wells, and as matters are now developing possibly one 13" would be sufficient.

I wish you would give this matter further consideration before making any definite arrangements for proceeding with the sinking of the wells.

The Triplex pump as recommended by Mr. Blum will doubtless be the most efficient type of pumping machinery.

Chief Engineer.

HES-ar

2013

Saint Paul, March 29, 1924.

Mr. A. R. Cook:

Your letter of the 25th about Harris air lift.

I do not see that any new information has been developed which would indicate that this type of pump was particularly adapted for Auburn water supply. On the contrary it does not appear to me to be a type which should be selected for the conditions which prevail at that point.

Do you know definitely if the present compressor installation at Auburn would be ample to supply the additional air required for operating the air lift? If we have to install and operate another compressor, this would still further increase the cost of this type of pump and operation.

I note Mr. Tannant is very anxious to make a test, which he states will not obligate the Railway Company in any way. I would have no objection to his making such test provided he understood that we did not consider the installation adapted to the Auburn conditions. However, in making tests of this character the salesman usually figures that after he has gone to the expense of demonstrating his apparatus the Company should either reimburse him, or put in the installation, regardless of the previous understanding about no obligation being incurred.

Chief Engineer.

HES-ar

Saint Paul, March 28th, 1924.

Mr. H. E. Stevens,

Chief Engineer.

Returning your file about the new Auburn wells:

The advantages which Mr. Judson gives in his letter of the 19th to Mr. Stotler cover the arguments for air lift pumps. The statement though that where air is used the pump operates with the surplus air from the compressor, is a little misleading. I presume what is meant is that the compressors have capacity sufficient to provide air for the air lift pumps in addition to their other requirements. However, it costs just as much to compress that air as though the compressors were set up expressly for the air lift. It is of course useless to compare the operation of other air lift installations as the engineering features of the problem in question should decide the best thing to do.

Bernard Blum
Engr. Mtce. of Way.

BB-O
encl.

Re: Auburn Water Supply.

OFFICE OF CHIEF ENG. MAR 28 1924

Seattle, Wash.,
March 25, 1924.

1003-1-4

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

Dear Sir:-

Acknowledging your favor of March 21, in re installation of Harris Air Lift for Auburn water supply.

I am attaching hereto copy of Assistant Engineer Judson's report on wells operated in Tacoma with Harris Air Lift, together with statement showing size of well and amount of water furnished.

However, as Mr. Blum is apparently better qualified to pass on the subject, I will not proceed further in the matter without his recommendation.

Yours truly,

A. R. Cook

ARC:L
Encl.

B Bowden 3/28

noted B.B. 3/28

(COPY)

Tacoma, Wash.,
March 19, 1924.

Mr. A. F. Stotler,
District Engineer,
Seattle, Washington.

Dear Sir:-

Per your verbal instructions I have inspected and obtained data on various Harris Air Pumps in operation at Tacoma.

Attached is a sheet showing data on seven Harris Pumps now in operation in Tacoma. All of these pumps were inspected with the exception of the Regents Park Water Works and the H. A. Rhodes residence.

The inspection of the pumps does not develop much in that there are no working parts and all one can see is the water coming from the discharge pipe. The method of installation varies at the different locations to mee the needs of each well. Pumps shown aith automatic control pump only as required while the other pump s work continuously, with the air supply regulated to pump as near as possible to the requirements, and with overflow facilities provided.

In talking to the men who operate or are familiar with the working of the pumps at the various plants I could find no one who was not entirely satisfied eith the results obtained. In most cases more water was being obtained from the wells than with other methods of pumping and in all cases the cost of the water has been greatly reduced. In plants where air is in use pump operates with the surplus air from the compressor and with very little if any attention. Sand does not affect the pump and the pumps are now equipped with air valve with which air and water can be reversed in the pump and well cleaned.

Mr. Tannant of the Washington Machinery Depot advises that in the case of the proposed well at Auburn it will require approximately one-fourth of a cubic foot of air to pump one gallon of water. If new compressor is provided for pump at Auburn it can be operated by electrical control and if air is used from the present supply at Auburn valve can be put in the supply line which will operate automatically from a float in the tank.

Mr. Tannant would like to be advised when well at Auburn has been driven as he would like to make a test of the well. He advises that there will be no expense to the

Railway Co. for this test and will not obligate them in any way. He also advises that in driving the well, the casing should not be stopped at the first indication of water but to obtain the best results casing should be taken down into the water about two feet.

Attached are some books on the Harris Air Pump.

Yours truly,

W. W. JUDSON

Assistant Engineer.

DATA ON HARRIS AIR PUMPS IN OPERATION AT TACOMA.

Location	Depth	Diameter	Gals. per minute	Total Lift	Remarks
Peterman Mfg. Co.	108'	6"	60	70'	Harris Standard
Wheeler-Osgood Co. Sawmill	492'	8"	300-350	90'	Harris Standard with special gravity discharge
Wheeler-Osgood Co. Factory	495'	8"	250-350	130'	Harris Standard - has booster system
St. Paul & Tacoma Lumber Co.	495'	8"	500	100'	Harris Special
Regent Park Water Works	210'	12"	180	50'	Harris Standard with Electric Automatic control.
	123'	12"			
Rhodes Residence	68'	6"	25	30'	Electric Automatic Control
Matthaei Bakery Co.	358'	6"	32	80'	Electric automatic control

Systems which do not have automatic control work continuously.

2013

on Train #4, Dakota Division,
March 21, 1924.

Mr. A. R. Cook:

Your letter of the 6th about possibility of installing Harris air lift for the new wells at Auburn.

Mr. Blum has had some little experience in the installation and operation of air lifts, and I am attaching for your information copy of his letter of March 19.

The conditions at Auburn are not favorable for air lift operation, and I agree with Mr. Blum that a triplex pump installation would be the more efficient.

It is my recollection that you suggested the four 6" wells instead of two 12" because you thought the 6" would give all the water needed and distribute the intake over a wider area.

If the flow of water is found to be good it may well be that two 12" wells should be used, as suggested by Mr. Blum.

I suggest you get prices from the drillers for both 6" and 12" well.

Chief Engineer.

HES-ar

Encl.

Saint Paul, March 19th, 1924.

OFFICE OF CHIEF ENGINEER MAR 20 1924 NORTHERN PACIFIC RY.

Mr. H. E. Stevens,

Chief Engineer.

Your letter of the 15th in regard to attached papers about suggested installation of air lift for proposed new water supply at Auburn:

In order to make a test of the Northtown air lift installation we would either have to purchase an air meter or rig up an orifice in the air line to measure the amount of air consumed. The latter installation would, I think, cost even more than purchasing an air meter, which can be obtained for about $75.00. I would not recommend doing that as the conditions at Auburn are so evidently against the installation of an air lift that it hardly seems necessary to determine the efficiency of the Northtown installation. As you know, each air lift installation has to be figured out for itself and the condition of submergence at Northtown is so different from that at Auburn that the results at Northtown would have no bearing. I have figured out approximately what we could hope to obtain at Auburn based on a 100 foot well getting 250 gallons per minute and assuming the top of the tank is 75 feet above the ground level. Theoretically the horsepower required to elevate this water would be about six. An air lift under these conditions would have about 30 percent efficiency and require 20 horsepower. It is therefore evident that an air lift installation should not be considered.

In talking with Mr. Culbertson of Robinson, Cary & Sands Company, he tells me that you cannot get more than 36 percent efficiency out of any air lift installation. With a good triplex

pump you can get 80 percent efficiency. This is over all. To start with, the loss of power in compressing air is so much that the air lift is out of the running as an economical proposition. It has its place under certain conditions. I would strongly recommend that you figure on a good triplex pump of around from 750 to 800 gallons per minute.

The water stands about 10 feet below the ground level and from your file I would assume that under pumping the level would not be lowered over 10 feet. You could undoubtedly put the pump in the pump pit and get a very effective suction lift.

I would like to bring up to your consideration the matter of size of wells figured on. The AFE provides for four six inch wells 100 feet deep. I would recommend that you install two twelve inch wells. The cost of a 12 inch well of this depth is about double the cost of a six inch well so that you ought to be able to put in two twelve inch wells under the allowance. However, a 12 inch well has about four times the capacity of a 6 inch well so that with two 12 inch wells you would have about double the capacity of four 6 inch wells. I would recommend that you place the wells about 100 feet apart so that one will not encroach on the other.

The AFE covers a 20 horsepower motor with centrifugal pump. I have recommended a triplex plum as the more efficient and I think that is correct. A large capacity centrifugal pump under constant head and with proper speed is quite efficient but with a varying level of water in the tank you will not maintain the same head. Furthermore, variations in the speed of the motor decreases

the efficiency of a centrifugal pump. That does not follow with a triplex pump. It is true that a triplex pump will cost more for first installation but with such a big plant as this I think you will soon realize the difference in the economy of operation.

Bernard Blum
Engr. Mtce. of Way.

BB-O
encl.

2013

Saint Paul, March 15, 1924.

Mr. Bernard Blum:

Please note the attached from Messrs. Cook and Bratager, about suggested installation of air lift for proposed new water supply at Auburn.

I wish you would have the air lift installation at Northtown checked up and if possible determine its efficiency, how much air it uses, etc., also advise your opinion as to the proposed installation at Auburn.

As you will note from my file, we will probably be able to get a good supply of water at Auburn, although account size of wells Mr. Cook proposed in his AFE there is some question in my mind if we would not drop the water level in the holes very quickly by the operation of an air lift.

Chief Engineer.

HES-ar

Encl.

2013 Saint Paul, March 14th, 1924.

Mr. H. E. Stevens-

Referring to Mr. Cook's letter of March 6, file 1003-1-4, about pumping by air lift in the proposed wells at Auburn:

The AFE estimate provides for four driven wells each of 6" diameter about 100-feet deep to be operated by a 20 h.p. motor, using a centrifugal pump. The AFE gives no information as regards the water consumption nor the depths below ground from which water would be pumped.

The American Railway Engineering Association on pages 680-685, Volume 16, 1915, contains a committee report on deep wells and deep well pumping and relative economy as compared to other sources of water supply.

The investigations of the committee led it to the conclusion that the air lift is in many respects a desirable system for many deep wells, especially those in which the water is delivered from fine sand, requiring for the exclusion of the latter screens so fine, in order to avoid trouble with the pump plungers, that the capacity of the well is limited.

The summary of the tests conducted by the committee shows cost per 1,000-gallons pumped at:

$0.09	by oil
$0.069	by coal
$0.064	by electricity
$0.056	by air

The committee found the quantity of air (reported by 34 railroads) used per gallon of water pumped to range from 1 cu.ft. to 48 cu.ft.

The catalogue of the Harris Air Pump Company sent us by Mr. Cook gives the air consumption, on tests of wells 300 to 400-feet deep, 1.583 cu.ft. air to 3.742 gallons water pumped per minute, which is equal to only about 0.42 cu.ft. per gallon.

Assuming that 300,000 gallons per day of 8 hours would be used

OFFICE OF
CHIEF ENGINEER
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at Auburn, which is equal to 625-gallons per minute, the amount of air that would be required for pumping of same, based upon the AREA data, would range from 625 to 30,000 cu. ft. of air per minute. On basis of the Harrison Company's tests, however, to only 262.5 cu.ft. per minute.

The present air compressor at Auburn has a capacity of 704 cu.ft. and I presume is loaded to its capacity now, although we have no data here to show.

The efficiency of even a well designed air lift is stated to be low; varying from 20% for a lift of 600-feet to 45% for a lift of 50-feet.

From the "Waterworks Handbook" it is noted that the opinion has been expressed that compressed air causes an excessive growth of algae, and that the bacterial content of water is somewhat increased by the air lift unless the air supply is filtered.

If there is any available surplus of air in the present air compressor at Auburn which Mr. Cook can have checked up, I would suggest that after one of the 6-inch wells has been driven Mr. Cook arrange with the representative of the Harrison Air Pump Company at Tacoma for a thorough air lift test by them, and on basis of which Mr. Cook could determine as to whether or not such an installation would prove satisfactory and economical at that point.

S. J. Bratay

Asst. Chief Engineer.

SJB-h
encl

Re: Well at Auburn
Terminals.

Seattle, Wash.,
March 6, 1924.

File 1003-1-4

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

Dear Sir:-

A representative of the Washington Machinery Depot, Tacoma, Wash., who are Agents for the Harris Air Pump Company of Indianapolis, Ind., was in to see me the other day regarding the use of this appliance in the proposed well at Auburn.

I am enclosing to you herewith literature left with me by the Agent.

I do not know amything about the appliance and have not had any experience with air lift pumps. I note from the literature that there are some of these appliances in use in Iowa, Wisconsin and possibly Minnesota, and it may be that you are acquainted with them and their efficiency. If the pump is reliable I think it would be an economical appliance for Auburn as we have the air and would not have to install additional pumps and motors.

If we were to use this appliance I would recommend a larger well than we have contemplated.

The Agent for the Washington Machinery Depot states that they always test out a well in advance of installing the pump. This would also serve the purpose of demonstrating the capacity of the well. If the appliance is installed it will be necessary to install a separate discharge from the pump into the tank on account of the amount of air carried with the water. The arrangement gives a steady flow not an intermittent flow like the original air lift.

I would like to have your opinion.

Yours truly,

N. P. Cook

ARC:L
Encl.

Saint Paul, March 14th, 1924.

2013

Mr. H. E. Stevens-

Referring to Mr. Cook's letter of March 6, file 1003-1-4, about pumping by air lift in the proposed wells at Auburn:

The AFE estimate provides for four driven wells each of 6" diameter about 100-feet deep to be operated by a 20 h.p. motor, using a centrifugal pump. The AFE gives no information as regards the water consumption nor the depths below ground from which water would be pumped.

The American Railway Engineering Association on pages 680-685, Volume 16, 1915, contains a committee report on deep wells and deep well pumping and relative economy as compared to other sources of water supply.

The investigations of the committee led it to the conclusion that the air lift is in many respects a desirable system for many deep wells, especially those in which the water is delivered from fine sand, requiring for the exclusion of the latter screens so fine, in order to avoid trouble with the pump plungers, that the capacity of the well is limited.

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Assuming that 300,000 gallons per day of 8 hours would be used

at Auburn, which is equal to 625-gallons per minute, the amount of air that would be required for pumping of same, based upon the AREA data, would range from 625 to 30,000 cu. ft. of air per minute. On basis of the Harrison Company's tests, however, to only 262.5 cu.ft. per minute.

The present air compressor at Auburn has a capacity of 704 cu.ft. and I presume is loaded to its capacity now, although we have no data here to show.

The efficiency of even a well design air lift is stated to be low; varying from 20% for a lift of 600-feet to 45% for a lift of 50-feet.

From the "Waterworks Handbook" it is noted that the opinion has been expressed that compressed air causes an excessive growth of algae, and that the bacterial content of water is somewhat increased by the air lift unless the air supply is filtered.

If there is any available surplus of air in the present air compressor at Auburn which Mr. Cook can have checked up, I would suggest that after one of the 6-inch wells has been driven Mr. Cook arrange with the representative of the Harrison Air Pump Company at Tacoma for a thorough air lift test by them, and on basis of which Mr. Cook could determine as to whether or not such an installation would prove satisfactory and economical at that point.

Asst. Chief Engineer.

SJB-h
encl

Saint Paul, March 14th, 1924.

Mr. H. E. Stevens-

Referring to Mr. Cook's letter of March 6, file 1003-1-4, about pumping by air lift in the proposed wells at Auburn:

The AFE estimate provides for four driven wells each of 6" diameter about 100-feet deep to be operated by a 20 h.p. motor, using a centrifugal pump. The AFE gives no information as regards the water consumption nor the depths below ground from which water would be pumped.

The American Railway Engineering Association on pages 680-685, Volume 16, 1915, contains a committee report on deep wells and deep well pumping and relative economy as compared to other sources of water supply.

The investigations of the committee led it to the conclusion that the air lift is in many respects a desirable system for many deep wells, especially those in which the water is delivered from fine sand, requiring for the exclusion of the latter screens so fine, in order to avoid trouble with the pump plungers, that the capacity of the well is limited.

The summary of the tests conducted by the committee shows cost per 1,000-gallons pumped at:

$0.09	by oil
$0.069	by coal
$0.064	by electricity
$0.056	by air

The committee found the quantity of air (reported by 34 railroads) used per gallon of water pumped to range from 1 cu.ft. to 48 cu.ft.

The catalogue of the Harris Air Pump Company sent us by Mr. Cook gives the air consumption, on tests of wells 300 to 400-feet deep, 1.583 cu.ft. air to 3.742 gallons water pumped per minute, which is equal to only about 0.42 cu.ft. per gallon.

Assuming that 300,000 gallons per day of 8 hours would be used

at Auburn, which is equal to 625-gallons per minute, the amount of air that would be required for pumping of same, based upon the AREA data, would range from 625 to 30,000 cu. ft. of air per minute. On basis of the Harrison Company's tests, however, to only 262.5 cu.ft. per minute.

The present air compressor at Auburn has a capacity of 704 cu.ft. and I presume is loaded to its capacity now, although we have no data here to show.

The efficiency of even a well design air lift is stated to be low; varying from 20% for a lift of 600-feet to 45% for a lift of 50-feet.

From the "Waterworks Handbook" it is noted that the opinion has been expressed that compressed air causes an excessive growth of algae, and that the bacterial content of water is somewhat increased by the air lift unless the air supply is filtered.

If there is any available surplus of air in the present air compressor at Auburn which Mr. Cook can have checked up, I would suggest that after one of the 6-inch wells has been driven Mr. Cook arrange with the representative of the Harrison Air Pump Company at Tacoma for a thorough air lift test by them, and on basis of which Mr. Cook could determine as to whether or not such an installation would prove satisfactory and economical at that point.

Asst. Chief Engineer.

SJB-h
encl

0013

Saint Paul, March 11, 1924.

Mr. A. R. Cook:

In writing you last night about well at Hauser, I stated that Mr. Rapelje had authorized going ahead with this work in advance of formal approval of the AFE. I find, however, that I was mistaken in the AFE reference given in Mr. Rapelje's letter, and that the AFE referred to is the water supply at Auburn, on which he advises we may proceed without waiting for formal approval.

I have your letter about air lift pump for Auburn and am having the matter checked up and will advise you in a few days.

Chief Engineer.

HES-ar

2013

St. Paul, Minn., March 7, 1924. v

Mr. H. E. Stevens:

Referring to your letter of February 16, with which you enclosed Seattle Division AFE ED No. 47, covering installation of wells and pumping supply at Auburn:

You may arrange to proceed with this work without waiting for formal approval, which will reach you in a few days.

CC-Mr. A. V. Brown.

OFFICE OF
CHIEF ENGINEER
MAR
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1924
NOR. & SO. R.Y.

OFFICE OF
CHIEF ENGINEER
MAR
10
1924
NOR. & SO. R.Y.

2013

Saint Paul, February 16, 1934.

Mr. J.M.Rapelje:

Herewith for approval Seattle Division ED-47, covering the installation of wells and pumping supply at Auburn, amount $8,033.

This is a matter which we discussed in detail with the local officers, and it was agreed that Mr. Cook would submit an AFE as soon as possible.

Mr. Cook advises that he has located three reliable well drillers in that vicinity and hopes to be able to secure favorable prices promptly on approval of the AFE.

Chief Engineer.

HES-ar
Encl.

Received 2/24/18-24

Re: Re Seattle Divn.
ED #47-24 water
system at Auburn,
Wash.

Seattle, Washington,
February 7, 1924.

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

Dear Sir:-

I am forwarding to you herewith Seattle Division AFE ED 47-24, providing for the expenditure of $9,032. for the installation of a water system consisting of four drilled wells, a pump-house, pump and the necessary piping, on the terminal grounds at Auburn, Wash., in lieu of the existing gravity supply, which is insufficient.

If the gravity supply is to be continued, it will be necessary to relay the pipe line which is badly deteriorated and probably extend the intake to Big Soos Creek.

I have succeeded in getting names of three reliable well-drillers in this vicinity and hope to be able to write up the specifications today in anticipation of asking for bids immediately on the approval of the AFE.

Yours truly,

A. R. Cook

ARC:L

FORM 1386

Telegram—Be Brief

Time Filed

M.

215CFY

Seattle Feb 7 24

HEStevens

STP

replying your letter feby 4 re afe covering installation wells and pump house on terminal grounds at Auburn. AFE will be forwarded today L-34.

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Saint Paul, February 4, 1924.

Mr. A. R. Cook:

Your letter of the first advising that estimates have been prepared for water supply at Auburn terminals.

Has AFE been forwarded? If so, it has not yet been received here, and I think it should be hurried along, as we will not be able to let contract until we have definite authority.

Chief Engineer.

HES-ar

Re: Water supply at
Auburn Terminals.

Seattle, Washington,
February 1, 1924.

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

Dear Sir:-

Replying to your favor of January 23, in re water supply at Auburn Terminals.

Estimates have been prepared and we are endeavoring to locate several well-drillers west of the Cascades, with the idea of securing competitive bids. Expect to have this matter lined up during the coming week.

Yours truly,

A. R. Good

ARC:L

OFFICE OF THE CHIEF
FEB 4
1921
NO.

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Saint Paul, December 6, 1923.

Mr. A. R. Cook:

Your letter of the 3rd about water supply at Auburn terminal.

Mr. Rapelje expects to be on the coast again in January and we will at that time take the matter up for further consideration.

I agree with you that we have enough data to justify making up an AFE and, if approved, asking for bids covering the drilling.

We could, of course, put into these bids a provision to the effect that work might be discontinued after a hole had been put down.

I think it would be well for you to get the estimate and AFE all made up ready to submit for approval early in January.

Chief Engineer.

HES-ar

OFFICE OF CHIEF ENGINEER
DEC 6 1923
NOR. PAC. RY.
ST. PAUL, MINN.

Saint Paul, Minnesota.
December 6, 1923-rg.

Mr. H. E. Stevens:

Referring to your letter of December 5 in regard to water supply at Auburn, in which you state that Mr. Cook has been making some tests and that his investigation seems to indicate there will be little or no difficulty in obtaining a sufficient supply of good water.

As I recollect it in talking with Mr. Cook I felt we ought to be sure about this before we put in an AFE for the driving of a well. I do not recollect now what tests he has made; in any event, I think we will not make any AFE for this until after the first of the year. We probably can look this over when we are on the Coast along in January as I am anticipating in another letter I wrote you today.

J. M. Kapsey

OFFICE O
CHIEF ENG
DEC
6
1923
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ST. PA

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Re:Water supply at
Auburn Terminals.

Seattle, Washington,
December 3, 1923.

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

Dear Sir:-

Supplementing my letter of December 1 in re water supply at Auburn Terminals.

It is found on investigation that the Railway Company has paid the City of Auburn $648.00 during periods of water shortage and that it is estimated that the Railway Company have spent $1000.00 pumping from Green River to augment the supply from the head works.

Inasmuch as the water from the Railway Company's source of supply has been condemned by the State Bacteriologist as unfit for drinking water, the Company is also paying the City $540.00 yearly for drinking water, the total annual cost account of insufficient and unfit supply of water being $2188.00.

Yours truly,

A. R. Cook

ARC:L

2013

Saint Paul, December 5, 1923.

Mr. J. M. Rapelje:

Mr. Cook has been making some tests with a view of ascertaining if water supply can be obtained from wells at Auburn, and his investigation up to date seems to indicate there will be little or no difficulty in obtaining sufficient supply of good water. I advised him, however, that water supply for Auburn had been cut out of the 1924 budget, and if it was an absolutely essential improvement it would have to be submitted as a special item. He now advises me that during your last trip you authorized further investigation before submitting an AFE covering the whole project.

Mr. Cook states that in view of the City's success, and our own success, in finding water in sufficient quantities for drinking purposes that we are warranted in submitting the project without spending further money for test purposes. To make an additional test would necessitate putting down a drill hole, and we could do better if this was handled as a part of the regular contract; in fact, if the project was approved we could draw the contract so we could put down the hole, and if the unexpected should happen and we would be dissatisfied with the results of this hole we would have the right to cancel contract. If on the other hand, we obtained satisfactory results we would go right ahead and complete the entire work.

It seems to me, therefore, we have all the information necessary for submitting an AFE. Will you kindly advise if you wish us to do so.

HES-ar

Chief Engineer.

Re: Water supply at
Auburn Terminals.

Seattle, Washington,
December 1, 1923.

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

Dear Sir:-

Acknowledging your favor of November 24 in re water supply for the Auburn Terminal.

The present supply has proven inadequate and even now we are buying water from the City of Auburn. The present supply pipe leading from the head works to Auburn will have to be renewed and in view of the insufficient supply, especially during the dry season, this does not seem advisable, as the estimated cost is $33,000, whereas the estimated cost of the four 6-inch points is $10,000, this including pump, to be located in the present power house and operated by the man having charge of the power house.

During a trip over the line Mr. Rapelje authorized further investigation before submitting an AFE covering the whole project. It seems to me that in view of the City's success and our success in finding suitable water in sufficient quantities for drinking purposes, that we are warranted in going ahead with the project or at least submitting papers for authority to do so.

In placing the points, we will have to drill and case the hole, inserting the points inside the casing and down into the water-bearing gravel. We could of course arrange for drilling one hole but we could let the contract for all four holes for less money per foot than we could a contract for one hole.

Shall we submit papers covering the completed project or arrange under verbal authority for drilling one hole now?

Yours truly,

A. R. Cook

ARC:L

Form 821 6-16-22 1M RP

NORTHERN PACIFIC RAILWAY CO.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 27257

St. Paul, Minn., Nov. 30th 1923

To Mr. A. F. Stotler, Dist. Engr.

ANALYSIS OF WATER

Sent in by A. F. Stotler Station Auburn, Wash.

Test Request No. 45 Source of Supply Foreman O'Neil's Well

		Grains Per U. S. Gallon	
Incrusting Solids Producing Scale	Oxides of Silica, Iron, and Aluminum	Trace	
	Calcium Carbonate	3.04	
	Magnesium Carbonate	2.02	
	Calcium Sulphate	1.63	
	Magnesium Sulphate	-	
	Calcium Chloride	-	
	Magnesium Chloride	-	
	TOTAL INCRUSTING SOLIDS		6.69
Non-Incrusting Solids Producing Foaming	Alkali Carbonates		
	Alkali Sulphates		
	Alkali Chlorides	1.73	
	Alkali Nitrates	2.33	
	TOTAL NON-INCRUSTING SOLIDS		4.06
	TOTAL MINERAL SOLIDS		10.75

REMARKS: Incrusting Rating - Good
Foaming Rating - Good

It will be noted that the above water contains 2.33 grains per gallon of alkali nitrates, which have a tendency to impart a corrosive nature to the water.

DW(1)
CC--HES-3

H. G. BURNHAM

Engineer of Tests.

Form 821 6-16-22 1M RP

NORTHERN PACIFIC RAILWAY CO.

OFFICE OF ENGINEER OF TESTS.

REPORT NO. 27256

St. Paul, Minn., Nov. 30th 19 23

To A. F. Stotler, Dist. Engr.

ANALYSIS OF WATER

Sent in by A. F. Stotler Station Auburn, Wash.

Test Request No. 44 Source of Supply Well driven at South End of Yard Office

		Grains Per U. S. Gallon	
Incrusting Solids Producing Scale	Oxides of Silica, Iron, and Aluminum	Trace	
	Calcium Carbonate	1.66	
	Magnesium Carbonate	1.07	
	Calcium Sulphate	1.90	
	Magnesium Sulphate	-	
	Calcium Chloride	-	
	Magnesium Chloride	-	
	TOTAL INCRUSTING SOLIDS		4.63
Non-Incrusting Solids Producing Foaming	Alkali Carbonates	-	
	Alkali Sulphates	-	
	Alkali Chlorides	0.67	
	Alkali Nitrates	Trace	
	TOTAL NON-INCRUSTING SOLIDS		0.67
	TOTAL MINERAL SOLIDS		5.30

REMARKS: Incrusting Rating - Good
Foaming Rating - good

DW(1)
CC--HES-3

M. G. BURNHAM

Engineer of Tests.

2013

Saint Paul, November 24th, 1923.

Mr. A. R. Cook-

Your letter of the 17th about test wells at Auburn, - the last paragraph reading: "Should we before proceeding further arrange for drilling a hole or make the prospecting a part of the contract for completed well?":

We have no item in the 1924 budget for water supply at Auburn. I do not understand just what further proceedings you have in contemplation. It is my understanding the information you are obtaining was for making an approximate estimate for the purpose of carrying the item in the 1924 budget.

I think we have sufficient information for the purpose of making up an estimate and if you consider that something must be done on the water supply next season, then it will have to be submitted as a special item, not included in the budget.

Chief Engineer.

HES-h

2013

Re: Drive well at Yard-
master's office,
Auburn, Wash.

Seattle, Washington,
Nove,ber 17, 1923.

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

Dear Sir:-

Referring to the water supply at Auburn.

The drive well at the Yard Office has been completed and is now in service, and samples of the water from this well and from the section house well have been forwarded to Mr. Burnham for test. Samples of water from the City wells, according to Mr. Burnham's report of last August, showed that the water is rated as a good boiler supply water, from scale-forming and foaming standpoints.

The Bridge & Building Dept. started to drive a point for the well at the Yardmaster's office but after having penetrated about 10 feet, work was discontinued on account of encountering boulders. The B. & B. forces then excavated to a water line and drove a pipe 6 1/2 ft. below the water line, encountering fine so-called quicksand and it was necessary to pull the point up 3 1/2 ft. into a stratum of gravel 3 ft. in thickness, where a sufficient supply for their purposes was secured. The record of the excavation is:

First, 11 ft. loam and sand with clay streaks, enough clay to hold the sand from running.

Next, 11 ft. gravel and boulders followed by

2 ft. of clean, sharp sand where water level was found.

The present pump casing is driven 3 ft. below the water level and in gravel, total depth of the well from surface of ground to bottom of pipe, 27 feet. This stratum of water will not however be sufficient for terminal purposes.

I am attaching hereto section of our station plat, showing the location of the City wells in Block 11, First Addition to the Town of Slaughter, now Auburn, which are located almost directly north from the engine terminals, together with a diagram showing material encountered in the City wells, which are 74 feet in depth. Two of the wells, according to the best information available, are furnishing 250 gals. per minute, as an addition to the City supply. You will note that the top of the water bearing gravel is about 27 feet below the gravel in which the water for the Yardmaster's office is found. The water in the City wells raises to within 10 feet of the surface of the ground. If we put in the four 6-inch points at some place near the power house at Auburn, it will probably be necessary to first drill the holes, case the well on account of the boulders and quicksand, and set the points and then pull the casing. I have instructed Mr. Stotler to make up a sketch showing recommended location for the wells.

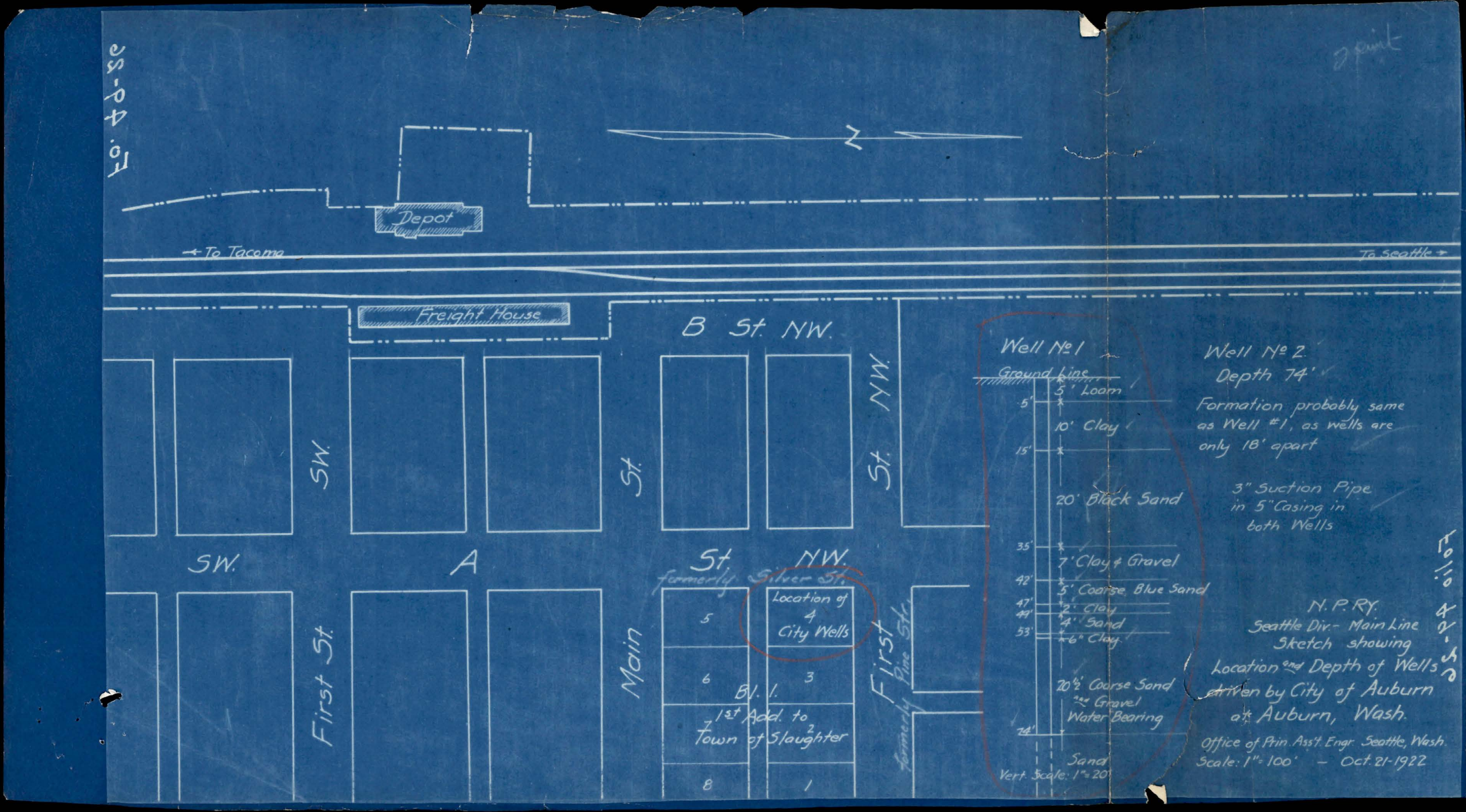
On referring to my letter of November 3, I note that the installation of four "6-inch pumps" is recommended. This should have been "points."

Should we before proceeding further arrange for drilling a hole or make the prospecting a part of the contract for completed well? It seems that it should be fully demonstrated that there is a sufficient supply of good water available.

Yours truly,

A. R. Cook

ARC:L
Encl.


Fo. 4-P-52
Depot
To Tacoma
To Seattle
Freight House
B St. NW.
SW.
First St.
A
St.
NW.
formerly Silver St.
Main St.
First St.
formerly Pine St.
Location of 4 City Wells
5
6
7
8
3
2
1
Bl. 1.
1st Add. to Town of Slaughter
Well No 1
Ground Line
5' Loam
5'
10' Clay
15'
20' Black Sand
35'
7' Clay & Gravel
42'
5' Coarse Blue Sand
47'
49'
53'
2' Clay
4' Sand
6' Clay
20½' Coarse Sand and Gravel Water Bearing
74'
Sand
Vert. Scale: 1" = 20'
Well No 2
Depth 74'
Formation probably same as Well #1, as wells are only 18' apart
3" Suction Pipe in 5" Casing in both Wells
N.P.RY.
Seattle Div. - Main Line
Sketch showing
Location and Depth of Wells
driven by City of Auburn
at Auburn, Wash.
Office of Prin. Ass't. Engr. Seattle, Wash.
Scale: 1" = 100' — Oct. 21-1922
Fo. 4-P-52

Re: Auburn water supply.

2013

Seattle, Washington,
November 3, 1923.

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

Dear Sir:-

Acknowledging your favor of October 17, referring to your letter of August 20, in regard to water supply at Auburn.

We have been awaiting the completion of the drive well at the yard office for the purpose of securing another sample of the water from a well on our grounds before proceeding further in the matter.

I understand, in conversation with the Assistant Supervisor of the Seattle Division, that this well is now completed and Mr. Stotler has instructions to secure a sample of the water and send it to the Engineer of Tests in the near future.

Should this sample be satisfactory, I recommend the installation of four 6-inch pumps, the electric pump to be operated by our engineer in the power house, and will make up plans and estimates accordingly.

The water supply at Auburn is one of the items in the Seattle Division Budget for 1924.

Yours truly,

A. R. Cook

ARC:L

St. Paul, Minn., October 17,1923.

Mr. A. R. Cook,
Asst. Chief Engineer,
Seattle Wash.

Dear Sir:

Will be glad to have reply to my letter of August 20th in regard to water supply at Auburn.

Yours truly,

REG:WP

Chief Engineer.

Form 821 12-29-21 2M RP

NORTHERN PACIFIC RAILWAY CO.

OFFICE OF ENGINEER OF TESTS.

2830

REPORT NO. 26294

St. Paul, Minn., August 24th 1923

To A. F. Stotler, District Engineer Seattle, Washington

ANALYSIS OF WATER

Sent in by W. S. Judson, Assistant Engineer Station Auburn

Test Request No. A. F. Stotler's ltr August 15th, 1923 Source of Supply Wells at Auburn Roundhouse Depth 74 feet.

		Grains Per U. S. Gallon	
Incrusting Solids Producing Scale	Oxides of Silica, Iron, and Aluminum	1.00	
	Calcium Carbonate	3.18	
	Magnesium Carbonate	1.96	
	Calcium Sulphate	-	
	Magnesium Sulphate	-	
	Calcium Chloride	-	
	Magnesium Chloride	-	
	TOTAL INCRUSTING SOLIDS		6.14
Non-Incrusting Solids Producing Foaming	Alkali Carbonates	-	
	Alkali Sulphates	1.56	
	Alkali Chlorides	2.40	
	Alkali Nitrates	trace	
	TOTAL NON-INCRUSTING SOLIDS		3.96
	TOTAL MINERAL SOLIDS		10.10

REMARKS: Incrusting Rating - Good
Foaming Rating - Good

The above water should be rated as a good boiler supply water from both Scale Forming and Foaming standpoints. Due to the laboratory not being equipped to determine the suitability of waters for drinking purposes, I regret that I am unable to furnish report in this regard.

JB(1)
CC-HES(3)

M. G. BURNHAM

Engineer of Tests.

OFFICE OF
CHIEF ENGINEER
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NOR 192
ST. PAUL MINN.
RY.

2013 410

Saint Paul, August 20th, 1923.

Mr. A. R. Cook:

Mr. Rapelje has sent me your letter to Mr. Blanchard of August 14th, and Mr. Blanchard's letter of the 15th, about water supply at Auburn.

I note sample jug has been sent to Mr. Burnham for analysis, and I presume on receipt of the result of this test you will let us have definite recommendations as to what you think should be done with a view of carrying the item in the 1924 budget.

Chief Engineer.

HES-ar

OFFICE OF CHIEF ENGINEER
AUG 20 1923
NOR. PAC. RY.
ST. PAUL, MINN.

Saint Paul, August 20th, 1923-s

Mr. H. E. Stevens:

Please note the attached letter from Mr. Blanchard enclosing one from Mr. Cook about water supply at Auburn:

I presume that you will have this matter looked into with a view of making an item for the 1924 budget.

J M Rapelje

Seattle, August 15, 1923.

Mr. J. M. Rapelje:

You will recall that on your last inspection trip on the Western District we discussed the water supply situation at Auburn. We are now getting water from Soos Lake through a long line of pipe which it isnecessary to soon renew and which costs considerable for maintenance and in addition thereto we do not have sufficient supply of water for three or four months during the dry season of the year and are compelled to put in a pump and pump water from the Green River, and there was a budget item in 1923 for two alternatives, one for procuring a gravity supply at an estimated cost of $25,000.00, and one with possibility of getting supply of water from wells in the vicinity of Auburn at an approximate cost of $10,000.00.

I attach hereto a letter from Mr. Cook, showing that the City of Auburn have recently put down two 5 inch wells, 74 feet in depth with a capacity of 250 gallons per minute, the water rising in the pipes to within 10 feet of the top of the ground. These wells cost the City $300.00 each, or a total of $600.00 for the two wells.

I have discussed this with Mr. Stotler and he is of the opinion that we should put down four 5" wells in the vicinity of our coal dock, which he thinks will give us an ample supply of water, if the analysis proves to be satisfactory. You will note that a sample has been sent to Mr. H. G. Burnham, Engineer

of Tests, St. Paul, for analysis.

Will you ascertain the result of the analysis and advise what action shall be taken.

cc - Mr. Brown,
Mr. Cook,

Re: Water Supply at Auburn.

Seattle, Washington, Aug. 14, 1923.

Mr. E. C. Blanchard,
General Manager,
Seattle, Wash.

Dear Sir:

Referring to conversation in re Auburn Water Supply while Mr. Rapelje was on the Coast a short time back. Further investigation of the City's wells has been made. It was found that the City has two - 5" wells 74 feet in depth with a capacity of 250 gallons per minute, the water rising in the pipes to within 10 feet of the top of the ground. The wells were drilled by the Puget Well-Drilling Company of Seattle at a cost of $300.00 each $600.00 for the two wells.

A one-gallon sample has been secured by Assistant Engineer Judson, the jug sealed and forwarded by express to Mr. H. G. Burnham, Engineer of Tests, St. Paul, for analysis.

Yours truly,

A. R. Cook

ARC:B

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