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Dean F. Peterson
Utah State University

Alvin A. Bishop
Utah State University

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LOGAN CITY CORPORATION

LOGAN, UTAH

OFFICIAL ESTIMATE

CONTRACT DOCUMENT

FOR

WATER SYSTEM IMPROVEMENT

DEWITT SPRING TO DAVIS CAMP

IN

LOGAN CANYON

STOCK - BISHOP - PETERSON

Professional Engineers

ENGINEER'S

ESTIMATE

JUNE 14, 1949

Sheet _____ of _____
File LOGAN CITY PIPE
Date 7/5/49
Comp. by _____
Checked _____

STOCK--BISHOP--PETERSON

PROFESSIONAL ENGINEERS

LOGAN, UTAH

CONTRACT DOCUMENTS
FOR
WATER SYSTEM IMPROVEMENT DEWITT SPRINGS TO DAVIS CAMP

* * *

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INVITATION

Sealed proposals will be received by Logan City Recorder, Logan City Offices, Logan, Utah, until 5:00 o'clock p.m. July 6, 1949, at which place and hour they will be publicly opened and read, for the construction of a pipe line and appurtenant works in Logan Canyon near Logan, Utah. The construction will involve 5900 feet of 36-inch diameter pipe, 10,422 feet of 30-inch or 24-inch diameter pipe, trenching and backfilling along with spring development, control and improvement. Proposals must cover the entire construction and the necessary labor and materials for the same. The right is reserved, as the interest of Logan City may require, to reject any and all bids, to waive any informality in bids received and to accept or reject any items of any bid unless such bid is qualified by specific limitation.

Plans and specifications are on file in the office of Logan City Engineer, Logan, Utah, where they may be reviewed by prospective bidders. Proposal forms, plans and specifications will be furnished by the City Recorder, Logan, Utah, on depositing \$5.00 which will be refunded upon return of plans and specifications in good condition. The specifications used in making a bid will be considered as returned. Each bidder must submit a letter from an approved surety company guaranteeing to furnish said bidder with required bond.

Cash, certified check, cashier's check, or approved proposal guaranty bond for not less than five per cent of total amount of bid made payable to Logan City must accompany each bid as evidence of good faith and a guarantee that if awarded the contract, the bidder will execute the contract and furnish bond as required. Any additional information may be secured at the office of the City Recorder of Logan, Utah.

Dated this _____ day of June, 1949

City Recorder

INSTRUCTIONS TO BIDDERS

Bids must be made on the form provided and must be enclosed in a sealed envelope plainly marked as follows:

"Bid for Logan City Water System Improvement
DeWitt Spring to Davis Camp"

To Be Opened: 5:00 p.m. MST, July 6, 1949

Bids may be delivered in person or may be mailed. If mailed, the sealed envelope referred to above shall be placed in a second envelope addressed to:

Logan City Recorder
Logan, Utah

Bids received prior to the time set for opening shall be securely kept, unopened. The officer whose duty it is to open them will decide when the specified time has arrived and no bid received thereafter will be considered, except that when a bid arrives by mail after the time fixed for opening, but before the award is made, and it is shown to the satisfaction of the officer authorized to make the award that the non-arrival on time was due solely to delay in the mails for which the bidder was not responsible, such bid will be received and considered. No responsibility will attach to an officer for the premature opening of a bid not properly addressed and identified. Unless specifically authorized telegraphic bids will not be considered, but modifications by telegraph of bids already submitted will be considered if received prior to the hour set for opening.

Reference is hereby made to the plans and specifications. The work to be accomplished must be done in strict conformity with the plans and specifications which were approved and adopted by the Logan City Commission on the 14th day of June 1949. Copies of plans and specifications will be furnished intending bidders upon application to the Logan City Engineer or the Recorder of Logan City and upon payment of the sum of \$5.00, which sum will be refunded on the return of the plans in good condition within ten days after the date set for the opening of bids.

Each bidder must submit with his proposal cash, certified check or a cashier's check made payable to Logan City Corporation in an amount not less than 5 per cent of the aggregate sum of the bid or a satisfactory proposal guaranty bond for said amount and so payable as a guarantee that the bidder will enter into the proposed contract if it is awarded to him. No bid will be considered unless it is accompanied by such check or bond. The cash, check or bond accompanying the bid and the proceeds thereof will become the property of Logan City Corporation if the bidder fails or refuses to execute the required contract within 10 days after being notified that the contract is awarded to him. Any check accompanying the successful bid will be returned upon the execution of the contract. Any checks

accompanying the rejected bids will be returned. The bidder to whom the award is made will be required to execute a written contract with the city and to furnish performance and payment bonds as specified within ten days after notice of award of said contract is delivered to him. The amount of the bond to be given to secure faithful performance of the contract for said work shall be 50 per cent of the contract price computed as hereinafter provided. The amount of the bond to be given to secure payment for labor, materials, equipment and supplies furnished for the performance of the work to be done under the contract and for any work or labor of any kind done in connection therewith shall be equal to 50 per cent of the contract price for the work. The contract price shall be computed from quantities given in the Bid Schedule herein and prices bid in the proposal.

The form of bonds required will be such that the city may proceed against the contractor and his sureties on the bonds immediately upon any default in the performance of the contract, or in payments for labor, material and supplies without waiting for the completion of the work and accumulation of damages.

The following documents are essential parts of the complete contract: Advertisement Inviting Bids, Instruction to Bidders, Affidavit of Bidders Qualifications, Proposal, Specifications, Plans, Contract and Bonds.

Bidders must examine and judge for themselves the location and surroundings of the proposed work, the nature of the excavations to be made and the work to be done and shall make their own estimates of the facilities and difficulties attending the execution of the contract.

The bidder must state in words and figures the unit prices or specific sums or both, as the case may be, for which he proposes to supply all the materials and perform the work required by the plans and specifications. Failure to examine plans, drawings, specifications, schedules and instructions pertaining to the work will not relieve the contractor of any work to be performed.

If more than one bid is offered by any one party in the name of his or their clerk, partner, or other person, all such bids may be rejected. This shall not prevent a bidder from making alternate bids as called for in the schedule or from quoting different prices on different qualities of materials or different conditions or delivery. A party who has quoted prices on materials to one bidder is not thereby disqualified from quoting prices to other bidders or from submitting a bid directly for the work.

All blank spaces in the proposal form must be properly filled in and the phraseology must not be changed. Any unauthorized conditions, limitations or provisos attached to a proposal will be liable to render it informal and may cause its rejection. Alterations by erasure or interlineation must be noted in the proposal over the signature of the bidder. Bids may be withdrawn on written or telegraphic request received from bidders prior to time fixed for the opening. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

Bidders are invited to be present at the opening of proposals for at this time their contents will be made public for the information of bidders and others properly interested.

The contract will be awarded to the lowest responsible bidder complying with the necessary conditions provided his bid is reasonable and it is to the interest of the City to accept it. The bidder to whom the award is made will be notified at the earliest possible date. The City, however, reserves the right to reject any and all bids and to waive any informality in bids received.

If the bid is made by an individual, it must be signed with the full name of the bidder whose address must be given; if it is made by a firm, it must be signed with the co-partnership name by a member of the firm, and the name and full address of each member must be given; and if it is made by a corporation, it must be signed by a properly authorized officer in the corporate name and the corporate seal must be attached to such signature.

The bidder shall affix to the proposal the number of his Utah Contractors License.

The quantities listed in the Bid Schedule are approximate only and are not guaranteed to be correct. They are the quantities, however, which will be used for the purpose of comparing bids.

All drawings showing the work to be accomplished under the contract or contracts are listed below:

Title

Title Sheet and Location Map	
Plan-Profile Station 0 + 00 to 36 + 00	Sheet 1 of 12
Plan-Profile Station 36 + 00 to 70 + 00	Sheet 2 of 12
Plan-Profile Station 63 + 00 to 104 + 00	Sheet 3 of 12
Plan-Profile Station 103 + 00 to 137 + 00	Sheet 4 of 12
Plan-Profile Station 137 + 00 to 163 + 22	Sheet 5 of 12
Typical Sections, Bend Schedule	Sheet 6 of 12
Anchorage and Air Valve Details	Sheet 7 of 12
DeWitt Spring Area	Sheet 8 of 12
General Plan for Spring House Development	Sheet 9 of 12
Plan of Recording and Control Vault	Sheet 10 of 12
Plan for Spring House Development	Sheet 11 of 12
Special Details	Sheet 12 of 12

STATEMENT OF CONTRACTORS' QUALIFICATIONS

Date _____

Note: The following experience records, as of the date shown, must be submitted by each bidder in company with his bid. All questions must be answered fully.

Name of Bidder _____

Business Address _____

Utah Contractor's License No. _____

1. How many years has your organization been in business as a general contractor under the present business name? _____

2. How many years experience in construction work has your organization had _____

(a) As a general contractor _____

(b) As a subcontractor _____

3. (a) Have you ever failed to qualify as a responsible bidder? _____

If so, when, where and why? _____

(b) Have you ever refused to enter into a contract after the award was made to you? _____

If so, when, where and why? _____

(c) Have you ever failed to complete any work awarded to you? _____

If so, when, where, and why? _____

(d) Has your concern ever failed in any business or compromised with creditors? _____

If so, when, where and why? _____

4. Has any surety or financial institution ever experienced loss on your concern? _____

If so, give details _____

5. What projects has your organization completed in the past 3 years?

CONTRACT AMOUNT	CLASS OF WORK	WHEN COMPLETED	NAME AND ADDRESSES OF OWNER

6. What is the construction experience of the principal individuals of your organization?

INDIVIDUAL'S NAME	PRESENT POSITION	YEARS CONSTRUCTION EXPERIENCE	MAGNITUDE AND TYPE OF WORK	IN WHAT CAPACITY

7. Does your organization operate as a corporation, copartnership, or individual? _____

(a) If a corporation, answer the following questions:

Amount for which incorporated, \$ _____

Capital paid in cash \$ _____

When incorporated _____ In what State _____

3. Remarks:

The undersigned hereby declares and certifies that the foregoing is a true statement of the experience of the individual, copartnership, or corporation, herein first named, as of the date herein first given, and that any agency or individual herein named is hereby authorized to supply any information as may be deemed necessary to verify this statement.

Subscribed and sworn to before me this _____ day of _____, 19____.

Notary Public

By _____

Note: This affidavit must be signed for the bidder by the individual authorized to sign the bid.

BID

Date _____

In compliance with the above invitation for bids and subject to all the conditions thereof, the undersigned offers and agrees to furnish all labor and materials and perform all work required for the construction of the pipe line and appurtenant works on the property and in the location as shown on the drawings, in strict accordance with the plans, specifications and Bid Schedule, for the consideration of unit prices as shown in the Bid Schedule, provided this bid is accepted within thirty (30) calendar days from date of opening of bids.

The undersigned further agree that the pipe will be delivered and the work will begin within _____ calendar days after receipt of notice to proceed and will be completed within _____ calendar days from that date, subject to such extensions as may be authorized by paragraph twenty-five (25) of the "General Conditions."

Bidder _____

Address _____

By _____
(Signature of person authorized to sign this bid)

Title _____

ACCEPTANCE

Date _____

Accepted as to Bid Schedule items numbered _____

Logan City Corporation

By _____

Mayor

Commissioner

Commissioner

Note: See "Instructions to Bidders" before preparing this bid.

STOCK - BISHOP - PETERSON
Professional Engineers

Sheet 1 of 8
File LOGAN CITY PIPE
Date 7/5/49
Comp. by _____
Checked [Signature]
[Signature]
[Signature]

TITLE _____

BID SCHEDULE _____

Item	Work, Quantity and Unit Price	Amount
1	<p><u>Alternate A</u> Trenching, furnishing, laying and backfilling 36-inch cast iron pipe, 5900 feet at _____ (<u>\$ 29.00</u>) per foot. (words)</p> <hr/> <p><u>Alternate B</u> Trenching, furnishing, laying and backfilling 36-inch centrifugal concrete pipe, 5900 feet at _____ (<u>\$ 23.00</u>) (words) per foot.</p> <hr/> <p><u>Alternate C</u> Trenching, furnishing, laying and backfilling 36-inch asbestos cement pipe, 5900 feet at _____ (<u>\$ 30.00</u>) (words) per foot.</p> <hr/> <p><u>Alternate D</u> Trenching, furnishing, laying and backfilling 36-inch steel pipe, 5900 feet at _____ (<u>\$ 19.50</u>) per foot. (words)</p>	<p>#171,100.00</p> <hr/> <p>135,700.00</p> <hr/> <p>177,000.00</p> <hr/> <p>115,050.00</p>
2	<p>Excavating, forming, placing concrete, stripping and backfilling the control and measuring vault _____ (<u>\$ 5,600.00</u>) (words) lump sum.</p>	<p>5,600.00</p>
3	<p>Furnishing and laying 2-inch galvanized iron pipe drain from control and measuring vault to river, 600 feet at _____ (words) (<u>\$ 0.50</u>) per foot</p>	<p>300.00</p>
4	<p>Furnishing and installing 36-inch gate valve and 6-inch standpipe in control and measuring vault, one at _____ (<u>\$ 2800.00</u>) (words) lump sum.</p>	<p>2,800.00</p>

Item	Work, Quantity and Unit Price	Amount
14	<u>Alternate A</u> Furnishing and installing 36-inch by 30-inch reducer including anchorage for cast iron or asbestos cement pipe, one at _____ _____ (\$ <u>350.00</u>) (words) lump sum	\$ 350.00
	<u>Alternate B</u> Furnishing and installing 36-inch by 30-inch reducer including anchorage for centrifugal concrete pipe, one at _____ _____ (\$ <u>300.00</u>) (words) lump sum	300.00
	<u>Alternate C</u> Furnishing and installing 36-inch by 30-inch reducer including anchorage for steel pipe, one at _____ _____ (words) (\$ <u>200.00</u>) lump sum	200.00
	<u>Alternate D</u> Furnishing and installing 36-inch by 24-inch reducer including anchorage for cast iron or asbestos cement pipe, one at _____ _____ (\$ <u>300.00</u>) (words) lump sum	300.00
	<u>Alternate E</u> Furnishing and installing 36-inch by 24-inch reducer including anchorage for centrifugal concrete pipe, one at _____ _____ (\$ <u>300.00</u>) lump sum (words)	300.00
	<u>Alternate F</u> Furnishing and installing 36-inch by 24-inch reducer including anchorage for steel pipe one at _____ _____ (words) (\$ <u>200.00</u>) lump sum	200.00
15	<u>Optional</u> Furnishing and installing 36-inch by 22-inch Venturi Meter and Recorder, one at _____ _____ (\$ <u>7,500.00</u>) (words) lump sum	7,500.00

Item	Work, Quantity and Unit Price	Amount
16	<u>Optional</u> Excavation, common, for spring development division 1 and 2, 70 cubic yards at _____ _____ (\$ <u>4.00</u>) (words) per cubic yard	\$ 280.00
17	<u>Optional</u> Concrete in spring development division 1 and 2, 40 cubic yards at _____ _____ (words) _____ (\$ <u>70.00</u>) per cubic yard	2,800.00
18	<u>Optional</u> Backfill in spring development division 1 and 2, 35 cubic yards at _____ _____ (words) (\$ <u>2.00</u>) per cubic yard	70.00
19	<u>Optional</u> Cover for spring development division 1, one at _____ _____ (words) (\$ <u>900.00</u>) lump sum	900.00
20	<u>Optional</u> Cover for spring development division 2, one at _____ _____ (words) (\$ <u>600.00</u>) lump sum	600.00
21	<u>Optional</u> Installing 36-inch by 36-inch slide headgates in spring development as per plans and speci- fications, 2 at _____ _____ (words) _____ (\$ <u>250.00</u>) each	500.00
22	<u>Alternate A</u> Trenching, furnishing, laying and backfilling 30-inch cast iron pipe, 2550 feet class 50 at _____ _____ (words) (\$ <u>22.00</u>) per foot; 7372 feet class 100 at _____ _____ (words) (\$ <u>22.00</u>) per foot	229,284.00

Item	Work, Quantity and Unit Price	Amount
------	-------------------------------	--------

22(cont)

Alternate B

Trenching, furnishing, laying and backfilling
 30-inch centrifugal concrete, 2550 feet 100-foot
 head pipe at _____

(words)

_____ (\$ 17.00) per foot;

7372 feet 200-foot head pipe at _____

_____ (\$ 19.00) per foot

(words)

192,918.00

Alternate C

Trenching, furnishing, laying and backfilling
 30-inch asbestos cement pipe, 2550 feet class
 50 at _____

(words)

(\$ 23.00) per foot; 7072 feet class

100 at _____

(words)

(\$ 25.00) per foot

255,450.00

Alternate D

Trenching, furnishing, laying and backfilling
 30-inch steel pipe, 10,422 feet at _____

_____ (\$ 14.50)

(words)

per foot

151,119.00

Alternate E

Trenching, furnishing, laying and backfilling
 24-inch cast iron pipe, 2550 feet class 50
 pipe at _____

(words)

(\$ 15.75) per foot; 7372 feet class 100

pipe at _____

(words)

(\$ 15.75) per foot

164,146.50

Alternate F

Trenching, furnishing, laying and backfilling
 24-inch centrifugal concrete pipe, 2550 feet
 100-foot head pipe at _____

_____ (14.00)

(words)

per foot; 7372 feet of 200-foot head pipe at _____

(words)

(\$ 16.00) per foot

161,652.00

Item	Work, Quantity and Unit Price	Amount
22(cont)	<p><u>Alternate G</u> Trenching, furnishing, laying and backfilling 24-inch asbestos cement pipe, 2550 feet class 50 pipe at _____ (words) (\$ <u>15.00</u>) per foot; 7872 feet class 100 pipe at _____ (words) (\$ <u>17.00</u>) per foot</p> <hr/> <p><u>Alternate H</u> Trenching, furnishing, laying and backfilling 24-inch steel pipe, 10,442 feet at _____ (<u>\$ 12.00</u>) (words) per foot</p>	<p>172,074.00</p> <hr/> <p>125,064.00</p>
23	<p>Furnishing and installing 6-inch air inlet valve assemblies including manholes, 6 at _____ (<u>\$ 550.00</u>) each (words)</p>	<p>3,300.00</p>
24	<p>Furnishing and installing 2-inch air release valve assemblies, 8 at _____ (words) (<u>\$ 50.00</u>) each</p>	<p>400.00</p>
25	<p><u>Alternate A</u> Furnishing and installing 6-inch flush valve assemble in cast iron or asbestos cement line at station 102 + 50, one at _____ (<u>\$ 150.00</u>) lump sum (words)</p> <hr/> <p><u>Alternate B</u> Furnishing and installing 6-inch flush valve assembly in centrifugal concrete line at station 102 + 50, one at _____ (words) (<u>\$ 150.00</u>) lump sum</p> <hr/> <p><u>Alternate C</u> Furnishing and installing 6-inch flush valve assemble in steel pipe line at station 102 + 50, one at _____ (words) (<u>\$ 150.00</u>) lump sum</p>	<p>150.00</p> <hr/> <p>150.00</p> <hr/> <p>150.00</p>

Item	Work, Quantity and Unit Price	Amount
26	Furnishing and installing 24-inch gate valve in existing steel line, one at _____ (\$ <u>200.00</u>) (words) lump sum	# 200.00
27	<u>Alternate A</u> Furnishing and installing 30-inch by 24-inch reducer including anchorage for connecting cast iron or asbestos cement pipe to existing 24-inch steel line, one at _____ (words) (\$ <u>300.00</u>) lump sum	300.00
	<u>Alternate B</u> Furnishing and installing 30-inch by 24-inch reducer including anchorage for connecting centrifugal concrete pipe to existing 24-inch steel line, one at _____ (words) (\$ <u>200.00</u>) lump sum	200.00
	<u>Alternate C</u> Furnishing and installing 30-inch by 24-inch reducer including anchorage for connecting steel pipe to existing 24-inch steel line, one at _____ (words) (\$ <u>200.00</u>) lump sum	200.00
	<u>Alternate D</u> Furnishing and installing 24-inch adapter for connecting cast iron or asbestos cement pipe to existing 24-inch steel line, one at _____ (words) (\$ <u>175.00</u>) lump sum	175.00
	<u>Alternate E</u> Furnishing and installing 24-inch adapter for connecting centrifugal concrete pipe to existing 24-inch steel line, one at _____ (\$ <u>100.00</u>) (words) lump sum	100.00

Item	Work, Quantity and Unit Price	Amount
28	Concrete in anchorages as per plans and specifications (not required for steel pipe), 30 cubic yards at _____ (words) (\$ <u>25.00</u>) per cubic yard	\$ 750.00
29	<p><u>Alternate A</u> Service connections in centrifugal concrete specifications, 11 at _____ (\$ <u>40.00</u>) each (words)</p> <hr style="border-top: 1px dashed black;"/> <p><u>Alternate B</u> Service connections in cast iron, asbestos cement or steel pipe as per specifications, 11 at _____ (words) (\$ <u>20.00</u>) each</p>	<p>440.00</p> <hr style="border-top: 1px dashed black;"/> <p>220.00</p>

Items one to twenty-one inclusive constitute one construction unit and items twenty-two to twenty-nine inclusive constitute a second construction unit. Bids will be considered on all items of either unit, but no bid will be considered for separate items of either unit, except that the city may accept or reject optional items within either unit if it appears to its interest to do so. Where several alternates are listed under one item, only one of the alternates will be accepted.

Bidder

Address

By

SPECIFICATIONS

GENERAL CONDITIONS

1. Location of Work - The Logan City water supply main is located in Logan Canyon due east of Logan, Utah. The existing pipe line diverts water from DeWitt Spring at a point about six miles above the mouth of Logan Canyon and conveys it to the distribution reservoir located on the bench immediately east of the golf course in the mouth of Logan Canyon. From the spring the pipe line runs in a southerly direction and crosses the Logan River about 1,000 feet from the spring. It then follows the general river alignment to the mouth of the canyon. U. S. Highway 89 follows the same canyon but generally on the opposite side of the river from the pipe line.

2. Description of the Work - The principal construction features include trenching and backfilling together with furnishing and laying a new water supply pipe from DeWitt Spring to the Davis Camp, a distance of 16,322 feet, together with spring development and other appurtenant works as follows:

(a) An addition will be made to the existing spring house to serve as a combination pipe-inlet structure and a measuring, recording and control room. Addition, improvement and enlargement of the existing structure shall also be made.

(b) From the spring to a point near the "City Dam," distance of 5,900 feet, the pipe line will consist of 36-inch diameter cast iron, centrifugal concrete, steel or asbestos cement pipe as the owner may select.

(c) From the "City Dam" to the Davis Camp, a distance of 10,422 feet, the pipe line will consist of 24-inch or 30-inch cast iron, centrifugal concrete, steel or asbestos cement pipe as the owner may select.

(d) The necessary valves and protective structures as shown on the plans shall be provided to make the pipe line a complete and operable unit.

3. Definitions and Abbreviations - Whenever the words "contractor," "owner," or "engineer" occur in these specifications they shall have the meaning here given:

Contractor shall mean the party or parties entering into the contract for the performance of the work covered by these specifications.

Owner shall mean the corporation of the City of Logan, Utah.

Engineer shall mean the person or persons appointed by Logan City to the position of engineer for the work under these specifications or his properly authorized agents, such agents acting within the scope of the particular duties assigned to them.

Where the following abbreviations are used, they shall have the following meanings:

AWWA - Means the "American Water Works Association."

AWS - Means the "American Welding Society."

ASTM - Means the "American Society for Testing Materials."

4. Disputes - All disputes concerning questions of fact arising under this contract shall be decided by the engineer, whose decision shall be final and binding upon both parties to this contract. Any doubt as to the meaning of these specifications shall be explained by the engineer.

5. Bonds - The contractor shall furnish a performance bond for the protection of the owner with a surety or sureties satisfactory to the owner in an amount not less than 50 per cent of the amount of the contract. In addition to the performance bond, the contractor shall furnish a payment bond with a surety or sureties satisfactory to the owner, for the protection of all persons supplying labor and materials under the contract, in an amount not less than 50 per cent of the amount of the contract. Bonds shall be furnished by the contractor within ten days after the award of the contract.

6. Evaluation of Bids - In comparing proposals presented for different materials, the various proposals shall be evaluated by determining the annual cost to the City. This annual cost shall be determined by computing the annual amount, using the sinking fund method, necessary to replace the system at the end of its economic life based on the price stated in the proposal, and by computing an annual interest charge on this same stated price. The sum of these two amounts, sinking fund and interest, will be assumed to be the annual cost. The interest rate for the basis of this comparison is assumed to be four per cent and the estimated life of the different materials is assumed to be as follows:

<u>Material</u>	<u>Life in Years</u>
Cast iron pipe	100
Centrifugal concrete	100
Asbestos cement	100
Steel	50

7. Rights of Way - The necessary rights of way, Forest Service Special Use Permits, etc. required for the proper installation of the pipe line and appurtenant works as well as access roads and equipment and pipe storage areas will be furnished by the owner.

8. Staking Out Work - The work to be done shall be staked out by the engineer for the contractor. Bench marks and survey stakes shall be preserved by the contractor, and in case of their destruction or removal by him or by his employees, they shall be replaced by the engineer, at the contractor's expense and his sureties shall be liable therefor.

9. Verification of Data - The material to be removed in the trenching operation is believed to consist principally of unconsolidated

alluvium with small amounts of solid rock being encountered at points noted on the plans. The notations on the plans regarding material to be removed is based on surface examinations and surface evidence only, no test pits or borings having been made. For this reason it is expected that bidders will examine the work to decide for themselves the character of the work to be done and make their bids accordingly as the owner does not guarantee the accuracy of the descriptions.

10. Climate Conditions - The engineer may order the contractor to suspend operations on any feature of the work that may be subject to damage by climatic conditions.

11. Patents and Royalties - The contractor shall pay all royalties and license fees and shall defend all suits or claims whatsoever for infringement of any patent rights which may arise on this work and shall save the owner harmless from loss on account thereof.

12. Liability - The contractor shall maintain such insurance, as required by Utah State Law, as will protect him from claims under Workman's Compensation Acts, and from any other claims for damages for personal injury, including death, which may arise from operations under this contract. Certificates of such insurance shall be filed with the owner.

13. Accident Prevention - The contractor shall at all times exercise reasonable precautions for the safety of employees on the work and shall comply with all applicable provisions of Federal, State and Municipal safety laws. Since the area of the work is within a popular recreational area, the contractor shall erect barricades and maintain such flares and signals which may be necessary to warn and safeguard the public. The contractor shall also indemnify and save harmless the owner against all suits, claims and actions of every name and description brought against them, and all costs and damages to which the owner may be put on account or by reason of any injury or alleged injury to the person or property of another, resulting from negligence or carelessness in the performance of the work, or in guarding the work, or from any improper materials used, or by or on account of any act or omission of the contractor or his agents or employees.

14. Protection of the Work - The contractor shall protect the work and materials including the existing pipe line from damage because of the nature of the work and carelessness on the part of his workmen or others, or from any other cause whatsoever, until the certificate of completion has been issued and final payment made. In case damage to the work should occur, it shall be repaired by the contractor at his own expense to the satisfaction of the engineer.

15. Unnoticed Defects - Any defective work or material that may be discovered by the engineer before the final acceptance of the work or before final payment has been made shall be removed and replaced by work and material which shall conform to the true intent of the specifications; failure or neglect on the part of the engineer to condemn or reject inferior work or materials shall not be construed to imply acceptance of such work or materials and any defects previously unnoticed shall be corrected by the contractor whenever, previous to the issuance of the final

certificate, they shall be called to his attention by the engineer.

16. Rejected Materials - Any materials condemned or rejected by the engineer as not conforming to these specifications shall be plainly marked, and shall, on demand by the engineer, be removed from the vicinity of the work.

17. Cleaning Up - Upon completion of the work the contractor shall remove from the vicinity of the work all plant, buildings, rubbish, unused materials, concrete forms and other like material belonging to him or used under his direction during construction. All brush and trees removed from the site in the process of construction shall be burned or disposed of in a manner satisfactory to the U. S. Forest Ranger of the Cache National Forest. Grounds and facilities in picnic and summer home areas shall be restored to a condition as near to their original state as possible and to the satisfaction of the engineer and Forest Ranger. In the event of failure on the part of the contractor to enforce the provisions of this paragraph, the owner may order the necessary work done at the contractor's expense and his surety or sureties may be liable therefor.

18. Planting - If, in the opinion of the U. S. Forest Ranger, it appears necessary to restore vegetation in the form of range grasses to the areas denuded by the work specified in order to protect the lands from accelerated erosion and damage, such plantings shall be made by the contractor at his expense under the supervision of the U. S. Forest Service.

19. Sanitation - Sanitary facilities available in the park or picnic areas in the forest will be available for use by the contractor and his workmen. If additional facilities are required, they shall be provided by the contractor and constructed to the specification of the U. S. Forest Service. The engineer may establish sanitary rule and regulation for all forces employed under this contract and if the contractor fails to enforce these rules they may be enforced by the engineer at the expense of the contractor.

20. Quantities and Unit Price - The quantities noted in the schedule are approximations for comparison of bids, and no claim shall be made against the owner for excess or deficiency therein, actual or relative. Payment at the prices agreed upon will be in full for the completed work and will cover materials, supplies, labor, tools, machinery and all other expenditures incident to satisfactory compliance with the contract, unless otherwise specifically provided.

21. Payment - Partial payment based on estimates made and approved by the engineer will be made to the contractor each month, at the unit prices per linear foot bid therefor in the schedule, which cost shall include the cost of furnishing all materials, trenching, laying, jointing, and testing the pipe as described in these specifications.

In making such partial payments there shall be retained 15 per cent of the estimated amount until final completion and acceptance. Such work covered by partial payments made shall become the property of the owner, but this provision shall not be construed as relieving the contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made, or the restoration of any damaged work. In preparing the monthly estimates of quantities

upon which payments will be made, the engineer shall include only those materials incorporated into the project. No credit will be given for materials delivered on the site which have not been incorporated into the work and preparatory work done will not be taken into consideration.

22. Extras - The contractor shall, when ordered in writing by the engineer, perform extra work and furnish extra material, not covered by the specifications but forming an inseparable part of the work contracted for. Extra work and material will ordinarily be paid for at a lump sum or unit price agreed upon by the contractor and engineer and stated in the order. Whenever in the judgment of the engineer, it is impractical to fix the price in the order, the extra work and material shall be paid for at actual cost as determined by the engineer, plus 10 per cent for superintendence, general expense and profit. The actual necessary cost will include all expenditures for material, labor (including compensation insurance and social security taxes), and supplies furnished by the contractor, and a reasonable allowance for the use of his plant and equipment, where required, to be agreed upon in writing before the work is begun.

23. Failure to Complete Punctually - Because the damages that may result to the owner from any delay in completion of the work on or before the time agreed upon will be difficult, it not impossible to ascertain, the sum of \$50.00 per day for each day that any work shall remain incomplete beyond the time specified in the contract for its completion shall be deducted from amounts due the contractor not as a penalty, but as just and liquidated damages.

24. Abandonment - Should the contractor neglect or abandon the work or if at any time the engineer is convinced that the work is unreasonably delayed, or that the conditions of the contract are being willfully violated or executed carelessly or in bad faith, he may notify the contractor in writing, and if his notification be without effect within twenty-four hours after the delivery thereof, then and in that case the contractor shall discontinue all work under the contract, and the engineer shall have full authority and power immediately to purchase and hire materials, tools, labor and machinery for the completion of the contract at the expense of the contractor or his sureties or both; or said contract may be declared null and void, and the performance bond and retained percentage and the material built into the work and the materials delivered shall then become the property of the owner.

25. Time of Completion - Time of completion is important and the contractor shall so schedule his operations that the entire work shall be completed and the pipe line placed in service in a period of 180 calendar days. Saturdays, Sundays and holidays shall be included in the time period, but extensions of time shall be granted for time lost during periods that the contractor is prohibited from working because of climatic or other reasons. The contractor shall state in the proposal the delivery date of pipe and specify the beginning date.

SPECIFICATIONS

SPECIAL CONDITIONS

1. Requirement - It is required that there be constructed and completed in accordance with these specifications and attached drawings a pipe line from De Witt Spring to Station 163+22⁰ opposite Davis Camp along with appurtenant works and structures necessary to make a complete and operable system. The necessary plant, equipment, labor, tools, drainage, pumping, timbering and other items necessary to complete the work herein described together with testing and chlorination of the completed system shall be provided by the contractor.

Since the pipe line will be essentially a replacement of the existing woodstave pipe from which Logan City now obtains its water supply it will be necessary to safeguard the operation of the existing system. In many places the work covered by these specifications will closely parallel the pipe line now in operation and it is imperative that the existing pipe line be kept in operation in order that the water service to Logan City will not be interrupted. For this reason, the order of executing the work shall be subject to the approval of the engineer and the contractor shall obtain approval for his proposed plan of operation from the engineer before beginning construction in order that the interest of the owner in maintaining uninterrupted water service might be carefully safeguarded.

The major part of the installation can be constructed without interruption of service. Where destruction of the existing pipe is necessary, such portion of the work shall be delayed until all other work has been completed. At that time the contractor shall make all installations requiring destruction of the existing pipe and shall complete such construction as soon as possible.

2. Clearing - The right of way, where, in the judgment of the engineer, clearing is necessary, shall be cleared of all grass, brush, rubbish and other objectionable material and the cleared materials shall be burned or otherwise disposed of as approved by the U. S. Forest Service.

3. Grubbing - Sections of the pipe line as shown in the accompanying drawings will be supported by embankments and in order to provide a stable foundation supporting the pipe the surface to receive such embankments shall be cleared of all stumps, roots, and vegetable material of every kind before the embankment is placed. Material used in such embankment shall be taken from excavated materials along the right of way. These materials shall be subject to the approval of the engineer and shall not contain any roots, stumps or vegetable material of any kind.

4. Blasting - Blasting will be permitted only when proper precautions are taken for the protection of persons, work, (including the pipe line now in service,) and private property. Any damage done by blasting shall be repaired by the contractor at his expense. Caps or other exploders or fuses shall in no case be stored, or transported, or kept in the same place as dynamites are stored, transported or kept. The location and design of powder magazines, method of transporting explosives, and in general, the

precautions taken to prevent accidents, shall be subject to the approval of the engineer, but the contractor shall be liable for all injuries to or death of persons or damage to property caused by blasts or explosives.

5. Trenching - Trenching shall be made to the lines and grades as staked by the engineer and shown on the accompanying drawings. The trenches shall be of sufficient depth to give a minimum cover of three feet over all pipe. Typical pipe trench sections are shown on the drawings. The pipe trench shall in all cases be excavated to a width of not less than two feet greater than the diameter of the pipe to be installed. The contractor will not be required to excavate the trench with vertical sides, but regardless of the side slope and the width of the trench as actually excavated payment will be made on the basis of the price per foot bid for the completed work.

The bottom of the trench for the pipe shall be finished accurately by hand to the dimensions and grades shown on the drawings. If the material in the bottom of the trench is not suitable, as determined by the engineer, for a foundation for the pipe, it shall be removed and replaced with selected materials compacted to the satisfaction of the engineer. The bottom of the trench to receive the pipe shall be placed in such a manner that the pipe shall have a bearing for its entire length. Where rock is encountered, there shall be prepared a cushion not less than six inches thick compacted to the satisfaction of the engineer. In no case shall the material forming the bed of the pipe or the backfill contain rocks in excess of two inches in diameter within six inches of the pipe.

6. Excavation for Spring House Improvement - Excavation for the intake structure and spring-house improvement shall be made to the lines and grades staked out by the engineer. Most of the earth work for this structure can be excavated economically by the use of the excavating equipment used for the pipe trench and the work shall be coordinated so as to permit the use of such equipment to the fullest extent. It is expected that considerable water will be encountered in this excavation and the contractor shall provide the necessary pumps, sheet piling and other materials or equipment required to handle the water encountered or developed.

7. Disposal of Materials - All suitable materials for required excavation, or as much thereof as may be needed, shall be used for the construction of compacted embankment or for backfill of the pipe or for other required jobs as directed by the engineer. The materials removed in excavation and not suitable or required for the above-described purpose shall be wasted on the right of way owned by Logan City at such points as may be approved by the engineer. In the vicinity of the city reservoir in the area between the bridge to the Girl's Camp and the "City Dam," no material shall be wasted into the reservoir area but shall be excavated and wasted at points shown on the plans and designated by the engineer.

8. Backfill - Only selected materials free from rocks shall be used for the initial backfill. The selected materials shall be well compacted around the pipe up to at least its horizontal diameter. Backfilling shall be made in 8-inch layers, each layer being well compacted

before the next layer is placed. After the backfilling has been completed to a depth of at least 16 inches over the pipe, the remaining backfill may be made by any method selected by the contractor and special compacting will not be required. Any material left over shall be windrowed over the trench except in the camp, picnic areas and private home areas where the ground surface shall be left in as near its original condition as possible.

Cast Iron Pipe

9. General Description - Cast iron pipe shall conform to ~~Manufacturer's~~ Specifications for the diameter and class shown on the plans.

10. Laying - Laying of cast iron pipe shall be made in accordance with AWWA Standard Specification No. 7D.1-1933. Sections 1 to 11 inclusive and Sections 14 to 18 inclusive of this Standard Specification will be applicable. Lead joints shall be used.

11. Testing - Testing of cast iron pipe shall comply with Section 15 - Hydrostatic Tests of AWWA Standard Specification 7D.1-1933.

(NOTE: Copies of the above listed Standard Specification are on file in the office of the Logan City Engineer.)

Centrifugal Concrete Pipe

12. General Description - The centrifugal concrete pipe shall conform to AWWA Standard Specification 7E-T, Section 2 and Section 5 for the heads shown on the plans.

13. Angles - An attempt has been made to plan the layout so that a minimum number of sections of bevel-end pipe will be required. The gradual curvature required on most of the line shall be accomplished at the joint. Bevel pipe shall be used in all places as scheduled on the plans.

14. Jointing and Laying - Bell holes shall be excavated to provide ample room to properly make the joints. The pipe sections shall be laid with the spigot in the direction of the flow. The sections shall be tightly fitted together and care shall be exercised to secure true alignment and grade. The trench shall be backfilled to the top of the pipe before the joint is poured. The joint shall consist either of the collar type or the double rubber gasket type perfected by the American Pipe and Construction Company of Los Angeles, as shown on the plans or as required by the engineer.

The open end of the pipe shall be securely closed by canvas or otherwise at the end of each day's work. The inside joints shall be carefully finished by troweling off smooth with the inside of the pipe. These shall not be filled until the trench has been backfilled and any settlement of the line taken place, except where conditions make this impractical.

Careful inspection shall be made of every joint to insure a smooth interior surface. The interior of the pipe shall be thoroughly cleaned and any obstruction removed that may reduce its carrying capacity.

15. Testing - After laying and before any backfill is placed around the joint, the pipe shall be tested by closing valves, when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. Care shall be used to see that all air vents are open during the filling. After the line has been completely filled, it shall be allowed to stand under a slight pressure for several hours to allow the concrete to absorb what water it will and to allow the escape of air from any slight air pockets. During this period, the bulkheads, valves, manholes, and connections shall be examined for leaks. If any are found, these shall be stopped or, in the case of valves in the main line or bulkheads, provision shall be made for measuring the leakage during the test. The test shall consist of holding a pressure equal to 125 per cent of the specified working head on the line for a period of four hours. The water necessary to maintain this pressure shall be measured through a meter or by other means satisfactory to the engineer. The leakage shall be considered the amount of water entering the pipe line during the test, less the measured leakage through valves or bulkheads. This leakage shall not exceed 100 gallons per inch of diameter per mile per 24 hours. Any noticeable leaks shall be stopped and any defective pipe shall be replaced with new sections. Bulkheads, test gage, test pump, water meter, fittings and valves and all other materials necessary for making the test shall be supplied by the contractor.

16. Backfilling Trenches - After the pipe has been laid, the earth shall be tamped, using tampers approved by the engineer, in compact layers not exceeding 3 inches in thickness around the sides of the pipe up to the horizontal diameter. This backfilling and tamping is to be carried on simultaneously on each side of the pipe, care being taken to secure a uniform bed. The contractor shall furnish sufficient careful men for this work.

The balance of the backfill may be placed in the trench by any method desired by the contractor, provided care is taken that such methods do not disturb or injure the pipe line. The backfill shall then be thoroughly settled by flooding with water, when available. Where the backfill on pipe exceeds a 5-foot depth, the flooding shall be done after two feet of backfill has been placed over the pipe.

17. Guarantee - The contractor shall guarantee the pipe line against leaks and breaks due to defective material or workmanship for a period of one year from the date of completion of the contract. Damage or leaks due to acts of God, or from sabotage and/or vandalism are specifically excepted from this guarantee.

The owner of the contractor who has contracted with the owner for the trench excavation and backfill, shall be responsible under this guarantee for defective workmanship and lack of observance of the specifications in preparing the sub-grade for the pipe line. Side slippage of trenches and/or subsidence of trenches (not due to leakage) are specifically excepted from this guarantee.

When defective material and workmanship are discovered, requiring repairs to be made under this guarantee, all such repair work shall be done by the contractor at his own expense within five days after written notice of any leaks or breaks has been given him by the owner; provided, however, that if it is necessary to immediately repair such leaks or breaks, the owner shall have the right to repair the same and charge the contractor with the actual cost of all labor and material required. Should the contractor fail to repair such leaks within five days thereafter, the owner may make the necessary repairs and charge the contractor with the actual cost of all labor and material required.

The contractor shall arrange to have his faithful performance bond run for a period of one year after the date of the completion of the contract to cover his guarantee as above set forth.

Steel Pipe

18. General Description - The steel pipe required shall consist of U. S. Standard Gage No. 3 electric fusion welded pipe conforming to AWWA Standard Specification for Electric Fusion Welded Steel Water Pipe (No. 7A.3-1940 and No. 7A.4-1941-TR) of the diameters shown on the drawings

19. Steel Plates - Steel plates shall conform to the requirements of Section 4-2 AWWA Standard Specification 7A.4-1941-TR or Section 3-2 AWWA Standard Specification 7A.3-1940 or the following grades of steel, but no fabrication shall use more than one grade:

ASTM	-	Designation	A-139	Grade A
ASTM	-	Designation	A-139	Grade B
ASTM	-	Designation	A-245	Grade A

20. Fabrication - Fabrication shall be in accordance with Section 4-3 of AWWA Standard Specification No. 7A.4-1941-TR, or Section 3-3 of Specification 7A.3-1940. Straight seamed pipe or spiral seamed pipe may be used. Where the straight seam method is used, the pipe shall be made in courses of not less than 10 feet. Not more than one longitudinal seam will be permitted in each course. The longitudinal seams in adjacent courses shall be staggered on the opposite side of the vertical center line and shall be parallel to the axis of the pipe. Pipe shall be furnished in shipping lengths of not less than 40 feet and not more than 50 feet.

21. Preparation of Ends of Section - The steel pipe ends shall be bevelled for field butt welds in accordance with Section 4-3.9.3 of the AWWA Standard Specification 7A.4-1941-TR. Bends shall be made by field cutting the pipe to the proper bevel.

22. Protective Coating - The protective coating for steel pipe shall be in accordance with AWWA Standard Specification 7A.6-1940 for coal tar enamel protective covers for steel water pipe. The cover coat shall be kraft paper as specified in Section 6-2.6 of the above referred to specifications.

23. Field Procedure and Enameling - Transporting, handling and field enameling, along with the other items covered in Section 6-4 of AWWA Standard Specification 7A.6-1940, shall be strictly followed.

24. Welding - Welding of steel water pipe joints shall be in strict accordance with AWWA Standard Specification 7A.3-T and AWS Standard Specification D7.0-46T. All sections of this specification shall apply.

25. Testing - After the steel pipe line is installed, and before the joints are covered, the pipe shall be tested under pressure to check the tightness of field joints. Dished test heads, test pump, test gage and water meter shall be supplied by the contractor. The pipe shall be tested under a pressure of 150 pounds per square inch maintained for a period of four hours and no leakage will be permitted in welded joints. Any defective joints discovered by the test shall be repaired and made tight and the line retested before final backfill is made. The permissible leakage in the steel line shall not exceed $3/4$ gallon per 24 hours per linear foot of coupled joint. Before the test is made, thrust blocks shall be provided to prevent the line from pulling apart at coupled joints.

26. Expansion Joints - In order to provide for expansion and contraction of the steel pipe line during its installation, a "Dresser Coupling" Style 40 shall be installed in the line at intervals not to exceed 400 feet. The contractor may, with the approval of the engineer, provide for temperature stresses during construction by following the procedure outlined in Section A 8-1 AWWA Standard Specification 7A.3-T.

Asbestos Cement Pipe

27. General Description - Asbestos cement pipe shall be Johns-Manville Transite Pressure Pipe of the class specified on the drawings, or equivalent.

28. Laying - Laying and jointing of asbestos cement pipe shall conform to the manufacturer's specifications and couplings designed for use with this type of pipe shall be used.

29. Testing - After the asbestos cement pipe is installed and before joints are backfilled, it shall be tested in the same manner as specified for cast iron pipe. The permissible leakage shall not exceed that specified for cast iron pipe.

Structural Concrete

30. Composition - All concrete shall be composed of cement, sand and broken rock or clean gravel, well mixed with the proper amount of water, and brought to a proper consistency by adjusting the aggregate-cement ratio. The water-cement ratio shall be 6.0, i.e. 6 U. S. gallons of water, including the water held in the aggregate, shall be used in the mix per each sack of cement (94 lb. net weight). The consistency, as measured by the slump test, shall be such as to give a slump of 4 inches. The aggregate-cement ratio shall be varied to produce the proper consistency. The water-cement ratio shall be held constant. The maximum

size of aggregate shall be one inch for reinforced concrete and one and one-half inches for bulk concrete. The proportions of the mix shall be 1: 2: 3, but if the consistency of the mix is not that specified, the aggregate-cement ratio may be varied to obtain the proper consistency.

31. Cement - The cement used shall be Portland cement and shall conform to the Standard Specification and Tests for Type 1 Portland Cement (serial designation C150-46 of the American Society for Testing Materials

32. Sand - Sand for concrete may be obtained from natural deposits may be made by crushing suitable rock. The sand particles shall be hard, dense, durable uncoated, non-organic rock fragments that will pass a 1/4-inch square or a 5/16-inch round opening. It must be free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam, or other deleterious substances. The sand, as it is used in the concrete, must be so graded that, in the opinion of the engineer, concrete of the required workability, density, and strength can be made without the use of an excess of water or cement.

33. Broken Rock or Gravel - The broken rock or gravel for concrete must be hard, dense, durable, uncoated rock fragments free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter. The broken rock or gravel shall have maximum particles of the size specified for reinforced or plain concrete, and shall all be retained on a 1/4-inch square or 5/16-inch round opening sieve. It shall be so graded that, in the opinion of the engineer, concrete of the required workability, density, and strength, can be made without the use of an excess of sand, water or cement.

34. Reinforcing Steel - Steel used for concrete reinforcement shall conform to Standard Specification for billet steel bars for concrete reinforcement ASTM Designation A15-39 for deformed bars of structural grade.

All steel used shall be new steel of the size and dimensions shown on the drawings. Before the reinforcement bars are placed, the surfaces of the bars and the surfaces of any metal supports for reinforcement bars shall be cleaned of objectionable rust, scale, dirt, grease, or other foreign substances, and, after being placed, the reinforcement bars shall be maintained in a clean condition until they are completely embedded in the concrete. All bars shall be accurately placed and securely fastened to position as shown on the plans and tied with wire at all intersections in such a manner that the steel will not displace during the depositing and ramming of concrete. Where bars are spliced, they shall have a lap of at least forty bar diameters. Where bars are bent as shown on the drawings, they shall be bent cold around a pin having a diameter not less than six times the minimum thickness of the bar.

The bid prices for concrete shall include reinforcing steel as shown in the plans

35. Mixing - The concrete shall be mixed until there is a uniform distribution of the materials and the mass is uniform in color and homogeneous. The mixer used shall be of such a type as to insure maintenance of the correct proportions of the ingredients. The mixing shall continue for at least one minute after all the ingredients are in the mixer. The batch shall not exceed manufacturer's rating for mixer.

36. Formwork - Forms shall conform to the shape, lines and dimensions of the member as called for on the plans. They shall be of sufficient strength and tied and braced to maintain position and shape and sufficient tight to prevent leakage of mortar. All walls shall be formed on both sides except for pipe anchorages in trenches where the sides of the trench may serve as a form. Forms and shoring shall be removed in such a manner as to insure complete safety. In no instance shall forms be removed prior to 24 hours after placing the concrete. The contractor will be responsible for any damage resulting from removal of forms and, if in the opinion of the engineer, such damage impairs the value of the structure the contractor shall remove the damaged portion and replace with new concrete.

37. Placing - Concrete shall be placed in the work before the cement takes its initial set. All foundation surfaces upon or against which concrete is to be placed must be made free from mud and debris. When placing of concrete is to be interrupted long enough for the concrete to take its final set, the working face shall be given a shape by the use of forms that will secure a proper union with subsequent work. All concrete surfaces on or against which concrete is to be placed shall be roughened, and all laitance shall be removed by thorough scrubbing, brushing, and chipping before placing concrete or mortar upon or against them. Only methods of transportation and placing which will deliver concrete of the proper consistency into the forms without segregation of aggregates will be permitted. All concrete shall be placed in horizontal layers, and thoroughly worked and tamped with suitable tools until all voids in the mass are worked out, and until it completely fills the forms, closes snugly against all surfaces, and is in perfect and complete contact with all steel used for reinforcement. Concrete shall not be deposited under water, except as authorized by the engineer, and the method of depositing shall be subject to his approval.

38. Temperature of Concrete - Concrete, when deposited, shall have a temperature of not less than 40° F., nor more than 120° F. In freezing weather, suitable means shall be provided for maintaining the concrete at a temperature of at least 50° F. for not less than 72 hours after placing or until the concrete has thoroughly hardened. No admixture shall be used to prevent freezing.

39. Finishing - The surface of concrete placed against forms must be smooth, free from projections, and thoroughly filled with mortar. Immediately upon the removal of forms, all voids shall be neatly filled with cement mortar of the same consistency as the mortar in the concrete, provided that such voids do not render the concrete defective and unsuitable for its intended use.

40. Curing and Protection - The contractor shall protect all concrete from injury until final acceptance by the City. Exposed surfaces of concrete shall be protected from the direct rays of the sun for at least three days. All concrete shall be kept continuously moist for at least two weeks after being placed. The method of keeping concrete moist shall be by continuous or continual sprinkling or spraying with water, as may be necessary to keep the concrete from drying, or by other methods approved by the engineer.

Attendants Cabin

41. Attendants Cabin - Since the attendants cabin at the third dam is approximately on line, it will be necessary to move it to one side or the other to allow the pipe line to be installed. The responsibility for moving the cabin and restoring it to its original location after the pipe is installed shall be the responsibility of the contractor. Any damage done to the cabin in the moving operations shall be repaired by the contractor.

Power Poles

42. Power Poles - It is expected that several power poles may have to be moved. The price for removing and replacing these utility poles shall be included in the unit price bid for the pipe line. Replacement shall be of a quality equal to the existing installation and to the satisfaction of the engineer.

Appurtenances

43. Measuring Device - The measuring device to be installed in the recording and control room shall consist of a "Simplex Standard Venturi Type MO Meter" size 36" x 22", or equal, equipped with flanged ends and tapped for direct reading piezometers and automatic recording instruments. The total head on the Venturi tube will be less than 5 feet measured at the axis of the tube. For use with the Venturi tube, there shall be furnished one indicating, recording and totalizing meter register, designed for floor stand mounting and arranged for low head operation.

The instrument shall indicate the instantaneous flow through the line at all times on a uniformly-graduated, direct-reading, flow scale; shall record the flow on a uniformly-graduated, direct-reading, rectangular chart, designed for weekly removal; and shall totalize the flow on a direct-reading, five-dial totalizer whose fast-reading dial is at least 4 inches in diameter to provide for accurate checking at any time.

The indicating, recording and totalizing features shall be separate and distinct.

The instrument shall be of the mercury float operated, purely mechanical type, utilizing a shaped float at least 6 inches in diameter. No equipment employing the use of any electrical steps other than chart drive clock movement shall be given consideration.

The meter register and its accompanying Venturi tube shall be made by one and the same manufacturer.

There shall be included with the meter register a year's supply of charts, pens, ink, tools, mercury, and a water manometer testing device for checking the accuracy of the instrument at any time.

The equipment offered shall be capable of measuring from a maximum of 22,500,000 g.p.d. to a minimum of 2,500,000 m.g.d. with an average error over the entire range not exceeding 2 per cent.

The Venturi metering equipment described shall be installed in complete accordance with manufacturer's recommendations and proof shall be given by the manufacturer that similar equipment of his make has been in satisfactory operation under comparable conditions for a period of at least five years.

Upon the shipment of any instrument, there shall be supplied by the manufacturer certified test notes indicating that the instrument has maintained the accuracy required by these specifications.

44. Main Control Valve - The main control valve to be installed in the recording and control room shall consist of a 36-inch iron body, bronze mounted, gate valve equipped with flanged ends and non-rising stem design for a working pressure of 50 pounds per square inch.

45. Air Inlet Valves - Air inlet valves shall be furnished at each of the points indicated on the drawings. The valves shall consist of a 6-inch standard type VAC unit manufactured by the Simplex Valve and Meter Company, or equal.

46. Air Release Valves - Air release valves shall be furnished at each of the points indicated on the drawings. The valves shall consist of 2-inch standard Simplex Air Release Valves, or equal, designed for a working pressure of 150 pounds per square inch.

47. Gate Valves - At each of the points on the line where an air inlet valve is to be installed, there shall also be furnished a 6-inch iron body, bronze mounted, double gate valve designed for working pressure of 150 pounds per square inch. Valves shall be furnished with flanged end for connecting to air inlet valves and to the main water line. Valves shall be Pacific States Gate Valves, or equivalent.

At each of the points on the line designated to receive air release valves, a 2-inch gate valve shall be furnished having characteristics as specified above.

48. Valve Boxes - At each of the points designated to receive air inlet valves, a suitable box for housing the valve assembly shall be constructed in accordance with the attached drawings. Where air release valves are installed, valve boxes having a suitable cover shall be provided by Logan City and installed by the contractor.

49. Anchorage Concrete anchorages shall be constructed according to the schedule indicated on the drawings. Concrete for anchorages shall conform to the specifications for bulk concrete. (See paragraph 30.)

50. Service Outlets - Service outlets shall be installed in the line at points designated by the engineer. Corporation stops with lead goose necks attached, valves, valve boxes, meters and meter boxes shall be supplied by Logan City and installed by the contractor. Eight 3/4-inch, two 1-inch and one 1-1/4-inch service outlets will be required.

51. Installation of Valve in Existing Line - The owner will furnish a 24-inch flanged gate valve to be installed at a by-pass located at a point in the existing steel line several hundred feet below the end of the new pipe. The work will consist of uncovering the pipe, removing a short flanged section, installing the gate valve and providing and installing a 6-inch air inlet valve and manhole in accordance with the drawings for "Air Inlet and Manhole," sheet 7.

52. Flush Valves - The contractor shall install a 2-inch flush valve in the 35-inch pipe line in the control and measuring vault as shown on the plans. A second flush valve consisting of a 6-inch gate valve shall be installed in the line at station 102+50. Flush valves shall conform to specifications for gate valves (see paragraph 47). Valve box and cover for the 6-inch flush valve shall be furnished by Logan City and installed by the contractor.

53. Connection of Existing 24-inch Steel Line - The pipe line covered by these specifications shall be connected to the existing 24-inch steel line near station 163+22. The necessary fitting, designed for a working head of 200 feet, to make the connection shall be furnished and installed by the contractor. The connection shall not be made until it is necessary to discontinue delivery through the existing woodstave pipe.

54. Reducers - Reducers conforming to AWWA Standard Specifications for long-pattern reducers of the appropriate pressure class shall be supplied and properly installed where required. At station 59+00, a 36-inch by 30-inch or a 36-inch by 24-inch reducer will be required. At station 163+22+, a 30-inch by 24-inch reducer will be required only if the lower portion of the line consists of 30-inch pipe. The price bid for the reducer shall include the cost of anchorages as shown on the plans.

55. Removal of Existing Pipe at Dam - The existing pipe line running through the south abutment of the "City Dam," will present a definite hazard to the safety of the Dam when abandoned. For this reason, it will be necessary to remove the section of the existing woodstave pipe in the abutment of the Dam and backfill the abutment with suitable materials. Materials used for the backfill, except for the clay, may be obtained from required excavation as provided in paragraph 7. Clay will be hauled from a location west of Logan, probably from the vicinity of the Logan-Cache Airport, from a barrow pit provided by the owner.

Since this section of the existing line closely parallels the proposed new line, extreme care must be exercised to protect the new line if it is placed prior to the time the old line is removed. For this reason, work on this portion of the new line should probably be scheduled for completion during the period of discontinued service in the existing pipe. After the old pipe has been removed, the foundation to receive the backfill shall be prepared by removing all debris, roots and vegetable material of every kind and the section prepared as shown on the accompanying drawings. Clay and selected backfill shall then be placed in 6-inch layers and thoroughly compacted by rolling with a tamping roller having staggered, uniformly-spaced knobs, or by using pneumatic tampers, or other tamping machines approved by the engineer. Each layer

shall have the optimum practicable moisture content required for compaction purposes as directed by the engineer. If the moisture content of the material is greater than the optimum for compaction, the tamping shall be delayed until such time as the material has dried until it contains only optimum moisture. The degree of compaction shall be equivalent to that obtained by using a pneumatic tamper operating at an air pressure of not less than 100 pounds per square inch, having a total weight, in pounds, including the weight of the tamping foot, of not less than two and one half times the area, in square inches of the tamping foot and operating uniformly over an area of one square yard for a period of not less than three minutes, provided that the area of the tamping foot shall not be less than 40 square inches. Compacted backfill shall be continued up to the elevation of the top of the dam as shown on the plans.

The existing woodstave pipe shall be cut off and removed and the space left in the concrete cut-off wall of the dam shall be thoroughly cleaned and a keyway prepared as shown on the plans. The entire volume shall then be filled with concrete of the quality specified for reinforced concrete. Care shall be exercised to insure complete and perfect contact of new concrete with the existing concrete by ramming and tamping in order to prevent any possible leakage through the plug thus prepared.

Inlet Works

56. Recording and Control House - This unit consists of a reinforced concrete vault for housing the measuring device and the control valve. Construction of the unit can be undertaken at any time desired, however the unit, including installation of equipment, must be completed so that it may be put in service as soon as the pipe line is complete. The work includes all excavation, unwatering, formwork, concrete in place, backfill, cast iron manhole cover, rounded entrance for pipe inlet, removable concrete cover, supports for the Venturi meter and any other work or materials necessary to complete the structure as shown on the plans. Bolts for anchoring the instrument panels and flow-registering recorder shall be provided as indicated by the engineer. Rounding of the pipe entrance shall be accomplished by forming the concrete to the required radius or by forming to rectangular lines and removing the green concrete. If the latter method is elected, the inlet shall be accurately finished to shape by honing. The short section of inlet pipe shall be fabricated as shown on the plans and cast in place in the concrete.

57. Inlet Pipe - Inlet pipe as shown on the plans shall be placed in the concrete forms and the concrete poured around the pipe and rammed or vibrated in such a manner that the concrete is in complete contact with the entire surface of the pipe embedded. Inlet pipe, if consisting of steel, shall be prepared by welding two 3/8-inch round deformed reinforcing rods spaced 2 inches on centers around the section of steel pipe to be embedded. A continuous fillet, welding the rod to the pipe, shall be used. Cast iron inlet pipe shall have the bell end embedded in the concrete.

Inlet pipe shall be furnished with a flanged end for connecting to the Venturi tube or gate valve as the case may be, and the cost of this pipe shall be included in the unit cost per foot bid for the line.

58. Recording and Control Vault Drain - A drain shall be installed in the recording and control vault as shown on the plans. The drain line shall consist of 2-inch galvanized iron pipe between the vault and the river. The inlet shall be fitted with a brass screen, and a screen shall be provided at the river outlet. The pipe, at the river, shall be turned in such a manner that the drain discharge is parallel with the direction of river flow. The drain tile may be installed parallel to and in the same trench as the 36-inch pipe, but shall be laid to the grade shown on the drawings.

59. Collection Vault - A collection vault which collects the flow from drainage tiles tapping spring areas northeast of the spring house is located east of the existing spring house. This structure is approximately 21 feet long and varies from 6 to 9 feet in width and is presently covered with a wooden cover. The work includes draining of water, excavation, foundation walls and footings, backfill, construction of frame cover, painting, and any other necessary work shown on the plans. Excavation, concrete work and backfill shall be in accordance with the specifications for structures.

60. Spring Development, Division 1 and Division 2 - In order that the water available to the pipe may be increased, it is planned to extend the spring house 26 feet south. The work includes unwatering, excavation, concrete footings and foundation walls, backfill, timber superstructure, painting and sluice gates as shown on the plans. It is planned that the foundation walls will serve also as a cut-off to prevent excess leakage of water from the production area. All work shall be in accordance with the appropriate paragraph under these specifications.

61. Excavation and Backfill for Structures - Excavation for structures shall be made to the lines and grades shown on the plans, or as staked in the field by the engineer. Where concrete is to be placed on the ground, the excavation shall be finished accurately by hand to the proper lines and grades. If the material is excavated beyond the neat lines required to receive the structure, the excess excavation shall be filled with selected materials in layers not more than 6 inches and thoroughly compacted in a manner satisfactory to the engineer.

Backfill for structures, except pipe lines and anchorages, shall consist of selected material compacted in 6-inch layers in a manner satisfactory to the engineer. Backfill for anchorages shall meet the specifications for backfill for pipe lines.

It is anticipated that unwatering of structures in the spring area may be difficult. All costs for pumping, timbering and sheetpiling that may be necessary shall be included in the unit price bid for the structure.

62. Carpentry - All lumber incorporated into permanent structures shall be new and shall be clearly stamped with the inspector's stamp showing the grade and grading association under which graded. All structural lumber shall be Douglas fir conforming to the West Coast Lumberman's Association specifications for No. 1 Framing, Joists, Plank and Small Timbers or No. 1 Studding, Blocking and Small Posts or equal. Sheathing shall be No. 2 or better Douglas fir, hemlock, pine or spruce. Rustic siding shall be "B and Better" Douglas fir, spruce, hemlock, pine

or cedar Standard Pattern No. 105 West Coast Lumberman's Association. Shingles shall be No. 1 5/2 cedar exposed 4-1/2 inches to weather.

63. Painting - Surfaces shall be cleaned of all dust and dirt. Knots and resin deposits shall be treated with one coat of shellac before paint is applied. Prime coat shall consist of white lead paint with raw-linseed oil vehicle and turpentine thinner and drier. Second and third coats for the siding shall be white lead paint in raw linseed oil vehicle proportioned as approved by the engineer or a commercial mixed paint approved by the engineer. Paint shall be applied to the siding with a brush. Paint shall not be applied when the temperature is lower than 50° F. or during wet or dusty weather. Shingles shall be given two coats of shingle stain. Stain shall be of commercial grade acceptable to the engineer.

64. Slide Head Gates - Slide head gates shall be installed in the spring house to provide for diverting the spring flow to the river. Gates shall consist of Hardesty Model No. 15-00 sluice gates, size 36-inch by 36-inch, together with a suitable metal frame, and fitted with bronze seats and equipped with Hardesty Hand-wheel Lift, 30-inch, Type "D". Gates shall be installed at the locations shown on the plans.

65. Plugging Existing Pipe at Spring - After use of the existing pipe line has been discontinued, the spring intake for the abandoned line shall be bulkheaded and plugged with concrete as shown on the plans. Surfaces to receive the concrete shall be thoroughly roughened and cleaned in order that complete bond and a tight water seal might be obtained. No concrete shall be placed until preparations are thoroughly made and approval of the engineer has been obtained.