1963

Papers Concerning Logan Water Works; Correspondence

Dean F. Peterson
Utah State University

Alvin A. Bishop
Utah State University

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Mr. D. K. Fuhriman, Vice President  
Technical Services Incorporated  
292 West Center Street  
Provo, Utah  

Dear Mr. Fuhriman:  

Re: Well Driller's Permit No. 15  

This will acknowledge receipt of your letter dated January 22, 1963, together with your check in the amount of $15.00 and your Application for Renewal of Well Driller's Permit.  

In the course of checking through your activities for the year 1962, we have found that we have not received from you either Well Driller's Notice Cards or Well Driller's Reports for any of the work that you have performed for Logan City. We have been advised by the city that you have the principal contract for the well-drilling work that is currently being performed, and that the actual drilling is being done by the Andrew Drilling Company under a sub-contract. We have not received from the Andrew Drilling Company any Notice Cards or Well Driller's Reports for work that has been completed under this drilling program. It will not be possible for this office to take any action with respect to the renewal of your Well Driller's Permit for the 1963 calendar year, until this matter has been straightened out.  

Very truly yours,  

Francis T. Mayo, Chief  
Water Resources Branch  

FTM:bm  

CC: Andrew Drilling Company  

Ray C. Bugie, City Engineer  
Logan, Utah
January 25, 1963

Mr. Dennis Thompson
Waterworks Equipment Co.
502 West Third South
Salt Lake City, 10, Utah

Dear Mr. Thompson:

In reference to your telephone call to Dr. Bishop our estimates for NSPH at the inlet of the centrifugal pump are as follows:

<table>
<thead>
<tr>
<th>Q</th>
<th>NSPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000 g.p.m.</td>
<td>54</td>
</tr>
<tr>
<td>3250</td>
<td>48</td>
</tr>
<tr>
<td>3500</td>
<td>35</td>
</tr>
<tr>
<td>3750</td>
<td>16</td>
</tr>
<tr>
<td>3975</td>
<td>0</td>
</tr>
</tbody>
</table>

A review of our studies on the line indicates that a specification of 3400 g.p.m. at 215' is still the best design judgement we can make. The 10" 5813 impeller, trimmed to 15", curve furnished us satisfies this criterion. This curve shows 195' at 3750 g.p.m. which with 12' suction head and 12' friction losses between the pump and city main would coincide with 176' in the main, which we believe would rarely occur. In any case the back pressure valve can be set so that the NSPH can be controlled at any value necessary to prevent cavitation. A vacuum indicating guage has been included near the pump inlet so that this adjustment may be made under actual operating conditions and it is our intention to check this out under a performance test before placing in regular service. Although requested, we have been unable to obtain information from your company on permissable NSPH. If the 18' specification is unrealistic, please advise us what is permissable.

For the motor the rated horsepower shall be equal to or greater than required to drive the pump within the limits of the head and discharge requirements stated and under a load of 1.15 times such rated horsepower the temperature rise shall not exceed 40 degrees C. at altitude 4500'. We are clarifying this point by an addendum to the specifications.

I hope we may have pricing information for our estimate soon.

Yours very truly,

[Signature]

cc: City Engineer
Feb. 13, 1963

Bishop & Peterson
Professional Engineers
Utah State University
Logan, Utah

Subject: Logan Well #3 Booster Plant

Gentlemen:

Earlier today it was indicated to me that a decision relative to the selection of contractor and equipment for subject project was still pending. We believe the technical data and process description submitted by our company for your review is sufficiently complete for preliminary considerations but feel these may be lacking in "prestige" value. The enclosed information is primarily to enable you to consider the qualifications of the companies we represent rather than their specific products as we propose to furnish them.

Approximately two weeks prior to the preparation of our proposal we visited your offices and the office of the City Engineer and asked very pointedly if the City wished to receive bids and equipment only from a certain, single supplier favored in the specifications. The response was emphatic in the negative and underscored, particularly with reference to much of the control system, by noting that the specifications were functional and that the specific components of the system had not been preselected. In keeping with this open, friendly and engineering approach or response to our earlier contacts, we would be most grateful if you would:

1. Give us opportunity to meet on a single occasion with all persons interested in the technical aspects of the system to review the merits of our equipment and respond to questions relating to quality or the applicability of it.

2. Investigate the qualifications of our Company from the standpoint of technical competence, dependability of service and quality of product. Convenient references would be Todd & Horrocks, Engineers; Hansen & Smith, Engineers; and Mr. Howard Kelly, Waste Plant Superintendent, all of Brigham City. Mr. Kelly has a system of ours considerably more complex than required for your system.

3. Major components of the control system are products of manufacturers whom we have represented on an exclusive basis for several years. These are not temporary associations expedient to this project. Compare the homogeneity of our proposed system (e.g., our chlorinator and controlling flow recorder are products of the same manufacturer) with that of our competitors and investigate installations made by each of us in which we have used the control equipment identified in our bids.

Thank you for your many courtesies; we do not wish to be oppressive but do urge a further review of our more favorably priced equipment.

Sincerely,

[Signature]

M.K. Wimbish
February 14, 1963

Mr. Ray Hugie
City Engineer
Logan, Utah

Dear Mr. Hugie:

As you know, the bid of A. H. Palmer and Sons was the lowest regular bid for booster stations and control system opened on February 13, 1963.

A lower bid however, was received as an informal alternate from Olsen and Davis, which stated that if the City Engineer would accept the equipment furnished by WISCO Corp., a deduction of $1,300 from the Olsen and Davis bid would be made. The alternate bid is irregular in the following ways:

1. It was informal; not written on the bid form under the corporate seal.

2. The chlorinator proposed does not comply with the specifications which called for a Wallace and Tiernan V-notch type and permitted no substitutions.

3. We can rule on whether certain items meet specifications, but we cannot guarantee final acceptance which will be as per Art. 1.24. The request for advance acceptance would seem to relieve the contractor of his intended responsibility on this point.

4. Specifications and performance curves were not filed for the pump and motor for this alternative.

If the City were agreeable to considering other types of chlorinators, then we should consider rejecting all bids and rebidding on this basis. Since this is not the case, there would seem to be little to gain by rebidding. We therefore recommend acceptance of Palmer's bid.

Sincerely,

[Signature]

Bishop and Peterson
Harold F. Raybourn
Mayor
City of Evanston
Evanston, Wyoming

Dear Mayor Raybourn:

Attached are the data and recapitulation sheets which detail the comparative operating, maintenance and amortizing costs of a natural gas driven pumping unit and an electric driven pumping unit. To compile this data we have consulted with the following individuals and equipment suppliers:

John London & Clark Newell of the Utah Power and Light Company
Stanley Stringham of the Mountain Fuel Supply Company
Maurice McKendric and Vern Smith of the Water Works Equipment Co.
Wayne Briggs of the Wheeler Machinery Company
Dan Wolstenholme of the Fairbanks-Morse Company

Based upon this data and information, we have been able to determine that by using natural gas engines it is possible to affect an annual savings of $2,200.00. This computation is based upon a total yearly operation of 4300 pumping hours. We find the evidence to be in favor of natural gas.

We have attached a letter from Wheeler Machinery Company which outlines a guarantee they are willing to make if the City installs a natural gas engine supplied by their firm. In order to affect a cost comparison and control we could compare operating and maintenance costs of the new units with the related costs at our well No. 1.

Or, Wheeler Machinery Company will execute a written guarantee to the City that the maintenance, excluding fuel costs, will not exceed 40¢ per hour. Under this guarantee, they will completely maintain the Caterpillar engine. Based upon 4300 hours of operation, the City of Evanston would pay $1720 per year to Wheeler Machinery Company for this service.

We feel that the guarantee outlined in the attached letter will affect greater savings to the City since the estimated maintenance is 15¢ per hour. This gives a total annual cost of $645 compared with $1720. However, a City employee will have to make routine checks of the engine and change the spark plugs, filters and magnetos when required. This will not involve more than one and a half hours per month.
Harold F. Raybourn

Wheeler Machinery Company also guarantees that the designed horsepower requirement will be continually delivered at the shaft with no loss of efficiency and no increase in fuel consumption when overhauls are executed as directed by the Manufacturer. Wayne Briggs states that overhauls may be accomplished on the site with down time of only 3 hours for the Top Overhaul and 8 hours for major overhaul.

We feel that the facts, figures and information speak for themselves.

If there are questions relating to this study, or the data herein, please let us know.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR &amp; ENGINE, Complete</td>
<td>$25,100</td>
</tr>
<tr>
<td></td>
<td>$14,600</td>
</tr>
</tbody>
</table>

Based on operating 4300 hrs/yr

- 1.384.50/yr 1.648.50/yr
- 0.32/hr 0.39/hr

Yours truly,

COON, KING AND KNOWLTON

POWER & FUEL CONSUMPTION (Each unit)

- 1.00/hr 0.31/hr

TOTAL OPERATION & MAINTENANCE COST PER HOUR (Each Unit)

- 1.04/hr 0.46/hr

TOTAL COST PER HOUR FOR EQUIPMENT (Both units)

- 2.49/hr 1.31/hr

Incl. amortization, operation & Maint.

Based on 4300 hrs./yr operation:

- $5,860/yr $3,670/year

March 1963

as prepared by COON, KING & KNOWLTON
Salt Lake City, Utah

John S. Huefner
Engineer

(Original Document)
### Recapitulation

<table>
<thead>
<tr>
<th>Description</th>
<th>Electricity</th>
<th>Natural Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor &amp; Engine, Complete</td>
<td>$15,100</td>
<td>$14,600</td>
</tr>
<tr>
<td>incl. vari. speed &amp; cont. panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>800</td>
<td>1,100</td>
</tr>
<tr>
<td>Transformers</td>
<td>3,600</td>
<td>none</td>
</tr>
<tr>
<td><strong>Total Initial Cost (Both units)</strong></td>
<td><strong>$19,500</strong></td>
<td><strong>$15,700</strong></td>
</tr>
</tbody>
</table>

**Amortization (@ 4% interest)**
- Based on operating 4300 hrs/yr
  - Motor & Engine: $1,384.50/yr
  - Transformer: $1,648.58/yr
  - 0.32/hr

**Maintenance (Each unit)**
- Incl. oil, overhauls, etc.
  - 0.04/hr

**Power & Fuel Consumption (Each unit)**
- Motor & Engine: 1.00/hr
  - Natural Gas: 0.31/hr

  (Operating cost per Kwhr)
  - 1¢/Kwhr
  - 1/2¢/Kwhr

**Total Operation & Maintenance Cost per Hour (Each Unit)**
- 1.04/hr
  - 0.46/hr

**Total Cost per Hour for Equipment (Both units)**
- 2.40/hr
  - Incl. amortization, operation & Maint.

- Based on 4300 hrs./yr operation
  - Motor & Engine: $5,860/yr
  - Natural Gas: $3,630/year

March 1963

As prepared by COON, KING & KNOWLTON
Salt Lake City, Utah
March 18, 1963

John S. Huefner
Coon, King & Knowlton Engineers
1444 East 33rd South
Salt Lake City, Utah

Dear Mr. Huefner:

With reference to the cost comparison of a Caterpillar gas engine driven pump versus an electric motor driven pump that you are now preparing for Evanston City, we, Wheeler Machinery Co., will guarantee the operating costs of a Caterpillar natural gas engine to be less than the operating costs of a comparable electric motor, based on the current schedules of Utah Power & Light Co. and Mountain Fuel Supply Co. This guarantee includes total maintenance and fuel for the natural gas engine only and does not include the maintenance costs for the pump.

Wayne Briggs
WHEELER MACHINERY CO.

March 1963
prepared by: Koon, King & Knowlton
Salt Lake City, Utah
**NATURAL GAS**

**ELECTRICITY**

**DESCRIPTION**

<table>
<thead>
<tr>
<th>WELL #5</th>
<th>WELL #6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL COSTS:</strong></td>
<td></td>
</tr>
<tr>
<td>Engine complete (100 HP)</td>
<td>$6450</td>
</tr>
<tr>
<td>Motor (100 HP)</td>
<td>$2800</td>
</tr>
<tr>
<td>Flo-Matcher Equipment</td>
<td>$1090</td>
</tr>
<tr>
<td>Transformer(s)</td>
<td>$1380</td>
</tr>
<tr>
<td>Flo-Trol Panel</td>
<td>$2500</td>
</tr>
<tr>
<td>Installation</td>
<td>$500</td>
</tr>
<tr>
<td>Total Installation</td>
<td>$8,100</td>
</tr>
<tr>
<td><strong>TOTAL INITIAL COST (Both Units):</strong></td>
<td>$15,700</td>
</tr>
<tr>
<td><strong>AMORTIZATION (Both Units):</strong></td>
<td></td>
</tr>
<tr>
<td>Life of Motor 20 years (estimate)</td>
<td></td>
</tr>
<tr>
<td>Use 4% Interest for comparison</td>
<td></td>
</tr>
<tr>
<td><strong>$19,500 @ 4% interest for 20 Equal Payments</strong></td>
<td>$1384.50/yr (for 20 years)</td>
</tr>
<tr>
<td><strong>MAINTENANCE (Each unit):</strong></td>
<td></td>
</tr>
<tr>
<td>$100/yr for lubegrease, etc. - COST PER HOUR ($100/2150)</td>
<td>$0.04/hr</td>
</tr>
<tr>
<td><strong>POWER REQUIREMENT (Each unit):</strong></td>
<td></td>
</tr>
<tr>
<td>Using schedule 11 rate, the same as last year; actual data</td>
<td></td>
</tr>
<tr>
<td>from the Utah Power &amp; Light Company for existing Well #1, 100 HP motor yields cost per hour of</td>
<td></td>
</tr>
<tr>
<td>$1.00/hr</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL OPERATING &amp; MAINTENANCE COST PER HOUR PER UNIT (total operating cost = 1¢/kwhr):</strong></td>
<td>$0.15/hr</td>
</tr>
<tr>
<td><strong>FUEL CONSUMPTION (Each unit):</strong></td>
<td></td>
</tr>
<tr>
<td>125 BHP Engine requires 6150 BTU/BHP-hr @50c/MCF for cost of natural gas</td>
<td></td>
</tr>
<tr>
<td>COST PER HOUR ($150/1000BTU?CF x .0005CF x .125 BHP)</td>
<td>$0.31/hour</td>
</tr>
<tr>
<td><strong>TOTAL OPERATING &amp; MAINTENANCE COST PER HOUR UNIT</strong></td>
<td>$0.44/hour</td>
</tr>
<tr>
<td>prepared by: Koon, King &amp; Knowlton</td>
<td></td>
</tr>
<tr>
<td>Salt Lake City, Utah</td>
<td></td>
</tr>
</tbody>
</table>

March 1963

March 1963
NATURAL GAS

DESCRIPTION

INITIAL COSTS:

Engine, complete (100 HP) $6450 $6050
Pump Adaptor Equipment for Water Well $1050 $2100
Installation (Incl. gas hook-up) $600 $500

Sub Total: $8160 $4460

TOTAL INITIAL COST (Both Units) $8160 $4460

AMORTIZATION (Both Units)
Life of Engine 12 years (estimate)
use 4% Interest for comparison

WELL #5

WELL #6

Fuel Consumption: (Each unit)
125 BHP Engine requires 8150 BTU/HR at 30¢/MCF for cost of natural gas
COST PER HOUR (8150/1000BTU?CF x .0003CF x 125 BHP) = $0.31/hour

TOTAL OPERATING & MAINTENANCE COST PER HOUR UNIT
(total operating cost = 1/2¢/kwhr)

$0.46/hour

March 1963

Prepared by: Coon, King & Knowlton
S. 1t Lake City, Utah
March 28, 1963

Dr. A. Bishop
Engineering Department
Utah State University
Logan, Utah

Re: Logan City Corporation Deep Well Turbine Pump Installations

Dear Al:

I have been checking out pump selections on the above job and have come up with the following recommendations:

On the electric-driven unit, we can operate either a two speed motor-driven unit or a variable speed motor-driven unit. If there are only two pumping conditions to be considered--that of pumping into the reservoir or canal--perhaps the two-speed motor would be adequate. It just so happens that the pumping conditions fit pretty closely to the selected pump when the pump is operating at 1770 RPM or 1170 RPM. The 1770 RPM unit would produce a little bit more than 5,000 gallons a minute at 420 feet TDH, and the pump when operating at 1170 RPM would deliver a little bit better than 5,000 gallons a minute at 125 TDH. We, of course, could trim the impeller slightly to hit exactly the condition points, but I think this is close enough for you to analyze it at this time.

We would use the same pump for either of the wells and for either the engine-driven or the electric motor-driven unit. The only difference would be that we would use the 50 foot additional column for the Crockett Avenue well.

The equipment is as follows:

CENTER STREET WELL:

1 - well elevation, 4541 feet
   Reservoir elevation, 4868 feet
   Canal elevation, 4571 feet
   Static water level, 53 feet below the surface
   Probable drawdown, 32 feet
   Pumping condition No. 1 to reservoir, 412 feet
   Pumping condition No. 2 to canal, 115 feet
   Well casing 20 inch O.D.
   Capacity 5,000 GPM

1 - Fairbanks, Morse, Fig 6922 oil lubricated turbine pump, complete, including the following:
   1 - 700 horsepower vertical hollow shaft wound rotor variable speed motor, 3-phase, 60-cycle, 2300 volt with a thrust capacity of 20,000 pounds.
1 - 30\(\frac{1}{2}\) inch by 1\(\frac{1}{4}\) inch discharge assembly with one gallon solenoid oiler
1 - 150 feet of 1\(\frac{1}{4}\) inch discharge column by 1\(\frac{1}{4}\) inch oil tube by 2 7/16 inch shafting in ten foot lengths
1 - Three stage 18 inch XHC Fig. 6922 bowl assembly
1 - 1\(\frac{1}{4}\) inch cone strainer
1 - 2300 volt pumping plant panel
1 - drum control and resistor and cast grid resistors for 9 point speed control

Total estimating price including installation of pump only -- $37,000

1 - Two speed Unit One Fairbanks, Morse Fig. 6922 turbine pump equipped as listed above except with a two-speed motor in place of the wound rotor variable speed motor and less drum control and resistors but including panel

Total estimated price -- $32,000

CROCKETT WELL

1 - Well elevation, 4589 feet
Reservoir elevation, 4864 feet
Static Water level, 103 feet below surface
Drawdown, 15 feet
Pump capacity, 5000 GPM
Canal elevation, 4639 feet
20 O. D. well casing
Pump speed 1770 PRM or 1170 RPM
Engine speed, 1180 RPM or 800 RPM

1 - Fairbanks, Morse, Fig. 6922 turbine pump as listed above except with one Western Model 240-PN-1.5 to 1 ratio increasing right angle gear drive.
1 - WL 9 Watson Spicer flexible drive shaft complete with flanges
1 - Wauksha Model VLROU combination natural gas and gasoline power unit complete

Total estimated price -- $46,000

The engine driven unit, of course, would have variable speed control for any pumping condition.

I am attaching descriptive literature and performance curve along with typical specifications on the equipment. If I can be of further help to you, please advise.

Very truly yours,

D. A. Wolstenholme

DAW: ph
The pump is guaranteed for the set of conditions specified; other points on the curve are approximate. Capacity, head and efficiency guarantees are contingent on the pump being furnished with the specified amount of clear, fresh, non-aerated water at a temperature of not to exceed 85 degrees Fahrenheit.

FAIRBANKS MORSE & CO.
CHICAGO 5, ILLINOIS
For Well No 1 discharging into system - Consider full Reservoir and demand of 32 cfs 12 cfs supplied by well and 20 cfs in 24" line to 8th E and 10 cfs in line well No 3 to 4th N - Well #2 not operating.

24" line Reservoir to 8th E 7350'

(Equivalent) 16" line 8th E to 4th N 3500'

Well 16" line 4500' to 4th N.

Head loss - Res. Line
24" - 20 cfs $5.5/1000 \times 73.5 = 40.5$
16" - 10 cfs $9.5 \times 3.5 = 33.2$

Head loss - Well line
5050 gpm - 12 cfs $13.0 \times 4.5 = 59.0$

Assume 15' well pipe diff well Q = 58.50
10' - 10 kcs
H = 24.0'
April 3, 1963

Ray Hugie
City Engineer
Logan, Utah

Dear Mr. Hugie:

We have discussed the matter of priority on the various phases of the water system improvement and we think these should be as follows:

1. Complete the 16" link line from 10th North and 6th East to South Main Street.

2. Install a pump station of either the flowmatchér or a modulated gas-powered type to pump directly into this line at Well Site 1 or 2. We would not recommend equipping this site for exchange.

3. Complete part or all of the 6" distribution mains.

4. Equip Site 4 with a deep-well turbine pump for exchange purposes.

5. Equip either Site 1 or 2 with a standby pumping station with a separate power supply directly into the line.

If development requires it, Item 5 could be delayed in favor of developments on the south bench. Item 4 would probably cost only about $12,000 and could likely be completed in 30 days so this probably would not compete seriously if its priority were increased.

We have seven years after appropriation to complete proof so the well equipment can be phased for the future in order to spread capital investment; on the other hand, the strain on Utah's water resource is going to greatly accelerate and it might not be too desirable to leave this important program to the uncertainties of the too-far future if means are conveniently available to pursue it to consummation relatively soon. The additional capital invested in standby facilities may well lead to substantial savings to citizens (if not to the City's budget) in fire insurance premiums. We are pulling together specific information on this point.

Sincerely yours,

BISHOP AND PETERSON
APRIL 3, 1963

BISHOP AND PETERSON
71 NORTH 2ND WEST
LOGAN, UTAH

SUBJECT: DRILLING OF PRODUCTION WELL NO. 5 FOR LOGAN CITY

GENTLEMEN:

THIS IS TO ADVISE YOU THAT WE HAVE REACHED AGREEMENT WITH ANDREW WELL DRILLING CONTRACTORS FOR THE ADDITIONAL WELL WHICH LOGAN CITY DESIRES AT 10TH NORTH AND 3RD EAST.

IT IS REQUESTED THAT YOU PROVIDE FOR US AN AMENDMENT TO CHANGE ORDER NO. 2 TO PROVIDE FOR THE 20-INCH CASING ON WELL NO. 5 AT THE SAME PRICE AS WAS GRANTED FOR WELL NO. 1 AND WELL NO. 2.

AS WE READ CHANGE ORDER NO. 3 IT IS OUR UNDERSTANDING THAT THE ANDREW WELL DRILLING CONTRACTORS ARE ALREADY APPROVED AS SUBCONTRACTORS TO DO THIS WORK. PLEASE ADVISE MR. ANDREW AS TO THE EXACT LOCATION YOU DESIRE FOR WELL NO. 5.

YOURS TRULY,

TECHNICAL SERVICES INCORPORATED

DKF-JCM

CC - HOWARD ANDREW
April 4, 1963

Technical Services Inc.
292 West Center St.
Provo, Utah

Gentlemen:

This will approve Andrew Well Drilling as subcontractor for Well No. 4. You are directed to drill a new well at this site at a point approximately 50 feet south of the present hole. Backfill the present hole to approximate depth 190' with gravel and place one-fourth cubic yard concrete plug. Backfill remainder with earth, cut off and plug with one-fourth cubic yard concrete plug 3' below ground surface.

BISHOP AND PETERSON
April 12, 1963

Technical Services, Inc.
292 West Center St.
Provo, Utah

Gentlemen:

In reference to your letter of April 3, 1963 the City has not officially approved your suggestions, but I understand there will be no problem. Please include this, and the bill of April 3 in your next billing, crediting the City with the present payment on Well No. 4. The City would be willing to release the retainage on Wells 2 and 3 also, so you can include this also.

Very truly yours,

[Signature]

Bishop & Peterson
APRIL 16, 1963

BISHOP AND PETERSON
71 N. 2ND WEST
LOGAN, UTAH

GENTLEMEN:

WE ARE ENCLOSING HEREWITH THREE SIGNED COPIES OF CHANGE ORDER NO. 6 AS REQUESTED IN YOUR LETTER OF APRIL 12.

THIS WILL ADVISE YOU ALSO THAT WE HAVE MADE ARRANGEMENTS WITH ANDREW WELL DRILLING CONTRACTORS TO FILL AND PLUG WELL NO. 4 IN ACCORDANCE WITH YOUR RECENT INSTRUCTIONS. THEY ARE PLANNING TO PROCEED SOON WITH THE FILLING AND PLUGGING SO THAT THEY CAN THEN BEGIN DRILLING THE NEW WELL.

WE ARE IN THE PROCESS OF CHECKING QUANTITIES TO RESUBMIT BILLINGS ON THE WORK WHICH HAS BEEN COMPLETED TO DATE WITH A REQUEST FOR RELEASE OF RETAINAGE ON THE COMPLETED WORK AND INCLUSION OF THE ADJUSTMENTS ON THE ORIGINAL WELL NO. 4. AS SOON AS WE HAVE CHECKED THESE QUANTITIES IN OUR OFFICE AND WITH OUR SUBCONTRACTOR, WE WILL SUBMIT THIS UP-TO-DATE BILLING TO YOU.

YOURS TRULY,

TECHNICAL SERVICES INCORPORATED

DKF-JCM

ENCLOSURES
BISHOP AND PETERSON
71 N. 2ND WEST
LOGAN, UTAH

GENTLEMEN:

WE ARE ENCLOSING HEREWITHE A STATEMENT COVERING ALL OF THE WORK UNDER OUR CONTRACT UP TO, BUT NOT INCLUDING, THE WELL WHICH IS NOW IN THE PROCESS OF BEING DRILLED BY ANDREW WELL DRILLING CONTRACTORS. THIS IS PREPARED IN LINE WITH YOUR EARLIER SUGGESTIONS AND WE REQUEST THAT SINCE THE WORK COVERED BY THIS BILLING HAS BEEN COMPLETED AND ACCEPTED WE BE PAID THE RETAINAGE WHICH HAS BEEN HELD IN RELATION THERETO.

YOU WILL NOTE A SLIGHT CORRECTION ON THE BILLING FOR WELL NO. 1 COMPARED WITH OUR LAST PREVIOUS BILLING. WE HAD ERRONEOUSLY LISTED THE AMOUNT OF 20-INCH PIPE SLIGHTLY LESS THAN WAS ACTUALLY INSTALLED AT THIS WELL. YOU WILL ALSO NOTE THAT WE HAVE NOT INCLUDED ANY CHARGES IN RELATION TO THE INSTALLATION OF A LARGER PUMP AND MOTOR ON WELL NO. 1 OR 2 SINCE IT IS OUR UNDERSTANDING THAT YOU WERE DEALING DIRECTLY WITH THE ANDREW WELL DRILLING CONTRACTORS ON THIS WORK.

IF YOU HAVE ANY OTHER QUESTIONS IN RELATION TO THIS BILL, PLEASE LET US KNOW.

YOURS TRULY,

TECHNICAL SERVICES INCORPORATED

DKF-JCM

ENCLOSURE
Both the original and this copy of this letter was received by our office. It probably should have been sent to Ray Hugie.

Dear Mr. Johnson:

With regard to measuring the discharge pipe, which could be subject to wear, and which is caused to subject to wear, the engineer has agreed to permit disposal of the pipe under your direction.

Don't just ship—**EXPEDITE** call P·I·E for better service.

RECEIVED
MAY 31 '63
JOHNSON PUMP CO.
IDAHO FALLS, IDAHO

RECEIVED
MAY 31 '63
JOHNSON PUMP CO.
IDAHO FALLS, IDAHO
Dear Mr. Johnson:

The information furnished Logan City is inadequate for them to construct the equipment foundations on the Well No. 2 job. Information regarding elevation of the engine base with regard to pump base datum and horizontal distance from pump axis to engine base bolt locations has not been furnished.

With regard to measurements needed for fabricating the discharge pipe, rather than us taking the measurements, which could be subject to misinterpretation; the City Engineer has agreed to place a surveying crew at your disposal to take such measurements as you might need under your direction.

Sincerely,

[Signature]

Bishop & Peterson

cc: Ray Hugie
June 6, 1963

Mr. Win Templeton
Templeton And Linke
Consulting Engineers
Dooly Building
Salt Lake City, Utah

Dear Win,

I've been going over some of the figures we talked about yesterday and wonder if there are perhaps a few items we didn't think to consider. I think you'll agree that our figures should be as realistic as possible. First, in the operating cost I don't believe we considered an item for lubrication, attendance or repairs. Certainly based on a 40 year life the pump bowls would need to be repaired or replaced several times. Would you think 60 cents per acre foot is adequate to cover this? This would bring the operating cost to $5.25 per acre foot.

Second, in determining the fixed costs per acre foot shouldn't we use the actual water Logan City used in excess of its legal right? I think we used something in excess of 3000 acre feet, but I can't recall where that figure came from. The actual excess use was 1905 acre feet in 1961 and 1624 acre feet (before deductions) in 1962.

Also, the method of figuring depreciation may be questioned. We both agree that there are many ways of doing this but for your consideration I am suggesting the method used by the U. S. Department of Agriculture, which I think is fairly well accepted. The computations would be something like this:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual interest on investment</td>
<td>$40,000 @ 2% $ 800.00</td>
</tr>
<tr>
<td>Depreciation:</td>
<td></td>
</tr>
<tr>
<td>Well and casing @ 5%</td>
<td>1250.00</td>
</tr>
<tr>
<td>Pump @ 7 % (7500.00)</td>
<td>525.00</td>
</tr>
<tr>
<td>Motor @ 5% (7500.00)</td>
<td>375.00</td>
</tr>
<tr>
<td>Pump house @ 5%</td>
<td>35.00</td>
</tr>
<tr>
<td>Total fixed cost</td>
<td>$ 2985.00</td>
</tr>
</tbody>
</table>
June 22, 1963

A. H. Palmer and Sons
188 North Main
Logan, Utah

ATTENTION: Kenneth Palmer

Dear Mr. Palmer:

There is a time delay relay in the existing circuitry on the outside panel at the City's booster pump station. This delay is set when the pump stops to assure that the pump will not be restarted until it has unwound under the pressure of the water running back down the well and come to a stop. This is set at five minutes.

Will you please make sure that the new wiring is such that this time delay will take over regardless of the reason for stoppage. That is, the new wiring must not bypass this time delay. This is probably the case, but please make sure.

By copy of this letter I am suggesting that the City Engineer request the electrical superintendent to permit no one to change the setting of this time delay except on his specific authorization.

BISHOP AND PETERSON

dp

cc: Ray Bugie
    City Engineer
June 24, 1963

Mr. Ray Hugie:
City Engineer
Logan, Utah

Dear Mr. Hugie:

It looks to me like there is no real reason for the continuing delay on completing the pump and control stations except the inability of the vendor to hook it up. The equipment has been on the job for ten days. I was informed it would be ready for inspection Monday, June 17, however, the day was spent in hooking up and checking which should have been done by the vendor in advance; the same was true on Thursday. It begins to appear like the only way we are going to get this done is to invoke the liquidated damage clause and I feel the City would be justified in doing this effective June 19.

BISHOP AND PETERSON

cc: A. H. Palmer and Sons

cc: Waterworks Equipment Co.
June 24, 1963

nothing which I was told was set at 50. Smith interrupted the narrative more than once and the last time I inquired about the rapid closure of the valve, although I'm not sure that I did so. He did remark that

Mr. Ray Hugie
City Engineer
Logan, Utah

Dear Mr. Hugie:

Only tonight, through Commissioner Covington, did I learn of the extent of the damage inflicted to the City's line by the operations connected with checking out the control valve Thursday evening, June 20. In this connection, I understand the valves were fully closed on Monday, June 17, in order to draw the reservoir down to test the pump. Since there was no resulting damage, it seems obvious that the line is safe, as we surmised, against static water pressure; it would appear, thus, that the bursting on Thursday was due to water hammer.

Attention is called to the specifications for the control valve p. 24 Art. 2.34 which provides:

"Regardless of control or power system, valve shall not hunt, nor shall valve open or close at such a rate as to cause discernible water hammer. In the event of electric power failure valve shall hold indefinitely at the opening at the moment of failure."

On Thursday evening, after he had checked out the reservoir control system, Mr. Smith invited me to close the valve by moving the set point. I did this and he cautioned me about moving the set point too rapidly in order to avoid too rapid closure. There was a 10% differential setting, further, the air pressure level was such that the valve would close only to about 1/6 opening. After readjustment of the system the valve was finally fully closed, but this was done very slowly.

The set point for the spring was set at 4.3' and the recorder pan showed 5.3'. Following checkout described above, Mr. Smith proceeded to work on other elements of the control panel. In order to do this he turned off the power and this caused the pressure indicator for the spring to drop to zero. When Mr. Smith turned the power back on, I became aware of the noise of the valve closing and noted that it had fully closed. The spring signal apparently responds slowly after an electrical current interruption. Smith was busy and I didn't say anything since I thought this problem had been taken care of by the differential
setting which I was told was set at 3%. Smith interrupted the power twice more and on the last time I inquired about the rapid closure of the valve, although I'm not sure that Smith caught on to what was happening. He did remark that the differential for the spring was erroneously set on zero. As I understand it, this would cause instantaneous response and rapid valve closure and that resulting water hammer damage would be the contractor's responsibility.

BISHOP AND PETERSON

cc: A. H. Palmer and Sons
188 North Main
Logan, Utah

Waterworks Equipment Co.
P.O. Box 236
502 West, 3rd South
Salt Lake City, Utah

In Saturday evening, prior to the shut down, Mr. Smith checked on the necessary control, valves. I was informed to observe the valves by moving the set point. I did this and he continued to check moving the set point too rapidly in order to avoid too rapid closure. There was a 1% differential setting. Further, the air pressure level was such that the valve would close only to about 1/4 opening. After readjustment of the air, the valve can finally fully closed, but this was done very slowly.

The set point for the spring was set at 0.5° and the recorder pen showed 3.3°. Following another observation above, Mr. Smith proceeded to work on other elements of the control panel. In order to do this he turned off the power and then caused the pressure indicator for the spring to drop to zero. Then Mr. Smith turned the power back on, I became aware of the noise of the valve closing and noted that it had fully closed. The spring acted apparently normal after an electrical current interruption. Both too busy and I didn't say anything since I thought this problem had been taken care of by the differential.
November 4, 1963

A. H. Palmer & Sons
Logan, Utah

Attention: Kenneth Palmer

Gentlemen:

We would like to make a final inspection of the work at the Logan City control house soon so that the contract can be settled. In this connection our specifications reads, p.24 Art 2. 34: "Regardless of control or power system, valve shall not hunt, nor shall valve open or close at such a rate as to cause discernible water hammer. In the event of electric power failure valve shall hold indefinitely at the opening at the moment of failure."

After an outage, the equipment for controlling the water level at the spring causes valve closure upon restart due to the slow response of the signal at the controls. We do not believe this satisfies the specifications. We question whether the differential setting would prevent this even if it were set on a high percentage, although we are willing to witness a demonstration otherwise if you can do it. The specification intends that the valve hold constant during the outage and then regulate from that point, not close due to a false signal in the restart interval.

It is also requested that you carefully check the reservoir air circuitry for leakage since the air consumption seems exhorbitant.

If possible, we would like to hold the inspection on Friday, November 29.

Yours very truly,

[Signature]

Bishop & Peterson

cc: Waterworks Equipment Co.
City Engineer Ray Mugie
December 10, 1963

Attention: Mr. D. F. Peterson

Subject: Logan City Well #1 Pumping Station

Gentlemen:

We wish to acknowledge with thanks receipt of your recent letter regarding the proposed electric pumping station for the recently drilled city well.

Back in September, the writer had discussed this job with Mr. Al Bishop and wrote him a letter under date of September 23 regarding the application of an 18" bowl with 16" column to this particular well. At that time, we were talking about handling up to 6500 GPM with this particular pumping unit. For capacities in the range of 5400 GPM to 6500 GPM, we would recommend this same 18" XHC bowl assembly, operating at a maximum of 1770 RPM.

Motor HP's in the range we are discussing run 600 HP, 700 HP and then 800 HP. The conditions of 5400 GPM at 400' TDH would require over 650 brake HP and therefore would call for the application of a 700 HP driver. With the thought in mind of fully loading the 700 HP motor, a pumping capacity in the range of 5,850 GPM at a total pumping head of 400' could easily be met. Basically, this would require the following equipment:

1- 700 HP 1770 RPM Type KZKVW 3/60/2300 volt vertical hollow shaft motor with extra heavy thrust bearing and with non reverse ratchet.

1- 30½ x 16 surface discharge head assembly.

1- 150' 16" O.D. column pipe x 4" oil tube x 2 7/16" drive shaft.

1- 3 stage 18 XHC Fig. 6922 enclosed impeller bowl assembly fitted with 16" O.D. suction strainer complete with 150' of ¼" airline with altitude gage and fittings.
This unit would be driven by squirrel cage induction motor, constant speed of 1770 RPM and an estimating figure to use for the above pump and motor installed would be approximately $25,000.

This same 3 stage 18" XHC bowl assembly would deliver in the neighborhood of 7600 GPM at a total pumping head of 300' and this would probably be the lowest operating head that this unit should be utilized at. The well itself would be a great factor in determining this as the draw down in the well and the NPSH requirements of the pumping assembly would have to be closely scrutinized. In any event, it however appears feasibly that the pump could be operated with the discharge throttled to deliver approximately 7600 GPM at a total dynamic head of around 300'.

Another way to accomplish the lower pumping condition would be to use a variable speed wound rotor motor instead of the squirrel cage induction motor and it would be then possible to relatively easily control the operating speed of the pumping unit. As an example, this 3 stage 18 XHC bowl assembly at 1170 RPM would deliver approximately 4250 GPM at a total dynamic head of 168' requiring approximately 207 bowl HP at 1170 RPM. Estimating price of pump with wound rotor motor is $29,200.00 less controls.

We are attaching performance curve covering this 18" bowl assembly and know that it will fit into this application very nicely. The writer will certainly make it a point to contact you quickly regarding this pumping application as it is felt that we can give you a lot of good information by discussing this job with you personally.

Very truly yours,

R. J. Rodgers
Field Engineer

RJR:jb
PER STAGE PERFORMANCE 18" XHC FIG. 6920

<table>
<thead>
<tr>
<th>NUMBER OF STAGES</th>
<th>EFFICIENCY CHANGE</th>
<th>IMPPELLER ENAMELED C.I.</th>
<th>BOWL ENAMELED C.I.</th>
<th>BOWL DIA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOWER 3 Pts.</td>
<td></td>
<td></td>
<td>17-7/8&quot;</td>
</tr>
<tr>
<td>2</td>
<td>LOWER 1 Pts.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IMP. NO. 2185

HYDRAULIC PERFORMANCE IS CONTINGENT ON FURNISHING THE PUMP WITH SPECIFIED AMOUNT OF CLEAR, FRESH, NON-AERATED WATER NOT TO EXCEED 85° F.

TEST 5777

3 STAGES: 5850 GPM

85.5% = 705 BOWL HP

@ 84% = 657 BOWL HP
PER STAGE PERFORMANCE

18" XHC FIG. 6920

NUMBER OF STAGES | EFFICIENCY CHANGE | IMPELLER ENAMELED C.I. | BOWL ENAMELED C.I. | BOWL DIA. 17-7/8 |
--- | --- | --- | --- | --- |
1 | LOWER 3 PTS. | | | |
2 | LOWER 1 PT. | | | |

K_T = 33.0

TEST 5777

HYDRAULIC PERFORMANCE IS CONTINGENT ON FURNISHING THE PUMP WITH SPECIFIED AMOUNT OF CLEAR, FRESH, NON-AERATED WATER NOT TO EXCEED 85° F.

SHUT OFF HEAD

14 1/4 DIA = 875'
13" DIA = 731'

TOTAL DYNAMIC HEAD - FEET

70
60
50
40
30
20
10

2500 3000 3500 4000 4500 5000 5500

U.S. GALLONS PER MINUTE

U.S. GALLONS PER MINUTE
A. Alvin Bishop
Dean F. Peterson
Professional Engineers
71 North 2nd West
Logan, Utah

Gentlemen:

In answer to your letter of November 29th, I submit the following information. The deep well turbine pump specified in your 1st paragraph would require 6 to 8 weeks delivery depending on the availability of a 700 HP motor. The pump and 700 HP motor including installation of the pump and motor only, not including switch gear or wiring would cost approximately $17,108.00.

Under limited operating conditions, the delivery would be approximately the same depending upon the availability of a 350 HP motor. Your cost, including the pump and 350 HP motor and installation of the pump and motor but not including switch gear or wiring, would be approximately $11,616.00.

We are also quoting you a barrel type pump for the combination of the two pump application. The delivery would be the same as above and again would depend upon the availability of a 350 HP motor. This pump would be installed along with the deep well turbine and does not have switch gear and wiring included. The cost would be approximately $9,292.00.

If you would furnish me with data concerning the type of switch gear required and starting characteristics required by the power available, I would be glad to send you approximate costs on your requirements.

Enclosed please find dimensional prints and performance curves for the above mentioned pumps. If I can be of further service, please feel free to write or call.

Sincerely,

[Signature]
Ralph Johnson
Branch Manager

Enc.
JOHNSON VERTICAL TURBINE PUMP

BASE MATCHES 3150 ASA FLANGE
14 150° DISCHARGE FLANGE

GE US or WESTINGHOUSE ELECTRIC
VERTICAL HOLLOW SHAFT MOTOR
100 HP 3 PHASE 60 CYCLE
2300 RPM 1750 RPM
Drip Proof Enclosure

24' 30' x 14' TYPE "A" DISCHARGE HEAD
NO .875 SOCKET SEAL STANDARD

14x32x2.75 WALK AROUND ASSEMBLY
4 STAGE BEARING ASSEMBLY
5700 USGPM
400 FT TOTAL DYNAMIC HEAD
MAXIMUM PSI DISCHARGE

LIQUID WATER
SPEC. GRAV. 10.0 - 10 F.PUMPING TEMP.
VISCOSITY 500 SUS. @ PUMPING TEMP.

CUSTOMER City of Logan, Utah

NOTE: DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED
JOHNSTON VERTICAL TURBINE PUMP

GE V5 or Westinghouse or Equal
Vertical Helical Shaft Motor
350 HP 3 Phase 60 Cycle
2300 Volt 1760 RPM
Drip Proof Enclosure

24" 24.5 x 14 Type "A" discharge head
No coupling
Seal standard

14 x 3 x 11/2 column assembly
2 x 4 x 18 elbow assembly
5400 GPM
2000 PSI
Max total dynamic head
Max suction head
Max discharge
Max fluid water
Max fluid grey

Customer City of Logan, Utah

Pumps
Johnston Serial #
Johnston Operating # U-1131
14" Strainer

Note: Do not use for construction unless certified

JOHNSTON PUMP COMPANY
PASADENA, CALIFORNIA
Note: All column losses are included.

Johnston Ref. No. U-1131
Dealer
Customer: City of Logan, Utah

Head Capacity

Pump Efficiency

Brake Horsepower

The capacity, head and efficiency guarantee is for the designated point only; it is based on shop tests, when handling clear, fresh water at a temperature of not over 85°F, and under suction conditions as specified in the

JoHNSTON PUMP CO.
VERTICAL PUMPS

Performance 2 Stage

185C Turbine
1160 RPM

J
PASADENA · CALIFORNIA · U.S.A.

Date: 12-12-63
JOHNSTON VERTICAL TURBINE PUMP

VERTICAL HOLLOWSHAFT MOTOR
360 HP 3 PHASE 60 CYCLE
2300 VOLT 1760 RPM
DRIFFROOF ENCLOSURE

NO COUPLING
SEAL STD.
TYPE "G" STEEL DISCHARGE HEAD

STAGE BOWL ASSEMBLY
BOWLS CAST IRON
IMPELLERS BRONZE
BEARINGS BRONZE
SHAFT 416 SS

FT TO SUCTION
IMPELLER EYE
CONDITIONS:
5700 USGPM
PSIG SUCTION PSIG DISCHARGE
DIFF. PSI MAXIMUM PSI
200 FT. TOTAL DYNAMIC HEAD
LIQUID WATER
SPEC. GRAV. 1.0 
°F PUMPING TEMP.
REQUIRED NPSH FT. & SUCTION FLANGE
VISCOITY SSU & PUMPING TEMP.
CUSTOMER: CITY OF LOGAN, UTAH

DEALER

JOHNSTON SERIAL #: JOHNSTON QUOTATION #: H-1131

NOTE: DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

JOHNSTON PUMP COMPANY
PASADENA, CALIFORNIA

H-1266-A
NOTE: All column losses are included

TOTAL DYNAMIC HEAD IN FEET

Can Pump

Head Capacity

Pump Efficiency

Brake Horsepower

THE CAPACITY, HEAD AND EFFICIENCY GUARANTEE IS FOR THE DESIGNATED POINT ONLY. IT IS BASED ON SHOP TESTS WHEN HANDLING CLEAR, FRESH WATER AT A TEMPERATURE OF NOT MORE THAN 85° F. AND UNDER SUCTION CONDITIONS AS SPECIFIED IN THE

JOHNSTON PUMP CO.

VERTICAL PUMPS

PERFORMANCE 2 STAGE

18E C TURBINE

1760 RPM

12-1962
NOTE: All column losses are included.

Johston: Ref. No. U-1134

Dealer: Ref. No._

Customer: City of Logan, Utah. Ref. No. Well 4.)

Head Capacity

Pump Efficiency

Brake Horsepower

1000 U.S. Gallons Per Minute

The capacity, head and efficiency guarantee is for the designated point only: it is based on shop tests. When handling clear, fresh water at a temperature of not over 85° F. and under suction conditions as specified in the contract.

Johnston Pump Co.

Vertical Pumps

Performance: 2 Stage

1800 RPM

1160 RPM

Pasadena, California, USA

Impeller: Bronze

Casing: Cast Iron

Water: 1.0