

Contract Documents

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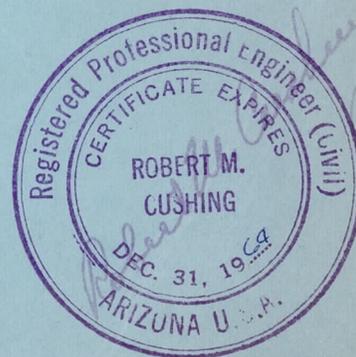
MAINS AND STORAGE TANKS

CITY OF TEMPE

TEMPE, ARIZONA

1964

JOHN CAROLLO ENGINEERS
Phoenix, Arizona



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Contract Documents

WATER WORKS IMPROVEMENTS

MAINS AND STORAGE TANKS

CITY OF TEMPE

TEMPE, ARIZONA

1964

John Carollo Engineers

Phoenix

Berkeley

JOHN A. CAROLLO
ROBERT M. BRERETON
LEON W. JACKSON
CHARLES A. ROLLINS
ROBERT M. CUSHING
H. HARVEY HUNT
DONALD R. PREISLER
HOWARD M. WAY

SPECIAL NOTICE

BIDDER'S ATTENTION IS CALLED TO THE FACT THAT
NO BID IS COMPLETE WITHOUT THE RETURN OF THIS
BOOK OF CONTRACT DOCUMENTS AND SPECIFICATIONS.

BIDS WILL BE RETURNED UNOPENED IF NOT SUBMITTED
PROPERLY SEALED.

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NOTICE TO CONTRACTORS

Sealed bids will be received at the office of the City Clerk, Tempe, Arizona, until 10:00 o'clock A.M. of March 3, 1964, for

furnishing all plant, materials, equipment, and labor and performing all work for construction of WATER WORKS IMPROVEMENTS for the City of Tempe, Arizona; at which time the proposals will be publicly opened and read aloud in the City Council Chambers. Any bid received after closing time will be returned unopened.

Pursuant to the Statutes of the State of Arizona, the City of Tempe, Arizona, has ascertained from the State Industrial Commission as of December, 19, 1963, the general prevailing scale of wages in the locality in which this work is to be performed for each craft or type of workman or mechanic needed to execute the Contract.

A certified copy of the prevailing wage scale is on file in the office of the City Clerk of the City of Tempe, Arizona, and is hereby made a part of this Contract.

It shall be mandatory upon the Contractor to whom the Contract is awarded, and upon any subcontractor under him, to pay all laborers, workmen, and mechanics employed by them in the execution of the Contract not less than the rates established by the State Industrial Commission for each craft or type of workman or mechanic needed.

Copies of the Plans, Specifications, and other proposed Contract Documents are on file in the offices of the City Clerk and City Engineer of the City of Tempe, Arizona, and in the office of JOHN CAROLLO ENGINEERS, 3308 North Third Street, Phoenix, Arizona 85012, and are open for public inspection and use.

Those interested in having individual sets of Plans and Specifications for inspection in a more convenient place may obtain the LOAN of a set of Plans and Specifications from JOHN CAROLLO ENGINEERS upon payment of a deposit of Twenty Dollars (\$20.00). Such sets of Plans and Specifications must be returned in good condition within ten (10) days after the date of opening bids, and upon their return one-half (1/2) of the deposit will be returned. Specifications contained in the Contract Documents submitted to the Owner by any bidder whose name appears on the Bid Tabulation will be considered as having been returned, and it will be necessary for said bidder to return only the corresponding set of Plans in order to secure the refund for that set of Plans and Specifications. No refund will be made to anyone for more than one set of Plans and Specifications. Single copies of Plan sheets may be purchased for Sixty Cents

(\$0.60) each, and single pages of Specifications may be purchased for Ten Cents (\$0.10) each. No refund will be made on such Documents.

A certified check or bid bond in the amount of ten percent (10%) of the bid will be required with each bid.

After the scheduled closing time for receipt of bids, no bid may be withdrawn for at least thirty (30) days.

The City of Tempe, Arizona, reserves the right to accept or to reject any or all bids and to waive informalities.

CITY OF TEMPE, ARIZONA
Owner

By _____
Lauretta A. Mutke
City Clerk

First Publication _____
(Date)

Second Publication _____
(Date)

INFORMATION FOR BIDDERS

SECURING DOCUMENTS

Copies of the Plans and Specifications and other proposed Contract Documents are on file in the offices of the City Clerk and City Engineer of the City of Tempe, Arizona, and in the office of JOHN CAROLLO ENGINEERS, 3308 North Third Street, Phoenix, Arizona 85012, and are open for public inspection and use.

Those interested in having individual sets of Plans and Specifications for inspection in a more convenient place may obtain the LOAN of a set of Plans and Specifications from JOHN CAROLLO ENGINEERS upon payment of a deposit of Twenty Dollars (\$20.00). Such sets of Plans and Specifications must be returned in good condition within ten (10) days after the date of opening bids, and upon their return one-half (1/2) of the deposit will be returned. Specifications contained in the Contract Documents submitted to the Owner by any bidder whose name appears on the Bid Tabulation will be considered as having been returned, and it will be necessary for said bidder to return only the corresponding set of Plans in order to secure the refund for that set of Plans and Specifications. No refund will be made to anyone for more than one set of Plans and Specifications.

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PROPOSAL

Bids to receive consideration shall be made in accordance with the following instructions:

Before submitting a bid, bidders shall carefully examine the Plans, read the Specifications and Contract Documents, visit the site of the work, fully inform themselves as to all existing conditions and limitations, and include sums in the bid covering the cost of each item included in the Contract.

Bids shall be properly executed upon the Proposal form attached to and made part of the Contract Documents. Numbers shall be stated both in writing and in figures, and the signatures of all persons signing shall be in longhand. The completed forms shall be without interlineations, alterations, or erasures. In case of a difference in written words and figures in a Proposal, the amount stated in written words shall govern.

Bids shall not contain any recapitulations of the work to be done. Alternative proposals will not be considered unless called for. No oral, telegraphic, telephonic, or modified proposals will be considered.

Bids shall be delivered to the office of the City Clerk, Tempe, Arizona, on or before the day and hour set for the opening of bids in the Notice to Contractors as published. Bids shall be enclosed in a sealed envelope bearing the title of the work and the name of the bidder. It is the SOLE responsibility of the bidder to see that his bid is received in proper time. Any bids received after the scheduled closing time for receipt of bids will be returned to the bidder unopened.

BID SECURITY

Each proposal shall be accompanied by a certified check or bid bond acceptable to the Owner in an amount equal to at least ten percent (10%) of the proposal, payable without condition to the Owner as a guarantee that the bidder, if awarded the Contract, will promptly execute such Contract in accordance with the proposal and in manner and form required by the Contract Documents and will furnish good and sufficient bond for the faithful performance of the same. The bid securities of the three lowest bidders will be retained until the Contract is awarded or other disposition made thereof. The bid securities of all bidders except the three lowest will be returned promptly after the canvass of bids.

WITHDRAWAL OF BID

Any bidder may withdraw his bid personally at any time prior to the scheduled closing time for receipt of bids.

CONTRACT AND BONDS

The successful bidder, simultaneously with the execution of the Contract, will be required to furnish a Labor and Material Bond in an amount equal to fifty percent (50%) of the Contract price and a faithful Performance Bond in an amount equal to the Contract price. Said Bonds shall be secured from a surety company satisfactory to the City of Tempe, Arizona.

The form of Contract which the successful bidder as Contractor will be required to execute and the forms of Bonds which he will be required to furnish are included in the Contract Documents and should be carefully examined by the bidder. The Contract and the Bonds will be executed in two original counterparts.

INTERPRETATION OF PLANS AND DOCUMENTS

If any person contemplating submitting a bid for the proposed Contract is in doubt as to the true meaning of any part of the Specifications or other proposed Contract Documents or finds discrepancies in or omissions from the Specifications, he may submit to the Engineer a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation or correction of the proposed Documents will be made only by Addendum duly issued, and a copy of such Addendum will be mailed or delivered to each person receiving a set of such Documents. The City of Tempe, Arizona, will not be responsible for any other explanations or interpretations of the proposed Documents.

ADDENDA

Any Addenda issued during the time of bidding, forming a part of the Documents loaned to the bidder for the preparation of his bid, shall be covered in the bid and shall be made a part of the Contract.

AWARD OR REJECTION OF BIDS

The Contract will be awarded to the lowest responsible bidder complying with these instructions and with the Notice to Contractors. The City of Tempe, Arizona, however, reserves the right to accept or to reject any or all bids if it may be deemed best for the public good, and to waive informalities.

The Contract may be awarded on the basis of accepting any particular alternate, not necessarily on the basis of accepting the alternate with the lowest price. The lowest bid will be taken as the lowest total bid embodying the alternate selected.

BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm, or corporation shall be allowed to make or file or to be interested in more than one bid for the same work, unless alternate bids are called for. A person, firm, or corporation who has submitted a subproposal to a bidder or who has quoted prices on materials to a bidder is not thereby disqualified from submitting a subproposal or quoting prices to other bidders.

ASSIGNMENT OF CONTRACT

No assignment by the Contractor of any Contract to be entered into hereunder or of any part thereof or of funds to be received thereunder by the Contractor will be recognized by the Owner unless such assignment has had prior approval of the Owner and the Surety has been

given due notice of such assignment in writing and has consented thereto in writing.

SPECIAL NOTICE

Bidders are required to inform themselves fully of the conditions relating to construction and labor under which the work will be or is now being performed, and the Contractor must employ, so far as possible, such methods and means in the carrying out of his work as will not cause any interruption or interference to any other contractor.

GENERAL CONDITIONS

REQUIREMENTS

It is required that there be constructed and completed in accordance with the Plans hereinafter listed and these Specifications, together with such supplemental Drawings and Addenda thereto as the Engineer may furnish from time to time, WATER WORKS IMPROVEMENTS, MAINS AND STORAGE TANKS, for the City of Tempe, Arizona.

DEFINITIONS

The following terms as used in these Specifications and Contract Documents are respectively defined as follows:

OWNER: The word "Owner" as used in these Specifications or in the Contract refers to the City of Tempe, Arizona. The official representative of said Owner in these proceedings shall be the Mayor thereof.

CONTRACTOR: The word "Contractor" as used in these Specifications or in the Contract means the person, firm, or corporation with whom the Contract is made by the Owner.

MATERIALS: The term "materials" includes, in addition to material incorporated in the project, equipment and other material used and/or consumed in the performance of the work.

SUBCONTRACTOR: The "subcontractor" includes those having a direct contract with the Contractor and those who furnish material worked to a special design according to the Plans or Specifications for this work, but does not include those who merely furnish material not so worked.

ENGINEER: The word "Engineer" used in these Specifications or in the Contract means the firm or person and their properly authorized assistants and inspectors, designated by the Owner to prepare Plans and inspect construction of the work.

WORK PERFORMED: The words "work performed" shall be construed to cover work done and materials incorporated in the work, as well as materials suitably stored at the site of the project.

CONTRACT DOCUMENTS: The words "Contract Documents" mean the "Notice to Contractors," "Information for Bidders," "General Conditions," "Specifications," "Proposal," "Contract," "Bid Bond," "Performance Bond," "Labor and Material Bond," "Plans," and "Addenda" thereto.

LAWS AND REGULATIONS

The Contractor shall keep himself fully informed of all existing and future City and County ordinances and regulations, State and National laws in any manner affecting the work herein specified. He shall at all times observe and comply with said ordinances, laws, and regulations and shall protect and indemnify the City of Tempe, Arizona, and its officers and agents against any claim or liability arising from or based on the violation of any such ordinances, regulations, or laws.

The City of Tempe, Arizona, has applied to, and will secure from, the County Highway Department a permit to lay a pipeline within the County road rights-of-way. The City has also applied to, and will secure from, the Salt River Project permits to: (1) cross under the Indian Bend Ditch at Scottsdale Road; (2) dispose of the waste water from the new Bell Butte tank into the pump ditch north of Broadway Road at 52nd Street; and (3) modify the Project pumping station at 23-1/2 E 5-1/4 N to enable the City to obtain water from this well. The Contractor shall, at his own expense, obtain all other necessary permits required by the City, County, or other public authorities; shall give all notices required by laws or ordinances; and shall pay all fees and charges incident to the due and lawful prosecution of the work.

The Contractor shall be licensed according to the laws of Arizona.

COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK

The Contractor shall commence work under this Contract on or before the tenth (10th) day after receiving written notice to proceed from the Engineer on behalf of the City of Tempe, Arizona, and shall fully complete all work under this Contract within one hundred fifty (150) consecutive calendar days from and including the date of receipt of such notice. The Contractor shall at all times during the continuance of the Contract prosecute the work with such force and equipment as are sufficient to complete it within the time specified.

The Engineer will not issue the Notice to Proceed until the Contractor has sufficient equipment and materials on the ground and is prepared to start work and complete the project without delay, providing the Contractor is not dilatory in ordering the materials and arranging to move equipment to the site. In order to assist the Engineer in issuing this notice, the Contractor shall state in a supplemental letter the estimated time required to commence work.

METHODS AND APPLIANCES

The methods and appliances adopted by the Contractor shall be such as will secure a satisfactory quality of work and will enable the Contractor to complete the work in the time agreed upon.

MATERIALS, SERVICES, AND FACILITIES

It is understood that except as otherwise specifically stated in the Contract Documents the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

Any work necessary to be performed after regular working hours, on Sundays, or legal holidays shall be performed without additional expense to the Owner.

LIQUIDATED DAMAGES

Should the Contractor fail to complete the work under this Contract within the time for completion stated in the section COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK of the General Conditions, then the Contractor shall pay the City of Tempe, Arizona, liquidated damages in the amount of One Hundred Dollars (\$100.00) for each calendar day of delay until the work is completed or accepted, subject to the provisions of paragraphs DELAYS and SUSPENSION OF WORK hereinafter mentioned.

In addition to the above liquidated damages for each day of delay until work is completed or accepted, the Contractor shall pay the City of Tempe, Arizona, liquidated damages in the amount of Fifty Dollars (\$50.00) for each calendar day that the Papago water tank is out of operation in excess of ten (10) calendar days during the period of work on the Papago tank starting before May 20, 1964. If work begins on the Papago tank after May 20, 1964, the Contractor shall pay the City of Tempe, Arizona, liquidated damages in the amount of One Hundred Dollars (\$100.00) for each calendar day that the Papago tank is out of operation in excess of five (5) calendar days.

Any extension of the time for completion of the work under the Contract will be granted only upon an approved change.

DELAYS

If any delay is caused the Contractor by a specific order of the Engineer to stop work or perform extra or additional work, or by the failure of the Owner to provide the necessary right-of-way or site for

installation, or by neglect on the part of the Owner or its employees, or by unforeseeable causes beyond the control of the Contractor, such delay will entitle the Contractor to an extension of time, except as otherwise provided in the paragraph **SUSPENSION OF WORK** hereof. Application for extension of time must be approved by the Engineer, but an extension of time, whether with or without such approval, shall not release the Sureties from their obligations which shall remain in full force until the discharge of the Contract.

If any delays from any of the above-mentioned causes occur after the expiration of the Contract period, no liquidated damages shall accrue for a period equivalent to such delay, but this provision does not preclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

SUSPENSION OF WORK

The Owner reserves the right to suspend the whole or any part of the work herein specified if deemed to its interest to do so without compensation to the Contractor for such suspension, other than to extend the time for completion of the work to the extent it may have been delayed by such suspension. No allowance for damages will be made for such delay.

FORFEITURE OF CONTRACT

It is further agreed by the Contractor that if the work to be done under this Contract shall be abandoned by the Contractor, or if there shall be a failure by the Contractor to perform the work of the character and in the time herein specified; or if the Contractor shall fail financially or from any other cause whatsoever be unable to carry out the Contract and complete the work; or if the Contract shall be assigned by the Contractor; or if the Contractor shall lose control of the work for any cause whatsoever, except for reasons beyond his control; or if at any time the Engineer shall be of the opinion and so shall certify in writing to the Owner that the work or any part thereof is unnecessarily or unreasonably delayed; or that the Contractor is willfully or persistently violating any of the conditions or covenants of this Contract, or is not fulfilling the Contract in good faith; the Owner shall have the power and authority and may then immediately notify the Contractor to discontinue all work or any part thereof as may be designated by the Engineer.

Upon notice being given as aforesaid by the Owner to the Contractor, or upon the happening of any of the conditions hereinbefore in this article specified, the Owner shall have a lien upon all equipment, materials, supplies, machinery, implements, and tools for the uses and purposes hereinafter set forth; thereupon the Owner shall have the power to, and may at the cost of the Contractor, complete the work by

letting a new Contract; and in completing the work by Contract the Owner may use such equipment, materials, supplies, machinery, implements, tools, and plant, as above-specified, as may be the property of the Contractor and may make the necessary repairs and replacements thereto.

The cost of fully completing all the work provided for under any new Contract shall include the sum or sums of money paid by the Owner to other contractors and all cost of repairs and replacements upon machinery, implements, tools, and plants of the Contractor hereunder, and also all sums of money paid for first aid, medical, surgical, and hospital services and compensation for accidental injuries or death suffered by employees of any new contractor in the course of their employment in completing the work.

The cost and expenses of fully completing the work as aforesaid shall be charged to the Contractor, and the amount of such cost or expenses so charged shall be deducted from and paid by the Owner out of any moneys that may be due to or may at any time thereafter become due to the said Contractor, under and by virtue of this Contract, as far as the same shall suffice therefore.

Should the amount remaining unpaid of the original Contract price be insufficient to reimburse the Owner for the cost and expense of fully completing the work, then the Owner may sell all materials, supplies, machinery, implements, tools, and plant then on hand, whether obtained from the Contractor or by purchase, at public sale on giving the Contractor twenty (20) days' notice of the time and place of such sale, and the net proceeds derived from the sale of the said property at such sale shall be credited to the Contractor; and should the amount received from the sale be then insufficient to pay such deficiency, the Contractor and his bondsmen shall be liable to pay the amount of the deficiency; and at any such sale of the property as provided hereunder, the Owner may bid and become a purchaser of the property.

NOTICE AND SERVICE THEREOF

Any notice to the Contractor from the Owner relative to any part of this Contract shall be in writing and considered delivered and the service thereof completed when said notice is posted, by registered mail, to the said Contractor at his last given address or delivered in person to said Contractor or his authorized representative on the work.

SUBCONTRACT

Subcontracts shall be in accordance with, and the Contractor shall be bound by, the following provisions:

All subcontracts shall be subject to the approval of the Engineer.

All subcontracts shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the Contract.

Certified copies of any and all subcontracts shall be furnished to the Engineer; however, prices may be omitted.

Subcontracts shall conform to the regulations governing employment of labor.

The subcontracting of any part of the work will in no way relieve the Contractor of his responsibility under the Contract.

CONTRACTOR'S INSURANCE

Neither the Contractor nor any subcontractor shall commence work under this Contract until he has submitted and had approved by the Owner certificates covering all insurance required.

COMPENSATION INSURANCE: The Contractor shall secure and maintain during the life of the Contract Workmen's Compensation Insurance for all of his employees employed at the site of the project.

PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE: The Contractor shall secure and maintain during the life of this Contract such Public Liability and Property Damage Insurance as shall protect him from claims for damages for personal injury, including accidental death, as well as from claims for property damages which may arise from operations under this Contract, whether such operations be by himself or by any subcontractor or by anyone directly or indirectly employed by either of them. The amounts of such insurance shall be as follows:

Public Liability Insurance in an amount not less than \$100,000 for injuries, including accidental death, to any one person, and subject to the same limit for each person, in an amount not less than \$200,000 on account of one accident, and Property Damage Insurance in an amount not less than \$50,000.

INDEMNITY

The Contractor shall indemnify and save harmless the Owner from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description

brought or recovered against him by reason of any act or omission of the said Contractor, his agents, or employees in the execution of the work under this Contract.

CHANGES IN THE WORK

The Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to, or deducting from the work, the Contract being adjusted as specified herein. All such work shall be executed under the conditions of the original Contract, except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

Extra work shall be that work not indicated or detailed on the Plans or specified. Such work shall be governed by all applicable provisions of the Specifications.

The Engineer shall have authority to increase or decrease the quantities of the items of work in the Contract. The total value of these changes will not exceed ten percent (10%) of the total amount of the Contract. Any single item may be increased by any amount or omitted entirely as long as the total amount of the Contract is not changed by more than ten percent (10%). Any change in the quantities of items of work included in the Contract that will change the total amount of the Contract by more than ten percent (10%) shall be mutually agreed upon as provided herein.

In giving instructions the Engineer shall have authority to make minor changes in the work not involving extra cost and not inconsistent with the purposes of the work; but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Engineer, and no claim for an addition to the total amount of the Contract shall be valid unless so ordered.

The value of any such extra work or change shall be determined in one or more of the following ways:

- (a) By Contractor's estimate and the Engineer's acceptance of a lump sum.
- (b) By unit prices named in the Contract or subsequently agreed upon.
- (c) By actual cost, with fifteen percent (15%) added for superintendence, use of tools, and profit.

The actual cost will include the costs of labor, material, insurance, taxes, and equipment rental. The cost of labor shall be taken as the amount paid for same, as indicated by the payrolls of the Contractor, with cost of insurance added when such can be shown to have been paid. The cost of material shall be the actual price paid for same delivered at

the site of the work. Fifteen percent (15%) shall not be added to any unit or lump sum prices herein specified. In case the work is performed by a subcontractor, the said fifteen percent (15%) will be added only once to the actual cost of the work; however, the Contractor may add five percent (5%) to the subcontractor's price to cover his own overhead.

If none of the above methods are agreed upon, the Contractor, provided he receives an order as above, shall proceed with the work. In such case and also under case (c) above, he shall keep and present daily to the Engineer a complete, thorough, written breakdown of all labor, materials, and equipment covering all extra work for the previous day. The Engineer shall have the right to examine the Contractor's payroll and all other Contractor's records pertaining to costs of materials, equipment, labor, etc.

If the Contractor, on account of conditions developing during the progress of the work, finds it impracticable to comply strictly with these Specifications, and applies in writing for a modification of requirements or of methods of work, such change may be made or authorized by the Engineer if not detrimental to the work and if without additional cost to the Owner.

CLAIMS FOR EXTRA COST

If the Contractor claims that any instructions involve extra cost under this Contract, he shall give the Engineer written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property, and the procedure shall then be as provided for under CHANGES IN THE WORK. No such claim shall be valid unless so made.

QUALIFICATIONS FOR EMPLOYMENT

No person under the age of sixteen (16) years in normal occupations, no person under the age of eighteen (18) years in hazardous occupations, and no person currently serving sentences in a penal or correctional institution shall be employed to perform any work under this Contract. No mechanic or laborer not a bona fide resident of this State for one (1) year shall be employed to perform any work under this Contract, except in accordance with the provisions of law in such cases made and provided. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health and safety of others shall be employed to perform any work under this Contract, provided, however, this condition shall not operate against the employment of physically handicapped persons who otherwise employable may be safely assigned to work which they can ably perform.

WAGE RATES

Pursuant to the Statutes of the State of Arizona, the City of Tempe, Arizona, has ascertained from the State Industrial Commission as of December 19, 1963, the general prevailing scale of wages in the locality in which this work is to be performed, for each craft or type of workman or mechanic needed to execute the Contract.

The prevailing rates so determined are as follows:

PREVAILING WAGE SCALE

	<u>Hourly Rate</u> \$
BOILERMAKERS	
Foreman	5.40
Assistant Foreman	5.15
Boilermaker-Blacksmith	4.90
Boilermaker-Blacksmith Helper	4.60
BRICKLAYERS	
Cement Block	4.50
Bricklayer	4.50
Manhole Builder	4.50

Foreman: Shall receive not less than \$2.00 a day more than these rates.

Apprentice Rates:	1st 6 mos - 35%	4th 6 mos - 70%
	2nd 6 mos - 45%	5th 6 mos - 85%
	3rd 6 mos - 55%	6th 6 mos - 95%

Based on Journeyman's Rates.

CARPENTERS

Carpenter Journeyman	4.235
Carpenter Welder	4.36
Millwright and Welder	4.485
Power Tool Operator (other than hand portable but including automatic nailer)	4.485

Foreman: At least \$0.30 per hour over the highest paid carpenter classification over whom he has supervision.

Apprentice Rates: (Less than Journeyman rate per hour)

1st 6 mos - \$1.25 less	5th 6 mos - 0.50 less
2nd 6 mos - 1.00 less	6th 6 mos - 0.375 less
3rd 6 mos - 0.75 less	7th 6 mos - 0.25 less
4th 6 mos - 0.625 less	8th 6 mos - 0.125 less

WAGE RATES, Continued

Hourly
Rate
\$

CEMENT MASONS

Cement Masons (including Curb, Gutter and Sidewalk,
and Road Formsetter where Mechanical Finishing
Equipment is not used)
Concrete Troweling Machine Operator

4.095
4.24

Cement Mason's Foreman shall be required when 3 or
more cement masons are employed on a project and
shall receive at least \$0.30 per hour over the highest
paid classification under his supervision.

ELECTRICIANS (Phoenix, Arizona) Zone A

(Inside)

Journeyman - Wireman	4.80
Journeyman - Technician	4.80
Electrical Welder	4.80
Cable Splicer	5.05
Subforeman	5.03
Foreman	5.25
General Foreman	5.70

Apprentice Rates:

1st half of 1st year	\$2.16	2nd half of 3rd year	\$3.36
2nd half of 1st year	2.40	1st half of 4th year	3.60
1st half of 2nd year	2.64	2nd half of 4th year	3.84
2nd half of 2nd year	2.88	1st half of 5th year	4.08
1st half of 3rd year	3.12	2nd half of 5th year	4.32

(Outside)

General Foreman	5.75
Foreman	5.30
Cable Splicer	5.10
Journeyman - Lineman	4.85
Journeyman - Technician	4.85
Equipment Operator	4.56
Equipment Mechanic	4.56
Jackhammer Operator	3.96
Lineman	4.85
Groundman - 1st year	3.28
2nd year	3.58
Thereafter	3.73

Apprentice Rates:

1st year	Employed as Groundman with rate of 1st year Groundman
2nd year	\$3.69
3rd year	3.92
4th year	4.15

WAGE RATES, Continued

IRONWORKERS

	<u>Hourly Rate</u>
Journeyman Reinforcing Ironworker	\$ 4.505
Journeyman Structural Ironworker	4.73
Cable Splicer	4.98
All other classifications	4.73

Foreman: \$0.35 more per hour than the hourly rate of the highest Ironworker classification over which he has jurisdiction.

Apprentice Rates: 1st 1,000 hours - 67%
 2nd 1,000 hours - 75%
 3rd 1,000 hours - 83%
 4th 1,000 hours 90%

LABORERS

Section 1 - General

Foreman: Shall be paid not less that \$0.30 per hour more that the hourly rate of the highest paid classification over which he has supervision, but in any case not less than Group 8.

Classifications

<u>Group 1</u>	3.165
Laborer, General or Construction	
Tool Dispatcher or Checker	
Flagman	
Fence Builder - Highway	
Chat Box Man	
Dumpman and/or Spotter	
Riprap Stone Man	
Form Stripper	
Landscape Gardener and Nurseryman	
Packing Rod Steel and Pans	
All helpers not herein separately classified	
 <u>Group 2</u>	 3.25
Cement Finisher Tender	
Cutting Torch Operator	
Fine Grader (Highway Engineering and Sewer Work only)	
Guinea Chaser	
Kettleman-Tarman and Bander	
Power Type Concrete Buggy	

WAGE RATES, Continued

Hourly
Rate

LABORERS, Continued

\$

<u>Group 3</u>	3.335
Chucktender (except Tunnel)	
Powderman Helper	
Concrete Curer (Impervious Membrane)	
Sandblaster (Pot Tender)	
Spiker and Wrencher	
<u>Group 4</u>	3.395
Operator and Tender of Pneumatic and Electric Tools Vibrating Machine	
Chain Saw Machine (on clearing and grubbing)	
Hydraulic Jack and similar mechanical tools not separately herein classified	
Asphalt Raker	
Ironer	
Cement Dumper (Skip-type Mixer or Handling Bulk Cement)	
Pipe Caulker	
Cribber and Shorer (except Tunnel)	
Pipe Wrapper	
<u>Group 5</u>	3.505
Grade Setter (Pipeline)	
Driller	
Jackhammer and/or Pavement Breaker	
Pipe Layer (excluding Caulker)	
Rock Slinger	
Head Rock Slinger (plus \$0.25)	
Air and Water Washout Nozzleman	
Scaler (using Bos'n's Chair or safety belt)	
<u>Group 6</u>	3.725
Driller (Core, Diamond, Wagon, or Air Track)	
Powderman	
Sand Blaster (Nozzleman)	
Concrete Saw (hand guided)	
Drill Doctor	
Gunman and Mixerman (Gunite)	
<u>Group 7</u>	4.095
Gunite Nozzleman or Rodman	
Scaler (Driller)	

WAGE RATES, Continued

LABORERS, Continued

Hourly
Rate

\$

Group 8 3.615

Foreman

Section 5

Watchman 1.625

MACHINISTS

Machinist 4.25

Heavy-duty Mechanic 4.25

Welder 4.25

Foreman: At least \$0.30 per hour over highest paid classification over which he has supervision.

OPERATING ENGINEERS

Group I 3.36

Air Compressor Operator

Field Equipment Serviceman Helper

Grade Checker (excluding Civil Engineer Crew)

Heavy-duty Welder Helper and Heavy-duty Repair Helper

Oiler

Pump Operator

Group II 3.515

Generator Operator (Welding Machine)

Welding Machine Operator - Gasoline and Diesel Power

Group III 3.715

Concrete Mixer Operator - Skip Type

Concrete Pump or Pumpcrete Operator

Field Equipment Serviceman

Motor Crane Driver

Power Sweeper Operator (self-propelled)

Ross Carrier or Fork Lift Driver

Skip Loader Operator (all types with rated capacity 1-1/2 CY or less)

Wheel Type Tractor Operator (with or without attachments, except as otherwise classified)

WAGE RATES, Continued

Hourly
Rate
\$

OPERATING ENGINEERS, Continued

<u>Group IV</u>	3.945
A-Frame Boom Truck or Winch Truck Operator	
Asphalt Plant Fireman	
Batch Plant Operator - Power Type, with rated batch capacity 1 CY and over (where operator is directly responsible for the operation of power equipment)	
Central Mix and Batching Plant Operator - 1 CY rated batch capacity and under (AutoCrete)	
Concrete or Asphalt Spreading, Mechanical Tamping or Finishing Machine Operator	
Multiple Power Concrete Saw Operator	
Pavement Breaker, Mechanical Compactor Operator (power propelled)	
Roller Operator - All types except on asphalt pavement	
Stationary Pipe Wrapping and Cleaning Machine Operator	
<u>Group V</u>	4.175
Asphalt Plant Mixer Operator	
Boring Machine Operator	
Central Mix and Batching Plant Operator (over 1 CY rated batch capacity)	
Elevating Grader Operator - all types and sizes (Euclid Loader, Athey Force Feed Loader)	
Heavy-duty Repairman or Welder	
Operating Engineer Rigger	
Pneumatic-tired Scraper Operator - all sizes and types (Turnapull, Euclid, Cat D-W, and similar equipment)	
Roller Operator - on all types asphalt pavement	
Stationary Central Generating Plant Operator (rated 300 kw or more)	
Tractor Operator - Bulldozer, Tamper, or Scraper	
Traveling Pipe Wrapping Machine Operator	
Trenching Machine Operator	
<u>Group VI</u>	4.445
Concrete Mixer Operator - Paving Type and Mobile Mixers	
Crane Operator - both Crawler and Pneumatic Type	
Crawler Type Tractor (with Boom Attachment) Operator	
Grade-all Operator	
Motor Grader Operator (any type power blade)	
Piledriver Engineer (Portable, Stationary, or Skid Rig)	
Skip Loader Operator - all types, rated capacity over 1-1/2 CY	

WAGE RATES, Continued

OPERATING ENGINEERS, Continued

Hourly
Rate
\$

Group VI, Continued	4.445
Specialized Power - Digger Operator (attached to Wheel-type Tractor)	
Universal Equipment Operator (Shovel Backhoe, Dragline, Clamshell, etc)	
Engineer Craft Foreman: Not less than \$0.25 per hour more than the highest rate paid for classification under his supervision.	

PAINTERS (Phoenix Area) Zone A

Journeyman Brush	3.875
Journeyman Brush Swing Stage	4.00
Journeyman Brush Steel and Bridge	4.125
Journeyman Spray	4.27
Journeyman Spray Steel and Bridge	4.52
Journeyman Spray Swing Stage	4.395
Journeyman Sandblaster (Nozzleman)	3.875
Journeyman Sandblaster (Swing Stage)	4.00
Journeyman Steeplejack	4.25
Journeyman Creosote Applier	4.30
Roller Applicator	3.875
Pressure Roller Applicator	4.27
Sandblaster (Pot Tender) to receive prevailing Journeyman Brush rates	
Job Foreman with 3 or more men to receive \$0.25 per hour above prevailing scale	

PLUMBERS AND FITTERS

Zone 1 or Free Zone

Up through 15 miles 4.70

Zone 2

Up through 30 miles 5.00

Zone 3

Up through 45 miles 5.35

Zone 4

5.70

Foreman: \$0.40 per hour above Journeyman rate
General Foreman: \$0.80 per hour above Journeyman rate
Superintendent: \$1.20 per hour above Journeyman rate

WAGE RATES, Continued

PLUMBERS AND FITTERS, Continued

	Hourly Rate				
	\$				
Apprentice:	<u>1st year</u>	<u>2nd year</u>	<u>3rd year</u>	<u>4th year</u>	<u>5th year</u>
	\$	\$	\$	\$	\$
1st half	1.96	2.61	3.045	3.48	3.915
2nd half	2.175	2.83	3.26	3.70	4.13

Based on Journeyman rate

TEAMSTERS

Teamster	3.165
Warehouseman	3.25
Pickup Truck Driver	3.25
Industrial Lift Truck Driver (Mechanical Tail Gate)	3.25
Dump Truck Driver - less than 8 CY, WLC	3.285
Flat Rack Truck Driver - less than 10 tons legal payload capacity	3.285
Water Truck Driver - under 2,500 gallons	3.31
Warehouse - Clerk	3.31
Dump Truck Driver - 8 CY but less than 12 CY, WLC	3.335
Flat Rack Driver - 10 tons but less than 15 tons legal payload capacity	3.335
Shop Greaser and/or Tireman	3.335
Dumptor Truck Driver, less than 7 CY, WLC	3.395
Dumpcrete Truck Driver	3.395
Heavy-duty Repairman Helper and/or Welder Helper and/or Field Equipment, Serviceman Helper	3.475
Dump Truck Driver - 12 CY but less than 16 CY, WLC	3.42
Flat Rack Driver - 15 tons but less than 20 tons legal payload capacity	3.42
Water Truck Driver - 2,500 gallons but less than 7,000 gallons	3.445
Oil Truck Driver and/or Bootman under 2,500 gallons	3.445
Transit Mix Driver - 8 CY and less capacity	3.63
Dumptor Driver - 7 CY but less than 16 CY, WLC	3.54
Water Truck Driver - 7,000 gallons or more	3.65
Dump Truck Driver - 16 CY but less than 20 CY, WLC	3.65
Flat Rack Driver - 20 tons but less than 35 tons legal payload capacity	3.65
Dumptor Truck Driver - 16 CY or more, WLC	3.65
Transit Mix Driver - 8 CY and less capacity	3.65
Dumpcrete Truck Driver	3.395
Dumpster Truck Driver - 16 CY and over, WLC	3.65

WAGE RATES, Continued	Hourly Rate
TEAMSTERS, Continued	\$
Euclid Type Spreader Truck Driver	3.65
LeTourneau Rocker Dump Driver	3.65
Ross Carrier Driver and Fork Lift Driver	3.815
Field Equipment Serviceman	3.815
Oil Truck Driver and/or Bootman - 7,000 gallons or more	3.88
Heavy-duty Repairman and/or Welder	4.275
Winch Truck Driver - \$0.125 per hour additional when operating power winch, A-Frame, or similar attachments	

The foregoing specified wage rates are minimum rates only, and the Owner will not consider any claims for additional compensation made by the Contractor because of payment by the Contractor of any wage rates in excess of the applicable rate contained in this Contract. All disputes in regard to the payment of wages in excess of those specified in this Contract shall be the sole responsibility of and adjustable by the Contractor.

Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed under this Contract at the site of the project shall be decided by the Owner's governing body or its duly designated official.

CHARACTER OF WORKMEN

None but skilled foremen and workmen shall be employed on work requiring special qualifications.

When required by the Engineer, the Contractor shall discharge any person who commits trespass or is, in the opinion of the Engineer, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. The Contractor shall keep the Owner harmless from damages or claims for compensation that may occur in the enforcement of this section of the Specifications.

PROVISIONS FOR HANDLING EMERGENCIES

Emergencies may arise during the progress of the work which may require special effort or require extra shifts of men to continue the work beyond normal working hours. The Contractor shall be prepared in case of such emergencies from whatever cause to do all necessary work promptly.

SANITATION

The Contractor shall provide and erect a suitable privy or privies at points to be determined by the Engineer for the use of employees on this construction.

Following the period of necessity for such privies, they shall be removed and all evidence thereof effaced.

The Contractor shall supply safe drinking water.

PROTECTION OF PERSON AND PROPERTY

The Contractor shall adopt every practical means to minimize interference to traffic and inconvenience, discomfort, and damage to the public. The Contractor shall protect against injury any pipes, sewers, conduits or other structures, public and/or private, lawns, gardens, shrubbery, or trees encountered in the work and shall be responsible for any injury done to such pipes or structures or damages to such property during the course of the work. Removal or changes of location of existing structures, pipes, sewers, or other obstructions encountered in the performance of the work called for in this Contract shall be made by the Contractor under this Contract as directed by the Engineer. All obstructions to traffic shall be guarded by approved barriers illuminated at night. The Contractor shall not trespass upon private property and shall be responsible for all damage done to persons or property directly or indirectly caused by his operations, and under all circumstances he shall comply with the laws and regulations of the City of Tempe, County of Maricopa, and State of Arizona, relative to the safety of persons and property and the interruption of traffic, as well as the convenience of the public. The Contractor will be held responsible for and required to make good at his own expense all damage to persons and property caused by the carelessness or neglect on the part of the Contractor or subcontractor or any agent or employee of either during the progress of the work and until its final acceptance.

ACCIDENT PREVENTION

Precaution shall be exercised by the Contractor at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws and of building and construction codes shall be observed. Machinery, equipment, and other hazards shall be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.

PLANS

The Contractor shall keep on the work a copy of the Specifications and Plans and shall at all times give the Engineer access thereto. Any Drawings or Plans listed anywhere in the Specifications or Addenda thereto shall be regarded as a part thereof and of the Contract. Anything mentioned in these Specifications and not indicated on the Plans, or anything indicated on the Plans and not mentioned in these Specifications, shall be in the same force and effect as if indicated or mentioned in both. The Engineer will furnish from time to time such additional Drawings, Plans, profiles, Specification Addenda, and other information he may consider necessary for the Contractor's guidance.

CONTRACTOR'S REPRESENTATIVE

The Contractor shall at all times be present at the work in person or represented by a foreman or other properly designated agent. Instructions and information given by the Engineer to the Contractor's foreman or agent on the work shall be considered as having been given to the Contractor.

PATENTS

The Contractor shall indemnify, keep and save harmless the Owner from all liabilities, judgments, costs, damages, and expenses which may result from infringement of any patent by reason of the use of any proprietary materials, devices, equipment, or processes incorporated in or used in the performance of the work under this Contract.

STREETS, ROADS, AND FENCES

Streets and roads subject to interference by the prosecution of the work under this Contract shall be kept open, and fences subject to similar interference shall be maintained by the Contractor until the work is completed.

PROTECTION OF WORK AND CLEANING UP

The Contractor shall be responsible for the protection of all work until its completion and final acceptance, and he shall at his own expense replace damaged or lost material or repair damaged parts of the work; and the Contractor and his Sureties shall be liable therefore. He shall take all risks from floods and casualties and shall make no claim for damages for delay from such causes. He may, however, be allowed a reasonable extension of time on account of such delays, subject to the conditions hereinbefore specified. The Contractor shall remove from the vicinity of the completed work all plant, surplus material, or equipment belonging to him or used under his direction during construction. All surplus excavated material, concrete, plaster, and debris of all

kinds shall be removed from the Owner's premises, streets or portions of buildings, or property at or adjacent to the site of the work, excepting that which may be required for refilling or grading the surface.

RIGHTS-OF-WAY

The Owner will provide rights-of-way and easements for all work specified in this Contract, and the Contractor shall not enter or occupy with men, tools, equipment, or materials, any private ground outside the property of the City of Tempe, Arizona, without the consent of the owner.

GUARANTEE OF WORK

The Contractor shall guarantee the work against defective material or workmanship for a period of one (1) year from the date of his acceptance of the final payment under the Contract. Upon discovery, repair work or replacement required, in the opinion of the Engineer, shall be done immediately by the Contractor at his own expense.

Should the Contractor fail to repair such defective material and/or workmanship, or to make replacements within five (5) days after written notice by the Owner, it is agreed that the Owner shall make such repairs and replacements and the actual cost of the required labor and material shall be chargeable to and payable by the Contractor.

Any omission on the part of the Engineer to condemn defective work or material at the time of construction shall not be deemed an acceptance, and the Contractor will be required to correct defective work or material at any time before acceptance of final payment and within one (1) year thereafter.

APPROXIMATE QUANTITIES

It is expressly understood and agreed by the parties hereto that the quantities of the various classes of work to be done and material to be furnished under this Contract, which have been estimated as stated in the Proposal, are only approximate and are to be used SOLELY for the purpose of comparing, on a consistent basis, the proposals offered for the work under this Contract; and that the Contractor further agrees that the Owner will not be held responsible if any of the quantities shall be found incorrect; and the Contractor will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or misstatement is found to occur in the estimated quantities, the same shall not invalidate this Contract or release the Contractor from the execution and completion of the whole or any part of the work in accordance with the Specifications and the Plans herein mentioned, and for the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation except as may be provided for in this Contract.

PARTIAL PAYMENTS

Not later than the fifteenth (15th) day of each calendar month, the Owner will make partial payment to the Contractor on the basis of an estimate, prepared by the Engineer, of the work performed during the preceding calendar month by the Contractor, plus the cost of all material on the site, but the Owner will retain ten percent (10%) of the amount of each such estimate and material cost until final completion and acceptance of all work covered by this Contract. Cost of material stored on the site will be based on vendor's invoices.

FINAL PAYMENT

For and in consideration of the faithful performance of the work herein embraced, the said Owner agrees to pay to the Contractor the amount earned as computed from the actual quantities of work performed under this Contract and to make such payments in the manner and at the times provided in the Specifications.

Within fifteen (15) days after the Contractor has completed the work under the Contract, and its acceptance, the Engineer shall render to the Owner and to the Contractor a final estimate, which shall show the amount of work done according to the terms of the Contract. Within thirty (30) days after final completion and acceptance of the work under the Contract, the Owner shall pay to the Contractor all sums remaining due after deducting from the final estimate such sums as have been paid the Contractor previously under the provisions of the Contract. Before the final payment is made, the Contractor shall satisfy the Owner by affidavit that all bills for labor and materials incorporated in the work have been paid.

The basis of payment shall be in full for all work actually performed in accordance with these Specifications and shall include all labor and materials incorporated in the completed work.

SPECIFICATIONS

GENERAL

LOCATION

The WATER WORKS IMPROVEMENTS are to be constructed on property owned or controlled by the City of Tempe, Arizona, as indicated on the Plans.

DESCRIPTION

The work to be done under these Specifications shall include the furnishing of all labor, material, and equipment necessary for or incident to the construction and completion of all work indicated on the Plans and as specified herein.

CONTRACT DRAWINGS

LOCATION AND SPECIAL DETAIL PLANS: The location of the work and the details for the construction of the improvements shall conform to the following Plans marked WATER WORKS IMPROVEMENTS, MAINS & STORAGE TANKS, TEMPE, ARIZONA.

List of Plans

<u>Sheet No.</u>	<u>Description</u>
1	Title Sheet
2	Key Map
3	Plan and Profile - Scottsdale Road Mains
4	Plan and Profile - Scottsdale Road Mains
5	Plan and Profile - Scottsdale Road Mains
6	Plan and Profile - Scottsdale Road Mains
7	Plan - College Avenue Mains
8	Plan - College Avenue Mains
9	Plan and Profile - Broadway Road Mains
10	Street Intersections - Mains
11	Street Intersections - Mains
12	Bell Butte Reservoir - Site Plan - Details
13	Bell Butte Reservoir - Details
14	Bell Butte Reservoir - Tank Supply - Details
15	Papago Park Reservoir - Altitude Valve Installation
16	Booster Pump Station at Well - Details
17	Booster Pump Station at Well - Details
18	Booster Pump Station at Well - Details
19	Booster Pump Station at Well - Electrical
20	Detail Sheet

All of the Plans listed above form a part of these Specifications and are filed in the offices of the City Clerk and City Engineer, City of Tempe, Arizona. These Plans, together with the Specifications, form a part of the Contract.

EXPLANATION AND MODIFICATIONS: The work shall also conform to such other Plans relating thereto as may be furnished by the Engineer prior to the opening of proposals and to such Plans in explanation of details or minor modifications as may be furnished from time to time during construction, including such minor modifications as the Engineer may consider necessary on account of conditions found during the prosecution of the work. Scaled dimensions shall not be used in the construction of the work.

In the event of any discrepancy between Plans and Specifications, the decision of the Engineer thereon shall be decisive. The written dimensions on the Plans are presumed to be correct, but the Contractor is required to check carefully all dimensions and quantities before beginning work thereon. Should any errors or omissions be discovered, the Engineer shall be so advised in writing and the proper corrections made. Any such adjustments made by the Contractor without prior approval shall be at his own risk, and the settlement of any complications arising from such adjustments shall be made by the Contractor at his own expense. All notes on the Plans shall be carefully observed by the Contractor and are to be made a part of the Contract.

MATERIAL AND EQUIPMENT DRAWINGS: Fabricated materials or equipment to be incorporated in the work shall be approved by the Engineer. In ample time to permit satisfactory progress of the work, the Contractor first shall obtain and check manufacturers' shop drawings and other pertinent data for conformance with all requirements of the Plans and Specifications. After completion of such checking and verification, the Contractor shall submit such shop drawings and pertinent data to the Engineer for approval. It shall be in such detail as the Engineer may require for informing himself as to the design, installation, and operation of such items.

The Contractor at his own expense shall make such changes in the above drawings as may be found necessary upon inspection by the Engineer to make the same conform to the Plans and Specifications. Prior to the approval of such drawings, any work which the Contractor may do on the fabrications covered by the same is at his own risk, as the Owner will not be responsible for any expense incurred by the Contractor for changes to make the same conform to the drawings as finally approved.

Drawings of minor or incidental fabricated materials and equipment may not be required by the Engineer; however, the Contractor shall furnish to the Engineer tabulated lists of such fabrications from time to

time, showing the names of the manufacturers and catalogue numbers, together with samples or general data as may be required to permit intelligent determination as to their acceptability for incorporation in the work.

Upon approval of the above drawings, lists, prints, samples, and other data, the same shall become a part of the Contract; and the fabrications furnished shall be in conformance with the same, provided that the approval of the above drawings, lists, prints, specifications, samples, or other data shall in no way release the Contractor from his responsibility for the proper fulfillment by any fabrication of the requirements of this Contract and of the purpose for which it is intended, nor from his liability to replace the same should it prove defective or fail to meet the specified requirements.

PROFILES AND ELEVATIONS

Profiles and elevations of the ground are indicated on the Plans. Elevations are referred to a datum to be given by the Engineer.

LINES AND GRADES

All work under this Contract shall be built in accordance with the lines and grades indicated on the Plans and as given by the Engineer. These lines and grades may be modified as provided in the Contract.

The Engineer will furnish only basic reference lines and bench marks from which the Contractor shall establish such other points as he may need, except as otherwise specified herein. The protection and care of such stakes shall be the responsibility of the Contractor, and any stakes lost or destroyed will be replaced only at the Contractor's expense.

On water lines and other types of pipelines, the Engineer will stake the centerline or an agreed offset line every 100 feet along the line and supply a cut sheet.

The accuracy of all the Contractor's stakes, alignments, and grades is the responsibility of the Contractor. However, the Engineer has the discretionary right to check the Contractor's stakes, alignments, and grades at any time. Where such discretion is to be exercised by the Engineer, he will notify the Contractor of his intention, stating the time at which the checking will commence. Any part of the work in progress, the results of which are predicated directly upon the Contractor's stakes, alignments, or grades to be checked, shall be held in abeyance until the Engineer has notified the Contractor that the checking has been completed and found to be in accord with the Plans and Specifications.

SEQUENCE OF WORK

Prior to commencement of the work the Contractor shall prepare and submit to the Engineer for approval a written schedule covering the general sequence of the whole work to be performed. The work schedule, when approved, shall not be subject to change without the written consent of the Engineer. Orderly procedure of all work to be performed under this Contract shall be the full responsibility of the Contractor.

The Contractor shall properly coordinate his work with the City of Tempe, Arizona, and with those other principals affected by the several parts of the project such as the Arizona Highway Department, the County Highway Department, and the Salt River Valley Water Users Association.

Priority No. 1 shall be the completion of the new water tank on Bell Butte and the 24-inch main on Broadway Road. These items shall be completed by June 30, 1964.

The water mains on Rural Road (Scottsdale Road) and College Avenue shall be completed by July 31, 1964.

The conversion of the butterfly valve into an altitude valve at the Papago tank shall be as follows:

1. If the work of converting the present butterfly valve to operation as an altitude valve at the Papago tank can begin before May 20, 1964, the Papago tank will be permitted to be out of service not to exceed 10 calendar days. In the event the Papago tank is out of operation for more than 10 calendar days during this period, liquidated damages totaling \$50.00 per day will be charged to the Contractor for each day over the allowed 10 calendar day period as set forth in the General Conditions of these Specifications under LIQUIDATED DAMAGES.

2. If work has not started on the valve by May 20, 1964, the Contractor must wait until the Bell Butte tank has been completed and in operation. In this event the Papago tank will be permitted to be out of operation for not to exceed 5 calendar days. In the event the Papago tank is out of operation for more than 5 calendar days, liquidated damages totaling \$100.00 per day will be charged to the Contractor for each day over the allowed 5 calendar day period as set forth in the General Conditions of these Specifications under LIQUIDATED DAMAGES.

MATERIAL AND WORKMANSHIP

Materials or equipment noted on the Plans or in the Specifications by a trade or manufacturer's name are so designated primarily to establish standards of quality, finish, appearance, and performance. In general it is not the intent to limit the choice of materials and equipment to the specific product designated. Requests relative to substitutions for materials or equipment specifically designated on the Plans or in the Specifications will not be considered until after award of the Contract. Such requests shall be made in writing and shall be accompanied by complete data on which the Engineer may make determination on the merits of the proposed substitution. The written request shall state how the product proposed for substitution compares with or differs from the designated product in composition, size, arrangement, performance, etc; and in addition, the request shall be accompanied by documentary proof of equality or difference in price and delivery, if any, in the form of certified quotations from suppliers of both the designated and proposed items. In case of a difference in price, the Owner shall receive all benefit of the difference in cost involved in any substitution and the Contract altered by Change Order to credit the Owner with any savings so obtained. In case of extra expenditure involved by a substitution, the Contractor shall stand this expense. Any item approved for substitution shall be subject to all applicable provisions of the Specifications.

All specific requirements of the Specifications shall be adhered to, and all necessary modifications shall be made in the article specified by trade name, type, or model of manufacturer's equipment to make it conform to the specific requirements of the Specifications.

Materials of a general description shall be the best of their several kinds, free from defects and adapted to the use for which provided.

The physical characteristics of all materials not particularly specified shall conform to the latest standards published by the American Society for Testing and Materials, where applicable.

All material shall be new and of the specified quality and equal to the approved samples, if samples have been submitted. All work shall be done and completed in a thorough, workmanlike manner, notwithstanding any omission from these Specifications or from the Plans; and it shall be the duty of the Contractor to call the Engineer's attention to apparent errors or omissions and request instructions before proceeding with the work. The Engineer may, by appropriate instructions, correct errors and supply omissions, which instructions shall be as binding upon the Contractor as though contained in the original Specifications or Plans.

All material and workmanship of whatever description shall be subject to the inspection of and rejection by the Engineer if not in

conformance with the Specifications. All defective work or materials shall be removed from the premises by the Contractor, whether in place or not, and shall be replaced or renewed as directed by the Engineer.

On all questions concerning the acceptability of materials, classification of materials, execution of the work, conflicting interest of contractors performing related work, and the determination of costs, the decision of the Engineer shall be final and binding upon all parties.

Any defective material or workmanship or any unfaithful or imperfect work which may be discovered before acceptance of final payment by the Contractor and/or within 1 year thereafter shall be corrected immediately on the requirements of the Engineer without extra charge, notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work at any stage shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. Salvageable materials belonging to the Owner, required or necessary to be removed from existing works and replaced with new materials, shall remain the property of the Owner and shall be deposited in his storage yards. It is the Contractor's ultimate responsibility to deliver complete work at the time of final payment which complies in all details with these Plans and Specifications.

TESTING AND INSPECTION

At the option of the Engineer, materials to be supplied under this Contract will be tested and/or inspected either at their place of origin or at the site of the work. Prior to commencement of the work under the Contract the Engineer will submit to the Contractor an itemized schedule of the material tests and/or inspections which will be required and the location where each such test and inspection is to be conducted. The Contractor shall give the Engineer written notification well in advance of actual readiness of materials to be tested and/or inspected at point of origin. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the material, nor shall it preclude retesting or reinspection at the site of the work.

Materials which will require testing and inspection at the place of origin shall not be shipped prior to such testing and inspection.

The Contractor shall also furnish the Engineer in triplicate certified copies of all required factory or mill test reports.

The Contractor shall at all times maintain proper facilities and provide safe access to all parts of the work and to the shops wherein the work is in preparation for purposes of inspection by the Engineer. Should any work be covered up before approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense.

WATER

The Contractor shall construct all facilities necessary to furnish water for his use during construction. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water.

EXCAVATION

GENERAL

The Contractor shall make all necessary excavation to construct the work indicated on the Plans. Excavation shall include loosening, removing, loading, transporting, depositing, and compacting in final location all materials, wet and dry, necessary to be removed for purposes of construction, or as required for ditches, grading, roads, and other purposes as indicated on the Plans; the furnishing, placing, and removing of all sheeting and bracing; all pumping and draining of excavation; the supporting of structures above and below the ground; the handling of all water encountered in the excavations; all backfilling around structures and backfilling of all trenches and pits; all other incidental excavation as indicated on the Plans and as specified; and the disposal of excess excavated materials.

Completed excavations for concrete floor slabs, bottoms, and kick block sides and bottoms shall have an undisturbed earth surface or a surface resulting from compaction of the earth to a uniform density of not less than 95 percent of the maximum density.

CHARACTER OF MATERIAL

The Contractor must satisfy himself regarding the character and amount of loam, clay, sand, quicksand, gravel, hardpan, rock, water, and all other material to be encountered and work to be performed.

CLEARING AND GRUBBING

The site of all excavation, embankments, and fills shall be first cleared of buildings, fences, lumber, walls, stumps, brush, weeds and rubbish, trees, and loose boulders, which shall be removed or disposed of.

Pits, fill, and other earthwork required for the erection of Contractor's construction facilities shall be filled or removed, as the case may be, upon the completion of the work and leveled to meet the existing contours of the adjacent ground.

EXCAVATION FOR FOUNDATION OF BELL BUTTE WATER STORAGE TANK

The location of the Bell Butte water storage tank will be established by the Engineer so that the entire area to be occupied by the steel storage tank, including the subdrainage line, gravel fill, and drain, will rest upon a natural and undisturbed foundation. After the excavation is completed, the back slope shall be scaled of all loose material.

The excavated material will be wasted at the tank site in the area indicated on the Plans.

TRENCHES AND TUNNELING

The Contractor shall make all necessary excavation to construct the work indicated on the Plans.

The pipe shall be laid in an open trench or in a tunnel, as indicated on the Plans.

Where open trenches or tunnels are not so indicated, the pipe may be laid in open trenches or in sections of open trenches connected by tunnels, provided, however, that the tunnel length shall in no case be more than 14 feet, and open trenches between tunnels shall be not less than 8 feet in length.

Tunnels shall have a height which will provide sufficient clear space above the top of the pipe to allow proper workmanship. In no case shall this be less than 2 feet.

If the bottom of the excavation is found to consist of rock or any material that by reason of its hardness cannot be excavated to give a uniform bearing surface, said rock or other material shall be removed to a depth of at least 3 inches below the bottom of the pipe and refilled to grade with selected material thoroughly compacted into place, all at the Contractor's expense for labor and material. Selected material for backfill referred to above shall have 100 percent of the material passing a 3/8-inch screen with enough fines in it to allow the proper compaction. This material shall not have any crushed gravel in it.

If the bottom of the trench or excavation is too wet or unstable to support the pipe properly, the Contractor shall excavate the trench to a minimum of 4 inches below grade or as required by the Engineer, and refill to grade with crushed gravel passing a 1-1/2 inch sieve and retained on a No. 3 sieve as a bedding for the pipe, at the Contractor's expense for labor and material.

Existing pavement and other hard surfacing shall be cut to neat lines. Sidewalks shall be cut back and removed to the nearest joint on either side of the trench. No part of the broken out material shall be used in the backfill except gravel.

At street crossings or where existing driveways occur on a street, the Contractor shall make provision for trench crossings at these points either by means of backfills, tunnels, or temporary bridges.

The use of trenching and backfilling machinery will be permitted on all streets, alleys, and rights-of-way.

Water pipe and appurtenances shall be laid in trenches separate from those used for sewers.

WIDTH AND DEPTH OF TRENCH

The minimum clear width of trench for pipe, measured at the top of the pipe, shall be not less than that indicated on the Plans.

The maximum clear width of trench for pipe measured at the top of the pipe shall not exceed those widths for the various pipe diameters indicated on the Plans.

If any trench through neglect of the Contractor be excavated below the bottom grade as required by the Plans, it shall be refilled to grade with selected material thoroughly compacted in place, at the Contractor's expense for all labor and materials.

LENGTH OF TRENCH

Trenches in pavement shall be opened not more than 750 feet in advance of the pipe laying nor left unfilled more than 750 feet in the rear of the pipe laying. Other trenches in traveled roadways shall be opened not more than 2,000 feet in advance of pipe laying nor left unfilled more than 2,000 feet in the rear of the pipe laying, except as the location of line valves requires a longer distance for testing. All streets, alleys, and driveways shall be provided with crossing ramps until backfilling is completed. The Contractor shall provide for the maintenance of 2-way traffic during work on and along Broadway and Rural Roads (Scottsdale Road).

SHORING

Where necessary, trenches and other excavations shall be properly sheeted and braced to furnish acceptable working conditions. The bracing shall be so arranged as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength. Any damage to structures occurring through settlements, water or earth pressures, slides, caves, or other causes due to failure or lack of sheeting or bracing or improper bracing, or through negligence or fault of the Contractor in any other manner, shall be repaired by the Contractor at his own expense.

UNAUTHORIZED EXCAVATION

Structure excavation carried beyond or below the lines and grades given by the Engineer shall be refilled, at the expense of the Contractor, with such material and in such manner as may be directed in order to insure the stability of the various structures. Space beneath any structures, excavated without authority, shall be refilled with concrete at the expense of the Contractor.

CLEARANCE FOR STRUCTURES

The sides of excavations for structures other than pipe and thrust anchors shall be sufficient to leave at least 12 inches in the clear as measured from the extreme outside of formwork.

BLASTING

All blasting shall be done in accordance with local ordinances by skilled operators. Blasting charges for trench excavation shall be kept small and blanketed to prevent damage to property and so that ordinary traffic will not be interrupted during work. Blasting for the tank foundation on Bell Butte shall be performed with all necessary precautions to eliminate hazards to traffic on Broadway Road and at the County maintenance yard south of Bell Butte.

REMOVAL OF WATER

The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water entering the excavations or other parts of the work. No concrete footings, foundations, or floors shall be laid in water, nor shall water be allowed to rise over them until the concrete has set at least 24 hours. Water shall not be allowed to rise unequally against new walls for a period of 14 days after wall completion.

The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction without prior consent of the Engineer.

Water shall be disposed in such a manner as not to be a menace to the public health.

DISPOSAL OF MATERIAL

Excavated material shall be disposed of by backfilling, filling, and grading around the work as may be directed, and to the lines and grades given by the Engineer. No excavated material shall be disposed as to cause pressure against newly placed or set concrete or masonry.

Excavated material in streets and roadways shall be laid alongside of the trench and kept trimmed up so as to cause as little inconvenience as possible to public travel. Free access must be provided to private drives and traffic on cross streets. Means shall be provided whereby storm and waste water can flow uninterruptedly.

Debris produced by clearing and grubbing and excess excavated material not required or usable for backfilling or filling shall be immediately removed and disposed of.

No surplus material shall be dumped on private property unless written permission is furnished by the owner of the property.

BACKFILLING STRUCTURES

All lumber, rubbish, and braces shall be carefully removed from excavations unless ordered left in place by the Engineer. Unless otherwise specified, all excavations shall then be backfilled up to the original surface of the ground or to such grades as shall be directed. The backfilling shall be done as completely as possible in such manner as to prevent after-settlement.

No backfill shall be placed against the walls of any structure until the walls have been inspected and approved by the Engineer. Shoring shall be carefully and completely removed as the backfilling progresses.

The material used for backfill shall be free from debris or other foreign material and shall be placed as specified hereinafter.

Backfill adjacent to structures shall be placed by either of the following methods:

- (a) Placement in layers not over 8 inches in depth and sprinkled with water and compacted with tampers as placed.
- (b) Placement of a portion of the backfill after the excavation is partly filled with water. The backfill so placed shall be agitated by poling or other means to insure complete wetting, and then shall be allowed to dry until firm. The remaining excavation shall then be backfilled by repeating the process in one or more lifts.

Backfill adjacent to structures on which pipe will be bedded shall be placed in layers not over 8 inches in depth and sprinkled with water and compacted with mechanical tampers as placed to a uniform density of not less than 95 percent of the maximum density as defined and specified

by the Tentative Method of Test for Moisture-Density Relations of Soils, ASTM D 698. Backfilling by this method shall be done until the backfill has reached the elevation of the pipe bedding. Further backfilling shall be done as outlined above under backfilling of trenches.

BACKFILLING TRENCHES

All lumber, rubbish, and braces shall be carefully removed from excavations unless ordered left in place by the Engineer. Unless otherwise specified, all excavations shall then be backfilled up to the original surface of the ground, or to such grades as shall be directed. Soil maximum density shall be as defined and specified by the Tentative Method of Test for Moisture-Density Relations of Soils, ASTM D 698.

Backfilling of trenches shall be done in such a manner as not to disturb the pipe, conduit, or other structures. In all cases the backfilling around the pipe shall be carried up manually to 6 inches above the top of the pipe with selected material or sand, free from large stones or lumps, except at street intersections where the backfill material up to 6 inches above the top of the pipe shall be sand. Sand and/or selected material manually placed for this work shall be compacted to a uniform density of not less than 85 percent of the maximum density during placement with a railroad or pneumatic tamper having a curved head. The pipe shall then be center loaded with backfill material and the pipe water tested before proceeding with the backfill operations. At street intersections the backfill may be carried to grade in order to minimize inconvenience to the public. After the water test has been completed, backfilling shall then proceed.

Unless otherwise specified, in all trenches which are under pavement, the rest of the trench backfill shall be placed in layers not over 8 inches in thickness, each layer dampened to insure maximum compaction, and then compacted with railroad or pneumatic tampers.

Trenches under County highway pavement or within 6 feet of the edge of County highway pavement shall be backfilled and compacted in accordance with Maricopa County Special Provisions for Installation of Underground Utilities, dated July 27, 1962. Backfilling within the above limits will be subject to inspection by the Maricopa County Engineer.

The backfill of all trenches within 6 feet of any existing County highway pavement shall be topped with 3 inches of compacted aggregate base course. The cost of this gravel backfill shall be included with the pipe items. The backfill of all trenches in the traveled portions of all streets, alleys, aprons, and parking areas, except as noted above, shall be topped off with at least 4 inches of compacted aggregate base course and shall eventually be left even with the surrounding surfaces. The cost of this gravel surfacing shall be included with the pipe items.

Elsewhere the rest of the trench may be filled and compacted as above, or at the Contractor's option the backfill material in the trench may be leveled out to approximately 2 feet below the surface and water applied to the fill to settle it, augmented by jetting with a water pipe thrust down into the fill material at close intervals, poling, or other means, additional water being applied if necessary. Additional fill shall then be placed while water is still in the trench to bring the surface to grade.

Aggregate base course shall consist of quarry waste, broken stone, crusher run gravel or crushed rock, or a combination thereof, composed of sound, durable particles with sand and a satisfactory binder. The aggregate shall be free from adobe, vegetable matter, loam, and other deleterious substances and shall be of such quality that it will compact thoroughly when watered and rolled to a firm, well bonded base. It shall conform to the following grading:

<u>Sieve Size</u>	<u>Percentage Passing Sieve</u>
1-3/4"	100
1-1/4"	90 to 100
3/4"	50 to 80
No. 4	20 to 40
No. 10	0 to 10

That portion passing the No. 4 sieve may consist of rock screening or other cementitious material.

When the aggregate does not contain sufficient binder to bond properly under the action of watering and rolling, there shall be incorporated into it a binder material of cementitious material. This binder material shall be well graded from coarse to fine and of such size that from 90 to 100 percent shall pass a No. 4 sieve.

The plasticity index shall not exceed 5 when tested in accordance with AASHTO T 91.

In the case of all trenches through pavement, after filling the trench to grade, the surface shall be treated with oil to keep down dust. After completion of the backfilling in the case of trenches through pavement, the pavement shall be swept or flushed clean of all dirt resulting from the excavating and backfilling operations.

Sheeting shall be removed in all cases except where authorized by the Engineer. Where sheeting is drawn, all cavities remaining in or adjoining the trench shall be solidly filled. Where sheeting is left in place, all cavities behind such sheeting shall be solidly filled.

Excess material shall be removed and all work areas shall be left in a neat and cleaned condition.

CARE OF EXISTING STRUCTURES

Existing power and telephone lines, trees, fences, water pipes, gas lines, sewers, or other conduits, embankments, and sundry structures in the vicinity of the work shall be supported and protected from injury by the Contractor during the construction and until the completion of the work. The Contractor shall be liable for all damages done to such structures, as herein provided, and shall save and keep the Owner harmless from any liability or expense for injuries, damages, or repairs to same.

A thorough attempt has been made to show the type, size, location, and number of all utility mains and services; however, no guarantee is made as to the true type, size, location, and number of such mains and services. The information was taken from the various utility companies' maps and transferred to the Plans as accurately as possible. Neither the Owner nor the Engineer shall in any way be responsible for the omission on the Plans of any mains or services of whatever nature nor shall they be responsible for any misrepresentation of size, type, number, location, or depth. The Contractor shall repair, in a manner satisfactory to the owner of any utility, main, or service, all mains or services damaged in the progress of his work. The Contractor shall notify all owners of utilities when his work will be in progress and shall make such arrangements as are necessary to make any emergency repair. The Contractor shall be prepared at all times with labor, equipment, and materials to make repairs on damaged mains or utilities.

No extra compensation will be made for the repair of any fences, services, or mains damaged by the Contractor's labor forces or equipment, nor for any damage incurred through the neglect or failure to provide protective barriers, lights, and other devices or means required to protect such existing utilities.

RESTORING SURFACES

GENERAL: That portion of all streets, alleys, driveways, aprons, parking areas, sidewalks, curbs, gutters, bank protection, etc. where the surface is removed, broken into, or damaged by this construction work shall be resurfaced or repaired as specified below.

MAINTENANCE: Backfilled trenches in the above-mentioned areas shall be maintained daily until the work has been accepted by the City, and the surface of the fill kept smooth. If fill surfaced with aggregate base course settles, additional aggregate base course shall be added

as often as necessary to keep the surface smooth. Trenches through pavement, etc, awaiting resurfacing shall be kept full and smooth and shall be maintained daily, and fill shall be added as often as necessary to keep the surface smooth until such time as the surfacing has been replaced. Where fill is added to trenches through pavement or where the oiled surface of the fill is disturbed, additional oil shall be applied to the surface of the fill so that the entire exposed surface of the fill is at all times oil covered. Any dirt deposited on the pavement at this time shall be swept or flushed off.

GRAVEL SURFACES: Resurfacing in gravel areas shall consist of at least 4 inches of aggregate base course, well compacted and using at least 1 cubic yard of aggregate for each 30 lineal feet of trench.

RESTORING PAVED SURFACES: Pavement cuts across a City or County road shall be replaced as detailed on the Plans.

All concrete used for pavement replacement shall be Class A as defined in these Specifications. All asphalt topping shall be a hot plant mix type with an emulsion and coarse sand seal extending at least 6 inches on either side of the patch.

Before placing concrete the edges of the existing concrete shall be thoroughly cleaned, wet, and painted with neat cement. Before placing asphalt topping, the edges of the existing asphalt shall be thoroughly cleaned and primed with asphalt emulsion.

Where the existing pavement is concrete, the patch shall be finished similar to the existing surface. Concrete pavement shall not be opened to traffic for 7 days or until the compressive strength of the concrete has reached 500 pounds per square inch.

Replacement of pavement crossings shall be placed in 1/2 of the pavement width at a time and allowed to cure properly before being opened to traffic. When this is accomplished, the other half may be paved. No paving replacement shall be opened to traffic without the Engineer's approval.

All pavement replacement shall be done to the satisfaction of the Engineer. All work on the County highway will be subject to inspection and approval by the County Highway Department. The old concrete roadway, not presently being used for Broadway Road and where cut for the new pipeline, need not be replaced with concrete. The pavement patch, in this case, shall consist of a 6-inch topping of ABC.

CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, ETC:

Curbs, gutters, sidewalks, driveway aprons, and other concrete surfacing shall be patched with concrete to match the original shape, thickness, and finish. Concrete shall be given three coats of clear curing compound. For the new pipeline on College Avenue, the removal and replacement of concrete sidewalks will be paid for under Item No. 19. No payment will be made for the removal and replacement of concrete curb and gutters, concrete valley gutters, and concrete aprons. However, curb and gutter will be included in the total length of pavement replacement. No individual item of payment will be made for removal and replacement of concrete sidewalks and driveway aprons on streets other than College Avenue, and all costs incidental thereto shall be included in the pertaining item of pipework.

TRAFFIC PROVISIONS: Unless a permit to close the street is obtained from the Superintendent of Streets, the Contractor shall so arrange his schedule of work that 1/2 of the roadway is available to traffic at all times.

TANK FOUNDATIONS AND ACCESS ROAD

GENERAL

The Contractor shall construct foundations and develop the site areas at the Bell Butte site to accommodate the new 2 million gallon storage reservoir and at the booster pumping station site to accommodate the new 58 thousand gallon forebay tank.

TWO MILLION GALLON RESERVOIR

GRAVEL CUSHION AND SUBDRAIN COVER: A gravel or rock cushion shall be placed on the compacted subgrade for the tank. The gravel or rock shall be a minimum of 4 inches in thickness, evenly spread over the entire base, and around and over the 6-inch subdrain line. The gravel or rock is to be carefully deposited over the subdrain with hand shovels in such manner as not to disturb the alignment at the pipe. Hauling will not be permitted over the pipe after it is in place.

The gravel or rock shall conform to the following gradation:

Passing 1/2" Sieve	100%
Retained on No. 4 Sieve	95 to 100%

SIX-INCH VITRIFIED SUBDRAIN: Vitrified clay pipe shall be extra strength pipe in accordance with the specifications of the Clay Pipe Institute. Any pipe which does not give a clear metallic ring when struck with a hammer while standing on end shall be rejected.

The pipe shall be laid without break up-grade, with 1/4-inch open joints from both sides of the drain box to the high point to be located in the field by the Engineer. Joints shall be wrapped as noted on the Plans.

DRAIN BOX: The drain box shall be constructed of Class A concrete in accordance with the specifications for CONCRETE herein.

OVERFLOW DITCHES AND CULVERTS: As indicated on the Plans, ditches and culverts shall be constructed and existing culverts shall be cleaned to conduct drain and overflow water from the south side of Broadway Road, across 52nd Street and Broadway Road, under an irrigation lateral and into the wasteway north of Broadway Road. Prior to acceptance of the work, the water used to purge and test the reservoir shall be drained through the ditch and culvert system. After this draining, the Contractor shall clean and dress the ditch and culvert system. The 18-inch reinforced concrete pipe leading from the drain box shall show no signs of joint leakage during the afore-mentioned draining.

If such signs of joint leakage, as dampness or seepage at the downstream end of the pipe, appear during the draining, the Contractor will patch the pipe joints until the dampness or seepage is stopped during future draining tests.

ACCESS ROAD: The Contractor shall construct an access road to the site of the 2 million gallon reservoir. This road shall be so constructed that:

1. The lower end shall be on Broadway Road near 52nd Street.
2. The upper end shall be at the gate in the chain link fence enclosing the site.
3. The road section shall be as indicated on the Plans.
4. No grade in the road profile shall exceed 20 percent.
5. Culverts shall be constructed on threads of existing washes and gutters crossed by the access road. Culvert pipes shall be furnished by and at the expense of the Contractor; shall be laid in the thread of the wash or gutters crossed by the road; shall be centered in their run on the road centerline; shall be equal in length to the road width (10 feet) plus three times the vertical distance between the culvert thread and the road surface; shall be 12 inches in diameter; shall be 16-gauge galvanized, corrugated, metal pipe; shall be sloped to drain on the thread of the washes or gutters; and shall be bedded on compacted ABC.
6. The route of the access road shall be established at the site by the Contractor in conformance with these Specifications and shall be subject to the approval of the Contractor.
7. At the conclusion of all work on the reservoir and prior to the final acceptance thereof by the City of Tempe, the access road shall be graded and the slopes of cuts and fills will be dressed and cleaned.

FIFTY-EIGHT THOUSAND GALLON FOREBAY TANK

SITE GRADING AND DRAINAGE DITCH: Prior to any construction at the site, the Contractor shall blade the work area to the Plan-indicated grade. Surplus earth shall be spoiled off the site. Prior to the

construction of the forebay subgrade, the area ditch shall be completed. During the course of all subsequent work, the site shall be dressed to drain, and the area ditch shall be kept free and operable.

SUBGRADE: The area of the tank plus 5 feet in all directions shall be stripped of all existing roots and other organic material and trash. The subgrade shall then be constructed to the Plan-indicated grade and shape. This construction shall be accomplished by the placing of ABC graded to remove all stones larger than 3 inches in diameter in courses compacted to 4 inches in thickness and moistened (if necessary) and compacted to achieve 90 percent optimum moisture density.

GRAVEL CUSHION: A gravel or rock cushion shall be placed on the completed subgrade. The cushion shall be 4 inches in thickness and shall be evenly spread over the area of the tank plus 2 feet in all directions. The gravel or rock shall have the gradation hereinbefore specified for the cushion of the 2 million gallon reservoir.

VALVE BOX: The valve box shall be constructed of Class A concrete in conformance with the detail on the Contract Plans.

CONCRETE

COMPOSITION

Concrete shall be composed of portland cement, fine aggregate, coarse aggregate, and water so proportioned and mixed as to produce a plastic, workable mixture in accordance with all requirements of this section and suitable to the specific conditions of placement.

MATERIALS

CEMENT: All cement shall be of a reputable brand and shall conform to the Specifications and test for portland cement ASTM C 150, Type I or Type II, except where the Plans or Specifications call for high-early-strength, in which case cement shall be Type III.

FINE AGGREGATE: Fine aggregate for concrete or mortars shall consist of clean, natural sand or of sand prepared from stone or gravel. Deleterious substances shall not be present in excess of the following percentages by weight of contaminating substances. In no case shall the total exceed 3 percent.

Removed by decantation (dirt, silt, etc)	3%
Shale	1%
Clay lumps	1%

Fine aggregate shall not contain strong alkali nor organic matter which gives a color darker than the standard color when tested in accordance with ASTM C 40. Fine aggregate shall have a fineness modulus not less than 2.50 nor greater than 3.00. Fine aggregate shall be graded from coarse to fine within the following limiting percentages by weight:

<u>Sieve Size</u>	<u>Percentage Passing Sieve</u>
3/8"	100
No. 4	95 to 100
No. 8	75 to 90
No. 16	55 to 75
No. 30	30 to 55
No. 50	12 to 30
No. 100	2 to 8

No individual size fraction shall exceed 35 percent.

COARSE AGGREGATE: Coarse aggregate shall consist of gravel or crushed stone made up of clean, hard, durable particles of stone, free from calcareous coatings or other foreign substances. It shall be free from micaceous particles, from flat or elongated pieces, and from all organic matter. Deleterious substances shall not be present in excess of the following percentages by weight, and in no case shall the total of all deleterious substances exceed 2 percent.

Soft fragments	2%
Shale	1%
Coal and lignite	1/4%
Clay lumps	1/4%
Materials finer than No. 200 sieve	1/2%*

*Except that when material finer than No. 200 sieve consists of crusher dust, the maximum amount shall be 1 percent.

Coarse aggregate shall be graded within the following limiting percentages by weight, except that the weight retained on any single sieve shall not exceed 45 percent of the total weight:

<u>Sieve Size</u>	<u>Percentage Passing Sieve</u>
1-1/2"	100
1"	88 to 100
3/4"	56 to 91
1/2"	25 to 60
3/8"	4 to 34
No. 4	0 to 10

WATER: Water for concrete shall be clean; free from oil, alkali, acid, organic matter, or other deleterious substances.

MIXING AND PROPORTIONS

Concrete shall be transit mix concrete in accordance with ASTM C 94. The proportions of materials shall be such as to secure the lowest water-cement ratio which is consistent with good workability, a plastic, cohesive mixture, and one which is within the specified slump range. The proportion of fine and coarse aggregate shall be such that the ratio of the coarse to the fine shall be not less than 1.0 nor more than 2.0, nor shall the amount of coarse aggregate be such as to produce harshness in placing nor honeycombing in the structures.

Concrete for kick blocks, thrust anchors, pipe encasement, slabs supporting pipe, curbs, gutters, and sidewalks shall be Class B. All other concrete shall be Class A.

Class A concrete shall contain a minimum of 5.8 sacks of cement per cubic yard of concrete (94-pound sacks) not over 7 gallons of water per sack of cement, and the slump shall be between 3 inches and 6 inches.

Class B concrete shall contain a minimum of 5.0 sacks of cement per cubic yard of concrete, not over 7-1/2 gallons of water per sack of cement, and the slump shall be between 3 inches and 6 inches.

PLACING

Concrete shall be poured in clean, tight forms. Bottom slabs and tops of walls shall be given a hard steel trowel finish. Top slabs shall be given a wood float finish. Tops of walls shall be given a 3/8-inch bevel or finished with a 1-inch radius edger. Outside wall corners which are to be exposed above ground shall be given a 3/8-inch bevel.

PATCHING AND POINTING

Cavities produced by form ties and surface honeycombed or requiring repair shall be thoroughly cleaned, saturated with water, and carefully filled and pointed with mortar. On all exposed walls, fins and projections shall be removed. Joints shall be left smooth, by grinding if necessary. However, it will not be necessary to remove form marks if the joints are smooth.

CURING

Concrete shall be cured by keeping wet for 7 days, or may be covered with three coats of colorless curing compound.

REINFORCEMENT

Reinforcing bars shall be deformed bars, intermediate grade, conforming to ASTM A 15 (billet-steel).

PIPE AND FITTINGS

GENERAL

REQUIREMENTS: The Contractor shall furnish all labor, material, and equipment, and shall perform all operations in connection with the installation of the pipelines and appurtenances, as indicated on the Plans and as specified herein. Each pipe shall be laid true to line and grade, and in such a manner as to form a close concentric joining with the adjacent pipe.

SPECIFIC USES: Except as otherwise noted, cast iron pipe shall be used for all mains 12 inches in size or smaller as indicated on the Plans. For sizes larger than 12 inches, steel pipe, concrete steel cylinder pipe, or ductile cast iron pipe may be used. The use of steel pipe, concrete steel cylinder pipe, or cast iron pipe will be determined according to the Owner's choice of alternates for this item. However, only steel pipe shall be used for the river crossing on Scottsdale Road between the limits indicated on the Plans, and only steel pipe shall be used for the line between Broadway Road and the new storage tank on Bell Butte.

OTHER UTILITIES: It shall be the Contractor's responsibility to replace or relocate all water, sewer, gas, or irrigation service connections damaged or in conflict with his work. Such replacement and/or relocation will be accomplished at no change in the Contract price.

CONNECTIONS TO EXISTING PIPE: Before getting close to a proposed connection, in time to properly adjust the grade and line of the new pipe, the existing pipe shall be uncovered at the location where the connection is to be made so that changes in the connections and fittings indicated on the Plans can be made if necessary.

BLOCKING AND THRUST ANCHORS: All pipelines shall be blocked with concrete kick blocks at all changes in direction, as at bends, crosses, wyes, or tees; at all changes in size, as at reducers; at all plugs; and at dead ends. Blocking against plugs shall be arranged so the capped end of the 2-inch nipple is not encased or covered by the concrete. Thrust on block shall be figured on the basis of 150 psi pressure in the line, and bearing areas of blocks against undisturbed soil shall be based on the following soil bearing loads:

Soft clay	500 lb/sq ft
Sand	1,000 lb/sq ft
Sand and gravel	1,500 lb/sq ft
Sand and gravel cemented with clay	2,000 lb/sq ft

The items of thrust anchors for the connecting line to the ground storage tank shall be as detailed on the Plans.

CLEANING AND TESTING: After installation, all pipelines shall be left thoroughly clean. They shall be tested for tightness under hydrostatic pressure to 150 psi at the lower end of the line. All joints shall be examined during the test, and all visible leaks shall be repaired. The Contractor shall furnish all necessary tools, labor, materials, water, bulkheads, and appliances needed for the test. Lines shall be filled slowly, and provisions shall be made for venting the air.

After satisfactory completion of the testing, the pressure in the pipe shall be maintained at 50 psi until the backfilling is completed.

STERILIZATION: After testing and before putting into service, all water lines shall be chlorinated by the Contractor in accordance with AWWA C601 and as directed by the Engineer. Chlorine will be furnished by the Owner, and the chlorination will be supervised by the Engineer.

CAST IRON PIPE

USES: Cast iron pipe, Class 150, shall be used for all distribution pipelines 12 inches in size and smaller and may be used on the transmission pipelines except where specifically noted on the Plans or in the Specifications.

PIPE: Cast iron pipe shall conform to the requirements for Class 150 pipe, ASA A21.2, ASA A21.6, ASA A21.8, ASA Proposed Specification A21.DW, or Federal Specification WW-P-421, except that if high strength 21/45 iron is used for pipe conforming to the above specifications, thickness of the pipe can be reduced according to the design computations outlined in ASA A21.1.

LINING AND COATING: Cast iron pipe shall be cement lined in accordance with ASA A21.4 except that the thickness of the lining need be only 1/2 the thickness required by this ASA Specification. Lining shall be applied to bare pipe. Following the application of the cement lining to the interior of the pipe, the interior and exterior of the pipe shall be coated with coal-tar pitch varnish.

JOINTS: Joints on cast iron pipelines shall be bell and spigot, mechanical joints to ASA A21.11 or "Tyton" type, except where flanged joints, Dresser couplings, or Victaulic couplings are specifically called for on the Plans.

Wherever the Plans indicate bell and spigot joints, mechanical joints or Tyton type joints may be used instead.

FITTINGS: In general fittings may be of the following types:

Class D, AWWA C100

ASA A21.10 (4-inch through 12-inch)

Short body fittings with ASA B16.1 laying dimensions and AWWA Class D metal thickness (for 14-inch through 20-inch)

Short body fittings in accordance with City of Los Angeles Standards

125-pound flanged fittings, ASA B16.1

Where a specific type of fitting is called for on the Plans, this type shall be used. Fittings shall be all bell unless indicated on the Plans or required to be flanged or spigot on one or more ends. Fittings shall be smooth cement lined in accordance with ASA A21.4, except that the lining shall be applied to 1/2 the thickness required by the above ASA specification. Lining shall be applied to bare metal. After application of the cement lining, fittings, except 125-pound flanged fittings, shall be coated inside and out with coal-tar pitch varnish. Fittings may be mechanical joint in accordance with ASA A21.11, provided dimensions of bells and gaskets are suitable for the outside diameter of the cast iron pipe being used, and provided body of fitting is in accordance with one of the types listed above.

Tapped plugs for pipe sizes 12-inch and under shall be tapped 2-inch and provided with 2-inch galvanized nipple and cap as indicated on the Plans. Plugs used with mechanical joint fittings shall be of a type which bolts to the fitting and does not require any blocking of the plug.

TAPS: Taps into cast iron pipe shall be made by machine.

FLANGES: Flanges may be cast integrally with the pipe, in which case they shall conform to ASA B16.1 as to diameter, thickness, drilling, etc. or they may be screwed on the threaded ends of the pipe. Screwed-on flanges shall conform to ASA B16.1 as to material, diameter, thickness, drilling, etc. but shall have special long hubs threaded especially for cast iron pipe. Screwed-on flanges shall be attached to the pipe in the shop, and after attachment, the faces of the flanges and the ends of the pipe shall be refaced so that the ends of the pipe shall be even with the faces of the flanges.

FLEXIBLE COUPLINGS: Flexible couplings shall be Dresser Style 53, furnished without pipe stops.

INSTALLING CAST IRON PIPE: All cast iron pipe shall be delivered, handled, and installed in accordance with the applicable provisions of AWWA C600. Excavation and backfilling shall be in accordance with the EXCAVATION section of these Specifications. Testing shall be as noted previously in this section. Poured bell and spigot joints shall be made up by calking with lead. The packing may be molded rubber rings, asbestos rope, or treated paper rope, well rammed into the joint, leaving a space 2-1/2 inches deep for the lead. Before pouring, the interior of each joint shall be inspected to be sure the packing has not been forced through into the inside of the pipe.

Flanged joints shall be made up with ring gaskets of 1/16-inch Granite in accordance with ASA B16.1, except that for flanges underground cast iron bolts or cadmium plated bolts shall be used.

Abrupt changes in grade, upward, downward, or both, for connections to existing intersecting pipelines, or for branch runs for connections to existing pipelines, or for branch runs to fire hydrants, are to be effected by use of all bell bends and inclined runs of pipe, or by use of bell and spigot offsets as indicated on the Plans.

CONCRETE PIPE

USES: Reinforced concrete pipe shall be used to construct the culvert in the overflow drain system at the Bell Butte reservoir and to construct the stilling basin and the stilling basin drain line at the booster pump station forebay tank. No hydrostatic or absorption tests will be required.

QUALITY: Reinforced concrete pipe shall conform to the requirements of ASTM C 76, Class IV. Pipe joints and the rubber gaskets therefore shall conform to ASTM C 443-62T.

PIPE CONSTRUCTION: The pipe shall be of the internal diameters as indicated on the Plans. Each laying length of pipe shall have bell and spigot ends perpendicular to the longitudinal axis of the barrel. The bell and spigot ends shall be so shaped that the pipe will be self-centering and so formed as to leave a recess or joint on the inside of the pipe.

PIPE DELIVERY AND HANDLING: All pipe shall be manufactured, handled, loaded, and shipped in such a manner that they will be delivered undamaged, in sound condition, and conforming in all respects to these Specifications. Each section of pipe shall be plainly marked with the date of manufacture. All pipe and fittings installed on the work shall be of new material.

PIPE LAYING: All pipe shall be laid without a break upgrade from end to end in each run. The pipe shall be placed in the ditch true to alignment and grade.

Collared pipe shall have the collar assembled before inserting the spigot in the other collar on the previously laid pipe.

To assemble the joint, the rubber gasket and the inner surface of the collar or bell upon which the gasket slides must be lubricated. The gasket shall be lubricated just before assembling by being dipped into a bucket containing a creamy mixture of flax soap and water. The collar or bell shall be lubricated by applying to the tapered entering shoulder and the rubber seat of the collar, a lubricant that is noninjurious to rubber or concrete, such as water glass or flax soap, or equal. These lubricants shall be chosen for their slickness and various drying times.

When the spigot of the pipe section is being introduced into the collar or bell, care must be exercised to be sure that the force used to get the two parts together is in a direct line with the axis of the pipe section and that all component parts are free of foreign matter.

All joints shall be checked with a thin metal feeler to be sure that the gasket is in its groove all the way around the joint and not bulged out at any point, because such a bulge may cause a leak.

If such a bulged out gasket is found, the joint must be taken apart, the gasket must be checked to be sure that it is not cut or damaged, the parts relubricated, and the joint reassembled with care being taken to assure that the force assembling the joint is directly in line with the pipe's axis.

To relieve all the weight of the pipeline from the collars or bells and to maintain a uniform grade, collar or bell holes must be dug along the grade line in the trench.

At the conclusion of all work related to the drain line and culvert, the pipelines shall be free of all debris and dirt.

CONCRETE STEEL CYLINDER PIPE

USES: Concrete steel cylinder pipe, modified prestressed type and reinforced cement mortar coating type as specified herein may be used on the transmission pipelines sizes 16 inches and larger except where specifically noted on the Plans or in the Specifications.

PIPE: Concrete steel cylinder pipe shall be one of the following:

1. Class 200 pretensioned reinforcement steel cylinder type pipe manufactured in conformance with the requirements of Federal Specification SS-P-381 as modified and qualified below. In no case shall the cylinder thickness be less than the following:

16-inch diameter pipe	0.1046 inch
24-inch diameter pipe	0.164 inch
30-inch diameter pipe	0.224 inch
36-inch diameter pipe	0.250 inch

Designated diameter of the pipe shall be the inside diameter of the cement lining. Joints shall be bell and spigot O-ring rubber gasket type unless otherwise designated or required for connection to other types of pipe. In winding the reinforcing bar around the steel cylinder, at each end of the pipe section there shall be one complete coil parallel to the pipe end, and the end of the bar shall be securely fixed.

The maximum stress in the steel cylinder when designed for 200 psi working pressure shall not exceed 50 percent of the yield stress of the steel or 33 percent of the ultimate tensile strength, whichever is the smaller of the two.

The circumferential rod reinforcement shall conform to the requirements of ASTM A 15, intermediate grade. The bar or rod reinforcement shall be wound under such tension that under an internal pressure of sufficient magnitude the steel cylinder and tension-wound bar will reach their respective minimum elastic limits simultaneously.

2. Nonpretensioned concrete steel cylinder pipe, cement lined and reinforced cement-mortar coated, manufactured in conformance with the requirements of Interim Federal Specification SS-P-00385 as qualified below. Pipe shall be designed for 200 psi working pressure based on an allowable design tensile strength of steel which is no greater than 50 percent of the yield stress or 33 percent of the ultimate tensile strength, whichever is the smaller of the two. The design for internal pressure shall be based entirely on the steel cylinder and shall not be dependent upon any added reinforcement intended to extend the design strength of the cylinder. In no case shall the cylinder thickness be less than the following:

16-inch diameter pipe	0.1046 inch
24-inch diameter pipe	0.188 inch
30-inch diameter pipe	0.250 inch
36-inch diameter pipe	0.281 inch

Designated diameter of the pipe shall be the inside diameter of the cement lining. Pipe shall have bell and spigot O-ring rubber gasket type joints unless otherwise designated or required for connection to other types of pipe.

The pipe shall have a 1-inch cement mortar coating, reinforced with a 14-gauge wire helically wound without measured tension and on a 1-inch pitch and placed at the approximate center of the coating. The pipe shall have a cement mortar lining of not less than 1/2 inch in thickness.

Other details for this pipe shall conform to applicable portions of the above-referenced Federal specification referring to pretensioned pipe; in particular, but not limited to, steel for cylinders, cement, rubber gaskets, allowable steel fiber stress, test pressures, and fitting design.

FITTINGS: Fittings shall be in accordance with Federal Specification SS-P-381 or SS-P-00385. Fitting branches for connection to other types of pipe shall be provided with spigot ends to fit either cast iron bells, Dresser couplings, or whatever item of coupling as may be required for the type of pipe being used.

PIPE ENDS: Where required for connections to cast iron fittings or valves, ends of pipe shall be spigots to fit cast iron bells.

PIPE LAYING: Pipe shall be laid on an unyielding foundation with a uniform bearing under the full length of the barrel. The first section of pipe shall be firmly placed in the center of the trench with the bell end pointing in the direction to be followed by the pipe laying. All adjustments to line and grade shall be made by scraping away or filling in under the pipe in accordance with the section on EXCAVATION. Hammering on the pipe, or dropping the pipe, or shimming under the pipe with rocks, blocks, and foreign material to get the pipe to grade will not be permitted.

Pipe shall be assembled and joined in accordance with the manufacturer's instructions for the type of joint used. All portions of the joints shall be thoroughly cleaned before the sections of pipe are put together and before any filling of joints with mortar or grout. The ends of each pipe shall abut against the next pipe in such a manner that there will be no unevenness of any kind along the bottom half of the interior of the pipe. If the pipe bears top or bottom markings, it shall be placed with the markings set in the proper position.

The joint space inside shall be filled with mortar tamped into the joint with a thin block of wood or other suitable tools to insure the complete filling of the joint and the bonding of the mortar with the pipe.

Inside joints shall be finished by troweling or brushing with mortar smooth and flush with the inside surface of the pipe; or, in the case of small size pipe, an approved method of buttering and swabbing the joint shall be used to insure a smooth, flush inside surface.

Grouting of the outside of joints shall be done in such a manner as to insure complete filling of the joint, particularly at the bottom. Several sections of pipe shall be laid before the grout is applied. However, the grouting shall never be more than 5 lengths of pipe behind the pipe laying.

All mortar or grout shall be newly mixed. Mortar shall be composed of one sack of cement to 2 cubic feet of sand, and grout shall be composed of one sack of cement to 4 cubic feet of sand. Sand shall all pass a 1/8-inch square opening sieve. No mortar or grout that has begun to set shall be used, and no retempering will be allowed. Admixtures may be used not exceeding the following percentages by volume of cement: hydrated lime, 5 percent; fire clay or diatomaceous earth or other inert material, 10 percent. Quicklime may be used in place of hydrated lime provided care is used to see that the lime is completely slaked before the mortar is set.

Testing shall be as noted elsewhere in this section.

CURING AND PROTECTION OF JOINTS: Immediately after each exterior joint is grouted, it shall be protected from the sun by an initial covering of fine, moist earth or sand approximately 6 inches to 12 inches above the top of the pipe, depending on the temperature. Extreme care shall be taken in placing such earth around the pipe to avoid injury to freshly applied grout. At the close of the day's work and at such other times when the pipe is not being laid, all openings in ends of the pipeline shall be covered by sacks and moist earth or sand to prevent drying out of the joint mortar by the circulation of air within the pipe.

CORRUGATED METAL PIPE

USES: Corrugated metal piping shall be installed, as indicated on the Plans, at the 2 million gallon storage reservoir on Bell Butte to serve as the drain line away from the tank's drain box and to serve as the under-culverts for the access road. The drain line shall be 18 inches in diameter, and the culverts shall be 12 inches in diameter.

QUALITY: Corrugated metal shall conform to the AASHTO Standard Specifications for Corrugated Metal Culvert Pipe M 36-60. Eighteen inch pipe shall be 12-gauge and 12-inch pipe shall be 16-gauge in thickness. Standard galvanized bands, nuts, bolts, and washers shall be used for joining sections of the pipe together.

PIPE LAYING: Bedding for the drain line and culverts shall be shaped to fit the bottom of the pipe and shall be filled to shape, where necessary for continuity, over rocky terrain with ABC graded free of all particles over 1 inch in size. Backfill with ABC graded free of all particles over 1 inch in size shall be hand placed along the sides and top of the pipe until 12 inches of cover has been obtained. Further backfill may be placed by machine.

STEEL PIPE

USES: Steel pipe cement mortar lined and coated and steel pipe cement mortar lined and coal-tar enamel coated and wrapped, as specified herein may be used on the transmission pipelines sizes 16 inches and larger except where specifically noted on the Plans or in the Specifications.

PIPE: Steel pipe shall be manufactured in conformance to the requirements of AWWA C201 or AWWA C202 and shall be of the nominal size indicated on the Plans after lining. All buried steel pipe used on the job shall be coated and lined as hereinafter specified. Each pipe shall be marked with the name of the manufacturer, the date of manufacture, the design pressure, and any special markings, if required, as to amount of bevel and point of maximum bevel and any markings required to indicate proper location in pipeline. Designated diameter of the pipe shall be the clear inside diameter of the lining.

If the Contractor shall bid steel pipe manufactured in accordance with AWWA C202-60T, it will be necessary for him to furnish stock items of a larger nominal size than that indicated in order that the specified clear inside diameter shall be obtained.

Steel pipe shall be designed for 200 psi working pressure based on an allowable design tensile strength of steel which is no greater than 50 percent of the yield stress or 33 percent of the ultimate tensile strength, whichever is the smaller of the two. In no case shall the thickness of the steel wall of the pipe be less than 0.1046 inch for 16-inch pipe, 0.188 for 24-inch pipe, 0.250 inch for 30-inch pipe, and 0.281 inch for 36-inch pipe. The thickness of the steel wall of the 30-inch pipe to be installed on Rural Road between Sta 29+93.84 and Sta 39+10 shall be not less than 0.281 inch.

In addition to the steel plate allowed under AWWA C201 and AWWA C202, steel pipe may be manufactured using steel plate which shall comply with the chemical and physical requirements of API Specifications for High Test Line Pipe, Standard 5LX, Grade X42, X46, or X52, and which also shall conform to the applicable requirements of the latest revision of ASTM A 6.

The manufacturer shall submit detailed design data and detailed drawings on pipe construction for approval before fabrication. The manufacturer shall furnish a certified statement that the required inspection and tests have been made. Certification shall be made in triplicate by an approved testing laboratory to the Engineer.

JOINTS: Joints may be any of the following types, except where a specific type joint is called for on the Plans.

Ring Type, Approved Rubber Gasketed Joint
 Welstrom Type Field Joint
 Lap Welded Field Joints
 Flanged
 Dresser Type Coupling
 Victaulic Type Coupling

In addition, joints shall have the same or higher pressure rating as the abutting pipe. Where the Plans call for a specific type joint, this type joint shall be used. Dresser couplings, as called for on the Plans, shall be Style 38 furnished without pipe stops. Victaulic couplings as called for on the Plans shall be of a style for use with steel pipe on either Type B or Type C collared ends as indicated in Victaulic Catalogue Manual 58. Grooving the pipe ends shall not be permitted. Flanged joints shall be made up with ring gaskets of 1/16-inch Cranite in accordance with ASA B16.1. Welded joints shall be lap welded field joints or Welstrom type field joints in accordance with the applicable provisions of AWWA C206. Flanges for steel pipe shall be Class D standard steel hub flanges in accordance with AWWA C207 faced and drilled for 125-pound ASA B16.1 connections.

Joints in the steel pipe used for transmission mains to be installed on Rural Road between Station 29+93.84 and Station 39+10 may be any of the following types, except where a specific type joint is called for on the Plans:

Lap Welded Field Joints
 Welstrom Type Field Joints
 Flanged

Welded joints shall be arc welded joints in accordance with the applicable provisions of AWWA C206.

FITTINGS AND SPECIALS: Fittings and specials shall be mitered and dimensioned in accordance with AWWA C208, Table 2. They shall be equal in design strength and shall have the same lining and coating as the abutting pipe. The manufacturer shall submit detailed design data and detailed drawings on fittings and specials for approval before fabrication.

Branch line fittings for connections to cast iron pipe, such as at tees and crosses, shall be flanged fittings of a pressure rating and drilled to match the abutting fitting or valve. Blind flanges shall be supplied to plug all dead ends.

CURVES: In general, horizontal or vertical curves shall be made by using pipe with beveled joints or by slight deflections in the joints of straight pipe, made so that the maximum joint opening from normal closure caused by such deflections shall not exceed 5/8 inch, or as recommended by manufacturer.

LINING: The pipe shall be lined in accordance with applicable provisions of AWWA C205, except that portland cement shall conform to ASTM C 150, Type II. The thickness of the lining shall be not less than 1/4 inch for nominal 16-inch pipe and 3/8 inch for nominal 24-inch to 36-inch pipe.

It will be the Contractor's option as to which method of lining he prefers to use. Whether his choice is shop lining with field joints or lining in the field after the pipe is in place, it shall be his sole responsibility to protect and cure the lining in accordance with the provisions of AWWA C205 or any additional provisions that may be required to produce a final product that will insure a cement lining that is firm, smooth throughout, and secure to the interior of the pipe throughout the length of the pipeline including all field joints.

If upon final inspection it is found that the lining has cracked, chipped, been scraped, spalled, or blistered away or has shrunk away from the pipe to such a degree as in the Engineer's opinion may impair the flow or the life of the pipe, then the defective part of the lining shall be removed. The section of the pipe from which the lining has been so removed shall have the lining replaced in accordance with AWWA C205 as specified for field application at no additional cost to the Owner, making sure that adequate bond is made between the new and old lining sections.

COATING: The pipe shall be coated in accordance with either AWWA C203 or C205.

Coal-tar coating and wrapping shall be in accordance with the applicable provisions of AWWA C203 and double wrapped in accordance with Section A1.4 of the Appendix of same. The resultant construction of the exterior protection shall be:

- (a) One coat of coal-tar primer
- (b) Two hot coats of coal-tar enamel to a minimum thickness of 3/32 inch

- (c) One wrapping of fibrous glass mat
- (d) One hot coat of coal-tar enamel to a minimum thickness of 1/32 inch
- (e) Bonded asbestos felt
- (f) One coat of whitewash or kraft paper

For the river crossing between the limits indicated on the Plans, the 30-inch steel pipe shall have an additional coat of coal-tar enamel. The resultant construction for the river crossing pipeline will be as designated above in the following sequence: (a), (b), (c), (d), (e), (d), and (f).

Joints shall be similarly protected.

Electrical testing of the coating and wrapping will be done by the Engineer, at his option, of the completed pipeline including field joints. Any holidays or flaws found shall be repaired by the Contractor at no additional cost to the Owner.

Cement-Mortar Protective Coating shall be in accordance with the provisions of AWWA C205, except that the portland cement shall conform to ASTM C 150, Type II. It shall be the Contractor's sole responsibility to protect the coating of the pipe in accordance with the provisions of AWWA C205 and such additional provisions as may be required to produce a final product that will insure a completely covered and protected pipeline, including joints.

If upon inspection, it is found that the coating has cracks, blisters, spalls, chips, or broken spots that would, in the Engineer's opinion, be deleterious or impair the life of the pipeline, then the defective section of the coating shall be removed and the coating shall be replaced by applying a Guniting patch, or by other approved method, at no additional cost to the Owner.

PIPE DELIVERY, HANDLING, AND LAYING: Pipe delivery, handling, and laying shall be in accordance with the applicable provisions in Standard Specifications AWWA C203 and AWWA C205. In addition to the foregoing there shall be a minimum of 3 inches of selected backfill material completely surrounding the pipe when coated and wrapped in accordance with AWWA C203. Also, backfilling of the pipe shall be done in accordance with the paragraph on BACKFILLING in the EXCAVATION section of these Specifications. Hammering on the pipe, or dropping the pipe, or shimming under the pipe with rock, blocks, and foreign material to get the pipe to grade will not be permitted.

WROUGHT STEEL PIPE

USES: Wrought steel pipe in accordance with ASA B36.10, Schedule 40, shall be used wherever wrought steel pipe under 4 inches in size is indicated on the Plans or called for in the Specifications. All wrought steel pipe shall be galvanized in accordance with ASTM A 120.

FITTINGS: Fittings may be malleable iron banded screwed fittings in accordance with ASA B16.3, galvanized in accordance with ASTM A 153, or fittings may be 150-pound forged steel slip-on or welding neck flanged fittings faced and drilled in accordance with ASA B16.5. Flanges for fabricated pipe shall be 150-pound forged steel slip-on or welding neck flanges faced and drilled in accordance with ASA B16.5. Cast iron screwed fittings shall not be used.

COUPLINGS AND JOINTS: Unless otherwise noted, pipe couplings may be screwed or Dresser Style 38.

THREADED PIPE CONNECTIONS: All threaded pipe shall be cut with approved wheel cutters or sawed and carefully reamed to remove all burrs. All cuts shall be clean and at right angles to the axis of the pipe. Threading shall be done with clean sharp dies. Pipe threads carelessly made, wavy, rough, or chewed will be rejected. All screwed joints shall be tightly and neatly made up with an application of graphite and engine oil or other approved compound applied to male threads only. No threaded unions shall be used. Dresser Style 38 couplings shall be used to connect new pipe to existing pipe and at other points in the pipe-lines in place of a threaded union.

VALVES AND WATER MAIN ACCESSORIES

SPECIFIC USES

Gate valves shall be used for all sizes 12 inches and under and butterfly valves shall be used for sizes 16 inches and over. Gate valves 12 inches and under in size shall be installed with valve boxes and concrete pillows in a vertical, directly buried position. Butterfly valves for underground pipelines 16 inches and larger in size shall be installed in a horizontal, directly buried position on a concrete pillow.

All valves and all installations shall be in accordance with these Specifications and the details indicated on the Plans.

GENERAL

The Contractor shall furnish and install, wherever indicated on the Plans, as called for in these Specifications, or as required for proper operation of equipment, all items specified under this heading, including gaskets, bolts, supports, calking materials, and such incidental materials and equipment as are required to make the items complete and ready for use.

The manufacturer shall furnish to the Engineer and Contractor any technical information required for evaluating and appraising the merits of each valve or component. This technical information shall include complete dimensions, weights, diameters of stems, alloys for every valve part, and any information the Engineer may require. No valve or any part or any component specified herein will be approved until complete information is received. General brief information as shown in some catalogues shall not be considered as sufficient information.

SHIPPING AND INSTALLING VALVES

Valves 16 inches and larger, before being shipped from the factory, shall have the flanged ends covered with plywood. Plywood shall be left on the valves until just before installation in the line.

Just before installation in the line, all valves shall be opened and closed to check the action, and the inside of all valves shall be thoroughly cleaned.

GATE VALVES

All gate valves 12 inches in size and under to be buried underground shall be nonrising stems, iron body, bronze mounted, double disc, with parallel or inclined seats, with operating nuts, in accordance with AWWA C500. Valves shall be bell ends or mechanical joint ends, unless

indicated on the Plans or required otherwise. Valves shall open counterclockwise.

The gate valves for installation at the booster pump station located at Water Users' Well No. 189, 23-1/2E 5-1/4N, shall conform to the applicable specifications of AWWA C500, flanged, OS & Y, iron body, bronze mounted, double disc, parallel or inclined seats, handwheel operated, opening by turning handwheel counterclockwise.

BUTTERFLY VALVES

GENERAL: Butterfly valves shall be tight-closing with rubber seats and shall be either flanged or wafer type as indicated. Shafts shall be of 1-piece, Type 316, stainless steel. Discs shall rotate 90 degrees between the fully OPEN and fully CLOSED positions and shall be of "Ni-Resist" alloy cast iron. The type of operators to be furnished shall be as noted and shall be adequate to seat and unseat the valves under the most adverse conditions noted. Valves shall be for installation in a horizontal pipeline with the valve shaft in a horizontal position and the operating shaft vertical. Pipelines and valves after installation will be tested at 150 psi pressure.

Butterfly valves shall be as manufactured by the Henry Pratt Company, or approved equal; having a minimum of 5 years experience in the manufacture of rubber seated butterfly valves.

FLANGED VALVES: Flanged butterfly valves shall conform to the requirements for Class 125-16 of the AWWA C504.

WAFFER VALVES: Wafer type valves shall have cast close-grain iron bodies complying with ASTM A 48, Class 40. Valves shall be "Monoflange MK II" as manufactured by the Henry Pratt Company, or approved equal.

MANUAL OPERATORS: Operators shall be in accordance with AWWA C504, except as modified herein. Manual operators shall have AWWA 2-inch square operating nuts conforming to Section 16 of AWWA C500 and shall require at least 30 turns of the tee wrench to rotate the disc 90 degrees. Operators shall be the totally enclosed self-locking gear or screw type with adjustable stops factory set to limit disc travel. Operator cases shall be expressly designed for installation and operation in a buried or submerged location and shall be fully gasketed, sealed, and factory grease packed. The operator case shall have a raised boss at the input shaft to accommodate a 5-inch soil pipe. The minimum torque rating for a buried service operator shall be 8,000 inch-pounds. Valves shall open counterclockwise.

ALTITUDE CONTROL SYSTEM:

General. The Contractor shall furnish and install all items of labor, equipment, appliances, and materials, and shall perform all items of work to provide a pneumatic altitude valve control system at the new 2 million gallon storage reservoir at Bell Butte and to modify the existing butterfly valve to provide an altitude control system at the Papago Park 1 million gallon storage reservoir. The Contractor shall provide for the supervision, checking, and approval of his work on the control systems by an accredited agent of the firm which he shall employ to provide the cylinder operator and assembly fabrication for the control systems.

Prior to the commencement of any work on the altitude control systems, the Contractor shall submit and receive approval for the shop, detail, and assembly drawings and manufacturer's data for the systems. Prior to the acceptance of the work on the altitude control systems, the Contractor shall demonstrate that the control systems are complete and operable under simulated conditions and shall supply a certificate of approval from the aforementioned providing firm for the materials and workmanship incorporated in the system.

The cylinder operators for the butterfly valves and the supervision and checking of the control system installation work shall be provided by the Henry Pratt Company or approved firm which has had at least 5 years of successful experience in the manufacture of butterfly valve operators and control systems.

Both altitude control systems shall be complete with manual operators at the butterfly valves. The systems shall be so arranged that the pneumatically powered cylinder operators can be overridden by the use of the manual operators. The altitude control systems shall consist of the inlet-outlet piping and fittings, the bypass piping and fittings, a control station, and an air compressor station. Piping and fittings are itemized on the Plans.

Altitude Control Station. The altitude control station shall consist of the butterfly valve, cylinder operator, manual operator on override, 4-way valve, and float operated linkage to the 4-way valve. The altitude control station shall perform the following operations:

1. Allow the reservoir to ride on the system with a full-open butterfly valve when system pressure is lower than the level of the water in the reservoir.

2. Close the butterfly valve as soon as the reservoir is filled.
3. Open the butterfly valve as soon as the reservoir level has lowered not more than 6 inches from the filled level.
4. Permit manual "override" of the pneumatic operation of the butterfly valve.

Compressor Station. The compressor station in each control system shall consist of all of the elements necessary to supply air in the range of 80 psig to 125 psig when powered with 110-volt, 60-cycle AC single-phase power. The compressor station shall include the following:

Electric motor equipped with automatic reset thermal overload. Overall sizing of system shall be such that motor "run time" to recharge the system from 80 psig to 125 psig shall be less than the normal "down time" of the motor.

Air compressor shall be single-stage, heavy-duty, V-belt driven type suitable for the service, complete with air intake muffler, fan flywheel, oil level gauge, etc.

Air tank shall be ASME Code stamped, of not less than 4 cubic foot volume or of sufficient volume to allow four strokes of the pneumatic air cylinder after electrical power failure, if greater volume is required. Tank shall be complete with floor mounting pads, motor base, compressor support, etc.

Complete starting pressure controls, safety valve, tank drain valve, pressure gauge, pressure reducing valve, and other associated hardware shall be furnished as required to make a complete working unit.

All of the above items shall be completely mounted, inter-piped, interwired, and factory-checked prior to shipment.

The compressor shall be equipped with a 3/4 horsepower motor, have not less than 1.2 cfm free air capacity, be signaled to start at 120 psi pressure in the receiver tank and shut off at 150 psi pressure in the receiver tank and deliver to a 4.0 cf minimum sized receiver tank.

CHECK VALVES

Check valves shall be rated for not less than 150 psi water working pressure, shall have a cast iron or cast carbon steel body, flanged, and shall be either a Mission Duo-Chek, Series 150, or a Smolensky noiseless flanged check valve, or a Chapman tilting disc check valve, List 23 or List 123A, or approved equal.

AIR AND VACUUM VALVE

An air and vacuum valve assembly shall be installed on the new 24-inch pipeline at the Bell Butte Reservoir. Exact location of the air and vacuum valve shall be determined in the field by the Engineer. The air and vacuum valve assembly shall be complete with the necessary pipe and fittings as detailed on the Plans with a 2-inch Crispin air and vacuum valve or a 2-inch, No. 144, Apco air and vacuum valve, or approved equal. The shutoff valve in the 2-inch pipeline connecting the air and vacuum valve to the main shall be a 2-inch, Figure 101S, lever operated, DeZurik valve, or approved equal.

AIR RELEASE VALVE

An air release valve assembly shall be installed at the booster pump station. The exact location of the air release valve will be located by the Engineer in the field. Each air release valve installation shall include a 2-inch No. 200-A Apco, 150-pound working pressure, air release valve, or approved equal, fitted with a 3/16-inch orifice. The shutoff valve in the 2-inch pipe connecting the air release valve assembly to the main shall be a 2-inch, Figure 101A, lever operated, DeZurik valve, or approved equal.

PUMP CONTROL VALVE

The Contractor shall furnish and install an electrically signaled, hydraulically operated pump control valve downstream from the booster pump unit. The valve shall be scheduled to operate so that: (1) the booster pump will start against a closed valve; (2) as the booster pump increases its discharge pressure, the valve will gradually open to increase line pressure to full pumping head; (3) when the booster pump is signaled to stop, the valve will gradually close reducing flow, while the pump will continue to operate; and (4) when the valve is completely closed on the stopping cycle, the pump will be shut off. In the event of power failure, the pump control valve will close the moment flow stops.

The pump control valve shall be an automatic unit of modified globe type design, shall be operated by a diaphragm, and shall have its operation controlled by a 4-way solenoid pilot valve. The opening and closing rates of the pump control valve shall be adjustable. The valve's control system shall be protected with self-cleaning strainers. The valve shall be operated by line pressure and shall be equipped with a built-in lift type check feature to prevent reverse flow, which feature shall operate independently of the solenoid control.

The pump control valve shall be Class 125 (175 psi maximum working pressure), shall have an operating temperature range of 32 degrees F to 180 degrees F, shall have ASA Class 125 flanged ends, shall have a body and cover of high-tensile cast iron conforming to ASTM A 48, shall have a nonmagnetic stainless steel stem, shall have a bronze seat, and shall have a diaphragm tested at 650 psi.

The pump control valve shall be completely connected to the electrical system as indicated on the Plans and shall be a 12-inch, No. 60P unit as manufactured by the Cla-Val Company of Newport Beach, California, or approved equal.

TAPPING SLEEVES AND VALVES

Tapping sleeves shall be mechanical joint or calked, bolted type with flanged or hub outlet, for 150 psi service, sized to fit the particular pipe on which it is to be installed.

Tapping valves shall conform to the requirements for gate valves above and shall have ends and seat rings of sufficient size to permit the use of full size cutter.

CUTTING VALVES INTO EXISTING MAINS

In cutting valves into existing mains, a section of the main shall be removed and the new valve installed using a cast iron solid sleeve and short nipple of pipe. The definition of the payment quantities are further detailed in the MEASUREMENT AND PAYMENT section of these Specifications.

VALVE BOXES

Cast iron valve boxes shall be installed over all buried 12-inch and smaller gate valves and the buried operating nut of the butterfly valves. The boxes shall be of enameled cast iron, with slip adjustment, shall be installed on a plumb axis, and shall be centered around and shall cover the operating nut of the valve. The valve boxes shall not be supported in any manner by the valve or the pipe and shall be seated as indicated on

the Plans. The top of each valve box shall be placed flush with the finish grade unless otherwise directed by the Engineer. The cover shall be marked with the word WATER or the letter W integrally cast with the cover.

As indicated on the Plans, those valve boxes set in pavement or areas of vehicular traffic shall be ringed with a collar of concrete.

VALVE SUPPORTS

Concrete supports for all butterfly valves shall be provided as detailed on the Plans, shall be poured an inch low, and shall then be grouted with nonshrink grout.

Concrete pillow blocks for 12-inch and smaller valves shall be cast to size in place.

Adjustable pipe supports shall be as indicated on the Plans.

ADAPTERS AND COUPLINGS

Connections between new wrought steel pipe and existing wrought steel pipe shall be made with Dresser couplings.

In all cases of cast iron pipe connections to valves, the valves shall have ends suitable for a proper fitting with the pipe joint system employed by the Contractor.

In all cases of steel pipe connections to valves, the valves shall have flanged ends and the pipe ends at the valves shall be flanged as hereinbefore specified under PIPE AND FITTINGS. In all cases of steel pipe connections to valves, one Victaulic coupling shall be furnished and installed.

In all cases of concrete steel cylinder pipe connections to valves, the valves shall have flanged ends. A flanged steel adapter shall be furnished and installed on each side of every valve. These adapters shall be as hereinbefore specified for steel pipe and steel pipe flanges under PIPE AND FITTINGS. Victaulic couplings shall be used to connect these adapters to proper ends of concrete steel cylinder pipe.

It will be necessary to provide a steel pipe transition in order to properly connect the flanged valves under the respective valve items to the pipeline. These transitions (two for each valve) shall be 10 feet long, cement mortar lined, of the pipeline size at one end, uniformly reduced to the outside diameter steel pipe size at the flanged end. The transition (reducer) will be measured for payment under the pipeline item of which

it is a part. Any difference in cost between the average pipeline installation and the transition installation shall be included for payment under the respective valve items.

Dresser couplings shall be Style 38, galvanized, with the inner stop removed.

Victaulic couplings shall be Style 44.

Bolts for any type of flexible couplings shall be cast iron, cadmium plated alloyed steel, or Everdur bolts and nuts manufactured of material having at least 50,000 psig tensile strength. The cast iron threaded bolts used with mechanical joints for cast iron pipe will be acceptable. Cadmium plated bolts shall have Class 2A threads, and nuts used with them shall have Class 2B threads. Cadmium plated bolts and nuts shall be plated in accordance with ASTM A 165, Type OS. So-called commercial cadmium plating will not be acceptable.

WATER STORAGE TANKS

GENERAL

The work to be done under these Specifications shall include the furnishing of all materials, plant, labor, equipment, appliances, and materials and the performance of all work necessary to construct, complete in every detail, a new 2 million gallon storage reservoir at Bell Butte and a new 58 thousand gallon forebay tank at the booster pumping station and to modify an existing 1 million gallon storage reservoir in the Papago Park area. The modification work on the existing tank is delineated in the following subsection. All other subsections, except as noted therein, pertain to the construction of the new reservoir and tank.

MODIFICATION OF EXISTING TANK

The Contractor shall schedule his work on the Papago tank so that the City of Tempe is given 2 weeks' written notice of his intention to proceed with the work. If the work on the Papago tank is begun after May 20, 1964, the new tank on Bell Butte shall be completed, tested, sterilized, and in operation prior to work on the Papago tank, and the Papago tank shall not be out of operation for a total period of more than 5 days. Any time in excess of this period will be considered as subject to payment of the full charges specified under LIQUIDATED DAMAGES in the General Conditions. If the work on the Papago tank is begun prior to May 20, 1964, the Papago tank shall not be out of operation for a total period of more than 10 days. Any time in excess of this period will be considered as subject to payment of the full charges specified under LIQUIDATED DAMAGES in the General Conditions.

The City of Tempe will see to it that the Papago tank and inlet-outlet pipe are drained at the time the Contractor intends to commence work thereon.

The Contractor shall install the altitude control mechanism, modify the existing 24-inch inlet-outlet pipe, construct the 12-inch bypass, and install the pipe valve slab as indicated on the Plans and specified elsewhere in the Contract Documents.

The 12-inch bypass flange and reinforcing pad shall be installed in accordance with the pertaining conditions of AWWA D100. Touch-up painting shall be accomplished in accordance with the Painting Process No. 1 subsection of this section of the Specifications. Sterilization shall be accomplished in accordance with the STERILIZATION subsection of these Specifications, except that the 24-inch inlet-outlet pipe shall be purged as directed at the site.

DETAILS OF DESIGN AND WORKMANSHIP

The tank on Bell Butte and the forebay tank at the booster pumping station site shall conform in design and workmanship to the American Water Works Association Standard Specifications for Elevated Steel Water Tanks, Standpipes, and Reservoirs, AWWA D100 and AWWA D102, latest revision, except as noted or modified herein. The limiting dimensions for water depth and diameter are indicated on the Plans.

Thickness of floor plates on the Bell Butte tank shall be not less than 1/4 inch and sketch plates not less than 5/16 inch. Spacing of roof rafters supporting roof plates shall not exceed 5'-6" at the periphery and at other points and shall be limited to 1/3 points in a radial direction. Deflection in the roof structure shall not exceed 1/270 of the span. A top angle not less than 3" x 3" x 3/8" in size or a girder shall be welded to the inside of the tank shell to distribute the roof load.

Thickness of the floor plates on the forebay tank shall be not less than 1/4 inch.

The roof loads (dead load, live and wind loads) may be carried by a single center column or by a system of columns. Column loads shall be distributed at the base by means of a grillage system or other suitable means so that the bearing load on the bottom is not increased by more than 1,000 pounds per square foot above the bearing load determined by the weight of the tank bottom and the weight of the water above when the tank is full. Shims shall be used if grillage beams span bottom tank joints.

The requirements of Section 3.2.3 of AWWA D100 relating to snow loads will be waived for this construction. The Uniform Building Code, Edition of 1961, is the building code adopted by Tempe and referred to in Section 1.3.2 of the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

Design notes shall be submitted to the Engineer at the time the detailed drawings are submitted.

INFORMATION PER AWWA D100, B3 - BELL BUTTE

The following section is an itemization of the information to be furnished by the purchaser in accordance with Appendix B, Section 3 of the referenced AWWA D100 as it relates to the Bell Butte tank:

1 and 2. The reservoir shall have a capacity of 2 million gallons and a height from bottom to overflow of 30 feet.

3. The roof shall be weathertight, of steel construction, shall have a pitch of 1 in 12 and shall have no eave projection.

4. Tank joints shall be welded.

5. Completion time for the tank shall be as required in the General Conditions of these Specifications.

6, 7, 8, 10, 11, 17, 18, 19, and 20. The tank site, access road, location, overflow, inlet-outlet cover, and number and type of pipe connections shall be as indicated on the Plans.

9. The roof shall have a minimum thickness of 3/16 inch and shall be supported on rafters. The rafters shall be supported on their outer ends by connections secured to the side plates and on their inner ends by header beams and masts.

12 and 13. Electric power and compressed air shall be furnished at the site by and at the expense of the Contractor.

15. No corrosion allowance need be made.

16. Safety cages will not be required on ladders.

21 and 22. Cleaning and painting shall be as hereinafter specified.

INFORMATION PER AWWA D100, B3 - FOREBAY

The following section is an itemization of the information to be furnished by the purchaser in accordance with Appendix B, Section 3 of the referenced AWWA D100 as it relates to the forebay tank at the booster pumping station:

1 and 2. The tank shall have a capacity of 58,000 gallons and a diameter of 30 feet.

3. The roof shall be weathertight, of steel construction, shall have a pitch of 1 in 12, and shall have no eave projection.

4. Tank joints shall be welded.

5. Completion time for the tank shall be that considered for any general item of work in the Contract.

6, 7, 8, 10, 11, 17, 18, 19, and 20. The tank site, access road, location, overflow, inlet and outlet cover, and number and type of pipe connections shall be as indicated on the Plans.

9. The roof shall have a minimum thickness of 3/16 inch and shall be supported on rafters. The rafters shall be supported on their outer ends by connections secured to the side plates and on their inner ends by a mast.

12 and 13. Electric power and compressed air shall be furnished at the site by and at the expense of the Contractor.

15. No corrosion allowance need be made.

16. Safety cages will not be required on ladders.

21 and 22. Cleaning and painting shall be as hereinafter specified.

HANDLING MATERIALS

Plates shall not be dragged up the hill, scratching and gouging the surface on the rocks.

FIELD INSPECTION OF WELDS

The Engineer shall have the right at any time to call for and witness the removal of one or more plugs from the welded seams. The Contractor shall pay the cost of removing all defective plugs and closing the holes. However, if more than 50 of the plugs which the Engineer calls for are found to be good, the Owner will stand the cost of all in excess of 50.

Field inspection of welds will be in conformance with the above-mentioned AWWA specifications.

DISTORTION

The assembly and welding procedure shall be such as to result in no objectionable distortions.

CLEANING AND PEENING

Each layer of weld metal shall be thoroughly cleaned, preferably with a power driven wire brush. Peening of welds need be done only to prevent excessive residual stresses in closing seams which are not free to move when the weld cools. Peening may also be used to loosen slag.

CONDITIONS UNDER WHICH WELDING MAY NOT BE DONE

No welding shall be done on poorly fitting, wet, oily, or dirty steel, or in high winds, or during weather such that the operator cannot work in physical comfort.

ASSEMBLY DEVICES

No fitting-up holes shall be used. Assembly devices may be welded to the adjoining parts during erection, but must be carefully chipped, or burned and chipped off after erection so as not to deface the metal surface.

ACCESSORIES

The Bell Butte tank shall be fitted with the following accessories located as indicated on the Plans:

- 1 - 24" circular shell manhole
- 1 - 24" flanged inlet pipe connection
- 1 - 24" flanged butterfly valve, for horizontal installation, to be operated by an altitude system control, with a manual override, as detailed on the Plans and as herein specified
- 1 - 24" inlet-outlet pipe run with all fittings per detail on Plans
- 1 - 10" overflow, with all fittings per detail on Plans
- 1 - Outside tank ladder with grabrails at the top
- 1 - Inside tank ladder
- 1 - 24" roof manhole
- 1 - Umbrella type lightproof screened vent at least 12-inch diameter
- 1 - Water level indicator with float
- 1 - 6" drain pipe connection including pipe, fittings, and 6" OS & Y gate valve per detail on Plans

The booster station forebay tank shall be fitted with the following accessories located as indicated on the Plans:

- 1 - 24" circular shell manhole
- 1 - 12" flanged inlet pipe connection
- 1 - 14" flanged outlet pipe connection
- 1 - 10" overflow with all fittings per detail on Plans
- 1 - Outside tank ladder with grab rails at the top
- 1 - Inside tank ladder
- 1 - 24" roof manhole
- 1 - Umbrella type light-proof screened vent at least 12 inches in diameter
- 1 - Water level indicator with float
- 1 - 3" drain with all fittings per detail in Plans
- 1 - (2) electrode holders in roof per note on Plans

TEST

The tank bottom, after welding and before painting, shall be tested according to AWWA D100, latest revision. After painting the tank, when it is first filled with water, any leaks showing up shall be repaired and spots repainted. Water for testing the tank will be provided at the inlet-outlet pipe at no cost to the Contractor.

PAINING

No steel shall be painted prior to erection.

The Contractor shall furnish all labor, materials, and equipment necessary to do all the painting specified or required. All materials specified by name, brand, or manufacturer, or selected for use under these Specifications, shall be delivered unopened at the job site in their original containers bearing the manufacturer's name.

No thinning of paint other than as directed by the manufacturer will be permitted without the approval of the Engineer. No painting shall be performed under conditions which, in the opinion of the Engineer, will jeopardize the appearance or quality of the painting in any way.

All paint for metal surfaces shall be applied at that rate and in that manner which are in conformance to the requirements of the manufacturer's specifications, except as modified herein.

All paint shall be especially adapted for use around water treatment plants. On surfaces which will be either continuously or intermittently in contact with water, only paints suitable for continuous or intermittent submergence in water shall be used. Such paints shall be suitable for surfaces in contact with drinking water. Upon completion of the painting, the Contractor shall remove all surplus materials and rubbish.

Undercoats, prime coats, and finish coats on any one item shall be products of the same manufacturer. If the incorrect coat is applied for any reason, it shall be sandblasted off and replaced with the primer specified for the optioned process.

Colors shall be as selected by the Engineer. Colors will not necessarily be standard colors, and the colors shall be mixed, if necessary, to secure desired color.

Paint products mentioned herein which contain the word or prefix "No-Ox-Id" are those manufactured by the Dearborn Chemical Company, Chicago 4, Illinois. "Deer-O" products are manufactured by Deer-O Paints and Chemicals, Phoenix, Arizona.

The underside of the bottom plates shall be thoroughly cleaned of all moisture, dust, grease, or any other deleterious material. The cleaned surface shall then be coated with a heavy application of No-Ox-Id A, thoroughly rubbed into the metal surface with a canvas covered wood block to produce a smooth film approximately 1/32 inch thick. Care shall be exercised so that the paint film is not damaged or rubbed off as the bottom plates are placed in position for welding. A No-Ox-Idized asbestos wrapper, 8 inches in width, shall be placed under the edges of the bottom plates so that the wrapper is directly beneath the seams to be welded.

After the completion of all welding, burning, interior cleaning, and testing of steel work and after the bottom has been tested, the painting work on the tank shall proceed. All surfaces to be painted shall be clean and dry. Rust, scale, and welding slag shall be removed from metal surfaces by wire brushing, chipping, or sandblasting. Grease or oil shall be removed from all surfaces by wiping with mineral spirits. All surfaces shall be dust free prior to the application of any paint. The surfaces of the tanks shall be power tool cleaned as specified in SSPC-SP3 prior to painting, except that brushoff blast cleaning as specified in SSPC-SP7 may be used in place of power tool cleaning. With either method, the resulting surface condition shall be such as will permit proper bonding of the paint to the metal. The above "SSPC" refers to the Steel Structures Painting Council.

No painting shall be done immediately after a rain or during rainy weather, over dew, or when the temperature is below 50 degrees F. No painting shall be done under dusty conditions.

Alternate coats shall be of a different color so that one coat can be readily distinguished from another. All work shall be done in a workmanlike manner, leaving the finished surface free from drops, ridges, waves, holidays, laps, and brush marks. If the material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with the undiluted material.

Additional coats of paint shall not be applied until the paints underneath are thoroughly dry. Drying time for any paint shall be at least as long as recommended by the manufacturer in his published literature. Unless otherwise specified, all paint shall be allowed to dry at least 24 hours (not just overnight) before application of another coat.

Application equipment shall be of a type approved by the manufacturer.

All existing exposed surfaces, including piping, shall receive a priming coat of Deer-O Industrial Synthetic Primer and two finish coats of Deer-O-Synthetic Industrial Enamel, or approved equal, of a color to match, or blend in with, the surrounding landscape. The Contractor shall submit proposed color samples to the Engineer for approval. Undisturbed areas of the Papago tank will not require painting.

The entire interior of the reservoirs shall receive three coats of red lead conforming to Federal Specifications TT-P-86a, Type I, and modified by the addition of 2 pounds of dry litharge per gallon, to be added shortly before application. The dry litharge shall be slowly added while stirring the paint. Only enough paint shall be treated with litharge as will be used in a working day. Drying and curing of the several coats shall be in conformance with AWWA D102.

After application of the final coat, warm air or forced air shall be circulated through the tank. The circulation of air shall be continued until all residual solvent odor is dissipated.

The water level indicator shall be painted, after priming with Deer-O Industrial Synthetic Primer, with two coats of white Deer-O-Synthetic Industrial Enamel for background and one coat of black Deer-O-Synthetic Industrial Enamel for marking and numbering.

STERILIZATION

After all construction and painting work on the tank and construction of connecting mains have been completed, the tank shall be sterilized. The City of Tempe will provide, at no cost to the Contractor and from the end of the nearest functioning main, water and chlorine for the sterilizing work. All other labor, material, and equipment for the sterilizing work shall be provided by the Contractor. The tank shall be filled slowly to the overflow level with potable water charged with sufficient chlorine to maintain a concentration thereof of 50 ppm. After the chlorine solution has remained in the tank for 24 hours, the solution shall be backdrained through the inlet-outlet pipe from Broadway Road in quantity adequate to sterilize the inlet-outlet pipe and connecting mains. The balance of the solution shall be drained to waste from the tank. After the tank has been proven watertight and the altitude control mechanism has been proven operable and immediately after sterilization of the tank, the tank shall be placed in operation on the system.

BOOSTER PUMP STATION

GENERAL

The Contractor shall provide all plant, labor, equipment, appliances, and materials and shall perform all operations necessary to construct a booster pump station at the Salt River Valley Water Users Association well at 23-1/2 E, 5-1/4 N, 1/2 mile east of Hayden Road and 1/4 mile north of McKellips Road. The Contractor's work at the booster station shall include all items of earthwork, concrete, masonry, carpentry, painting, fencing, piping, valving, fitting, equipment, and electrical installation to provide a complete and operable job as indicated on the Plans and in these Specifications. In general, the Contractor's work shall commence at the existing well discharge pipe and shall end at the "Limit of Work" indicated at the end of the City-installed transmission main.

The items of excavation and backfill, concrete construction, fence and tank erection, pipe and valve installation, and site work shall be as specified in other sections of these Specifications. The balance of the work shall be as hereinafter specified.

MECHANICAL EQUIPMENT

WATER METER: The Contractor shall furnish and install a 12-inch flanged tube water meter in the pipe run between the well and the forebay tank.

The tube type water meter shall be for 150 psi water working pressure. The meter shall be of the propeller type and furnished complete with integral cast tube of close-grain, high tensile cast iron, having flanged ends, faced and drilled per ASA B16.5. Meter tube shall have full length stainless steel liner and three stainless steel straightening vanes, radially spaced 120 degrees apart. Meter tube shall have the same nominal inside diameter throughout its length to offer minimum obstruction to the flow. Meterhead shall be connected to the tube by means of a flanged connection, designed for easy removal from the tube. Meterhead shall have a cover plate of close-grain, high tensile cast iron with propeller gear box of cast bronze. Meterhead is to be furnished with plastic propeller mounted transversely in the center of the meter tube. Rotation of the propeller shall be transmitted by means of a worm and worm gear to a 6-digit straight reading totalizer reading in thousands of gallons. Meter shall be suitable for normal flows between 250 and 3,000 gallons per minute and for temporary flows up to 50 percent above the normal maximum. Meter shall register within 2 percent of the true flow of water, all flows above the minimum rating. Meter shall be suitable for adaption of

electric transmission unit for remote recording. Meter shall be Sparling Main-Line, Type CF 115, equipped with a Type 245 indicator-totalizer, or approved equal which is the product of a manufacturer who has had at least 5 years' experience in the manufacture of similar metering equipment.

PUMP: The Contractor shall furnish and install a new line shaft vertical turbine pump as booster unit downstream from the forebay tank. The pump shall be the recognized product of an established manufacturer and shall have a guaranteed field overall efficiency (wire to water) of not less than 73 percent. The pump shall conform to the requirements of AWWA E101, Vertical Turbine Pumps - Part A, except as modified herein.

The bowl assembly shall be designed to deliver 2,000 gallons per minute against a total dynamic head of 260 feet; also the the pump shall be such that at a total dynamic head of 280 feet the discharge shall be not less than 1,700 gpm.

The bowl assembly shall be of the multistage type. The bowls shall be of alloyed cast iron or Meehanite, high-grade, close-grained cast iron, Class 30 or better, or approved equal, with smooth interior surfaces, free from blowholes, sand holes, and all other faults. Bowls shall be fastened together in such a manner that accurate alignment is assured and maintained. Guide passages for water shall be designed and finished so as to reduce friction to a minimum. The impellers shall be of bronze containing not more than 6 percent zinc or of close-grained nickel steel castings accurately machined with blades carefully scraped to insure smooth passageways. The impellers shall be balanced both hydraulically and dynamically, shall have nonoverloading characteristics, and shall have head-capacity characteristics as steep as possible so that an increase or decrease in the operating head above or below the design point will not cause an excessive increase or decrease in pump capacity. Impellers shall be attached and locked to the pump shaft in such a manner that they may be easily removed and that they will not work loose for any reason. Impeller shaft shall be of AISI Type 416 stainless steel, shall be not less than 1-15/16 inch in diameter, of adequate strength to do the work required, and shall be supported above each impeller. A suction strainer is not required.

Sufficient column shall be furnished to locate the suction of the pump not less than 6 inches above the bottom of the barrel. The outer column shall be 10-inch, Schedule 40, wrought steel pipe. The shaft shall be of AISI Type 416 stainless steel and shall be water lubricated. The column shaft shall be of the same size as the pump shaft. The column assembly shall contain a bearing retainer and bearing immediately below the discharge head to provide stability for the mechanical seal assembly.

The discharge head shall be of Meehanite, free of blowholes, sand holes, and other detrimental defects, and shall be accurately machined to fit the pump barrel. The base of the discharge head shall contain a minimum of sixteen 1-1/4 inch holes to permit bolting to the pump barrel. Bolts, 1-1/8 inches, shall be used for this purpose. The discharge head shall be fitted with a flange rated at 150 psi and with a Borg-Warner Type U balanced mechanical seal. The stuffing box shall be fitted with a stainless steel shaft sleeve for mounting the mechanical seal. Provisions must be made whereby the seal faces can be adjusted without disturbing the impeller adjustment or the head. The shaft through the head shall be AISI Type 416 stainless steel and of the same diameter as the pump shaft. In order to facilitate removal of the seal, the connection of the pump shaft to the vertical solid shaft motor shall be made with a 4-piece adjustable spacer type coupling. This arrangement shall permit the removal of the seal without disturbing the motor or the head. The head shall be fitted with a barrel vent and suitable air relief valve.

The barrel shall be of the above ground suction type and of 1-piece construction. The barrel shall extend at least 9 feet below the lower mounting flange. The barrel shall be 20-inch inside diameter and fitted with a 14-inch suction flange. Flanges shall be of steel and shall be drilled and rated at ASA 150 pounds. The barrel mounting plate and the head mounting plate shall be not less than 1-1/4 inch thick steel. The lower mounting plate shall contain four holes for the securing of anchor bolts. The upper mounting plate shall be machined to match the lower face of the discharge head. The fit between the barrel and the discharge head shall be gasketed and watertight. The barrel shall have shear clips welded to its exterior as noted on the Plans.

The exterior of the pumping unit housed in the barrel and the interior and exterior of the barrel shall be shop painted. The shop and finish coats shall be suitable for use with potable water and shall conform in all respects to the requirements of the PAINTING subsection of WATER STORAGE TANKS. All exposed piping shall be painted as specified under PAINTING subsection of WATER STORAGE TANKS.

The pump motor shall be of the vertical solid shaft type for operation on 3-phase, 440-volt, 60-cycle power. The motor shall be not less than 200 hp. Operation shall be at approximately 1,750 rpm. The motor shall be of the open dripproof design rated 60-degree C rise with an ambient temperature of 40 degrees C, Class B insulation. The motor shall have a service factor of 115 percent. The motor shall be furnished with sufficient thrust capacity to operate the pump under all conditions.

CHLORINATOR EXHAUST FAN: The Contractor shall furnish and install the exhaust fan unit in the chlorinator room of the control shelter that is specified under the ELECTRICAL WORK section of these Specifications.

CONTROL SHELTER: The Contractor shall furnish all items of plant, labor, equipment, and materials and shall perform all items of work necessary to construct the Plan-indicated control shelter.

Earthwork shall conform to all requirements of the EXCAVATION section of these Specifications. Footer concrete and slab ballast shall be placed on firm, dry, undisturbed earth which is free of all organic matter and trash. The area adjacent to the shelter shall be raked and dressed to drain at the conclusion of all work thereon.

Concrete and reinforcing steel shall conform to all requirements of the CONCRETE section of these Specifications.

Masonry block shall be 8 x 8 x 16 units conforming to ASTM C 90, Grade B.

Framing lumber shall be structural grade fir or pine. Plywood shall be of the Plan-indicated grades.

Doors shall be paint stock of the indicated grades. Hardware shall be brass finished stock as manufactured by the Stanley Works, or approved equal. Locks need not be master-keyed to any other site but shall be keyed to each other.

All exposed woodwork shall be given one coat of primer and two coats of finish paint of a color to be selected by the Owner and of a quality corresponding to DuPont "Dulux," or approved equal.

All items of work on the control shelter shall be in conformance with the best standards of the several trades and shall produce a square, sound, clean, and workmanlike structure.

CHLORINATOR UNIT: The Contractor shall furnish and install a Wallace & Tiernan A741 wall mounted chlorinator in the chlorinator room of the control structure. The installation shall be performed under the supervision of a Wallace & Tiernan engineer and, at the conclusion of the work, the Contractor shall provide from Wallace & Tiernan a certified approval of the installation.

The City of Tempe, Arizona, will provide all chlorine gas bottles required for the work.

The high pressure water line to the chlorinator shall begin with a 1-inch corporation cock at the main, run through 3/4-inch wrought steel pipe to the chlorinator room, pass through a Y-strainer, be measured by a wall mounted pressure gauge, be regulated by a solenoid valve, and enter the chlorinator unit. The Contractor shall provide all pipe and fittings to make this line complete with the kit-furnished components.

The chlorine feed from the chlorinator shall run from the chlorinator through 3/4-inch polyethelene plastic pipe (75 psi test) to a 1-inch corporation cock in the tank inlet pipe through a packing gland and injector tube. Exterior buried runs of the plastic pipe shall be housed in a 2-inch wrought steel pipe casing. The Contractor shall provide all pipe and fittings to make the line complete with the kit-furnished components.

The Contractor shall provide a Fairbanks-Morse 1,000-pound platform scale for chlorine bottle weighing. The scale platform shall be flush with the floor as detailed on the Plans.

ELECTRICAL WORK

GENERAL

The electrical work under these Specifications includes the furnishing and installing of the electrical equipment specified herein and its proper connection to produce a complete and properly functioning system as specified herein and indicated on the Plans.

The equipment and material shall be new and shall be installed in a workmanlike manner and shall conform to the latest applicable portions of the National Electrical Code.

All wires shall be installed in rigid steel conduit and of the size required by the Code, except that no conductor shall be smaller than No. 12 AWG. Flexible watertight conduit shall be used to facilitate connections between the ends of the conduit and the mechanical equipment and motors.

Where conduit is run underground or under the slab, it shall be encased in concrete with not less than 3 inches of cover. The top of the encasement shall be not less than 2'-0" below the surface of the ground.

All wires and conductors used for this installation shall be copper and shall be rubber insulated, neoprene jacketed, rated at 600 volts, Code Grade RHW, similar and equal to Simplex Anhydrex.

Conduit shall be made up in a secure and watertight manner and shall be electrically continuous throughout the system.

Power will be supplied at what is commercially known as 60-cycle, 3-phase, 3-wire, 440-volt and will be made available at a pole as indicated on the Plans. The meter socket will be furnished by the Salt River Project and shall be installed by the Contractor.

The Contractor shall install the riser conduit on the Contractor furnished pole as indicated on the Plans and in a manner approved by the Salt River Project. The Contractor shall verify the service direction with the Salt River Project.

PUMP MOTOR STARTER

The pump motor starter shall be an AC combination circuit breaker, full voltage, line start type for use with a 440-volt, 3-phase, 200 horsepower motor. The starter shall be installed in a NEMA I enclosure with a HAND-OFF - AUTO selector switch and RUN indicator

light on the cover and shall be provided with three overload relays and a running time meter. There shall be furnished, installed, a 120-volt control power transformer for operation of the starter and all other devices as indicated on the Plans. The starter shall be Square D Company Class 8539, Type GG-8, or approved equal. The Contractor shall confirm the motor horsepower and select overload relay trip units in accordance with the nameplate data on the motor furnished.

PHASE FAILURE RELAY

The phase failure relay shall be General Electric Company, Catalogue No. 1C2821-AA25014 in NEMA I enclosure. The above relay shall be operated from two General Electric Type JL-9, Catalogue No. 258X23, 300:5 current transformers, installed in a fabricated, code gauge, sheet steel, NEMA I junction box with bolted on cover.

MAIN DISCONNECT

The main disconnect shall be a 3-pole, 600-volt, 800-ampere, air circuit breaker with 700-ampere trip in a NEMA 3R raintight enclosure with front operating handle, Square D Company Type MA, Catalogue No. MA776R, or approved equal.

LIGHTING TRANSFORMER

The lighting transformer shall be an indoor-outdoor dry type, 5 kva, 480-120/240-volt transformer for wall mounting and with four taps, two 2-1/2 percent above and below, General Electric Type M, Catalogue No. 9T21A1013, or approved equal.

LIGHTING TRANSFORMER CIRCUIT BREAKER

The lighting transformer circuit breaker shall be a 100-ampere, F-frame, 2-pole, 15-ampere trip molded case circuit breaker installed in a NEMA I enclosure with a side operated external handle, Square D Company Type ML-1, Catalogue No. 75615, or approved equal.

LIGHTING PANELBOARD

The lighting panelboard shall be Square D Company Type NQO-3, Catalogue No. NQO-08-3L, or approved equal. The cabinet and trim shall be for surface mounting. The arrangement shall be for 120/240-volt, 3-wire power. There shall be installed in the panel, eight single-pole, 20-ampere, circuit breakers. The lighting panelboard shall be installed as indicated on the Plans.

CONTROL RELAYS

The control relays shall be machine tool type relays with poles and type as shown on the Plans. The relays shall be Square D Company Class 8501, or approved equal.

TIMER

The start timer shall be an Eagle Signal Company, Bulletin 125, HP5 series timer. The start timer shall have one isolated contact that closes 1 minute after the timer is energized and remains closed until the timer is de-energized. The maximum time period of the timer shall be approximately twice the above-indicated time, and the operating time period shall be adjustable in the field without use of tools. The reset time shall be 1/2 second or less. Repeat accuracy shall be less than 1 second. The timer shall be mounted in a NEMA I enclosure.

PUSHBUTTONS AND INDICATOR LIGHTS

The pushbuttons and indicator lights shall be of the heavy-duty, oiltight type and by the manufacturer of the equipment in which they are installed. The remote LOCK-OUT-STOP pushbutton shall be in a NEMA 4 enclosure.

MANUAL MOTOR STARTER

The exhaust fan manual motor starter shall be suitable for the protection of the exhaust fan motor and shall be installed in a weather-proof enclosure on the outside wall of the building near the switch designated S2, as indicated on the Plans, General Electric CR101-Y400H, or approved equal.

LIGHTING FIXTURES

Lighting Fixture A shall be a 14-inch diameter standard RLM dome reflector with a 150-watt, A-23 medium base lamp, Westinghouse No. BPD-150, or approved equal. The fixture shall be surface-mounted on the ceiling.

Lighting Fixture B shall be a Holophane No. 420 fixture mounted on a No. 0230 special conduit. The lamp shall be 200-watt with an A-25-C1 bulb and CC-6 filament (General Electric Company No. 200A/C1). This fixture shall be mounted on the wall of the building, approximately 8'-0" above the ground.

Lighting Fixture C shall be Revere Catalogue No. 6828-NFH floodlight with a 500-watt, T-3 quartz-iodine lamp, Catalogue No. 6800L. One shall be mounted on the service pole at the highest possible elevation on the west side; the other shall be mounted on the tank at the highest possible elevation at the location indicated on the Plans.

SWITCHES

The switches designated S and SY on the Plans shall be Hubbell Catalogue No. 17CM81, combination, and installed in a Crouse-Hinds, or approved equal, FD series conduit.

The switch designated S2 on the Plans shall be Hubbell Catalogue No. 17CM82, combination, and installed in a Crouse-Hinds, or approved equal, FD series conduit.

RECEPTACLES

The receptacles shall be Hubbell Catalogue No. 52CM62 with weatherproof cover 52CM21 and shall be mounted in a Crouse-Hinds, or approved equal, FD series conduit.

CHLORINATOR EXHAUST FAN

The Contractor shall furnish and install an exhaust fan unit in the chlorinator room. The fan unit shall consist of a mounting panel, integrally mounted fan and motor, and all of the drawing-indicated electrical installation. The fan shall have a capacity of 1,048 cubic feet per minute and shall be driven by a single-speed, single-phase electric motor operating at 1/20 horsepower on 120-volt, 60-cycle AC at 1,550 rpm. The fan shall be ILG-123, or approved equal. The disconnect means at the fan shall be by a plug and receptacle.

LOW LEVEL CUTOFF CONTROLS

The low level cutoff, pump down controls shall be made up of a Charles F. Warrick Company group consisting of a Type TF controller, a Series E2 electrode holder, and two Type W wire suspended electrodes. The electrodes shall be either low zinc content brass (less than 5 percent zinc) or stainless steel Type 304 or 316.

OVERFLOW PUMP SHUT OFF

The overflow pump shutoff shall be made up of a Charles F. Warrick Company group consisting of a Type TH controller, a Series E1 electrode holder, and one 1/4 inch diameter solid rod electrode. The electrode shall be made of low zinc content brass (less than 5 percent zinc) or stainless steel Type 304 or 316. The electrode shall be installed at the depth shown on the Plans and shall be adjustable to plus or minus 6 inches.

FIRE HYDRANTS

Fire hydrants shall be Pacific States Cast Iron Pipe Company fire hydrants. They shall have valve openings at least 5 inches in diameter, two 2-1/2 inch hose nozzle connections, and one 4-inch steamer connection. Bury of hydrants shall be as indicated on the Plans and differs from place to place.

For this project, the following schedule will apply:

Size of connecting pipe	- 6 inches
Type of end connection	- flanged
Number of nozzles	- 2 hose, 1 pumper
Nozzle threads	- 4-inch pumper, OD male 4.576 x 6 tpi
	- 2-1/2 inch hose, OD 3.075 x 6 tpi
Direction of opening	- left, counterclockwise
Color	- yellow

Hydrants shall be firmly set on a bed of coarse gravel containing at least 2 cubic feet of gravel. Pumper nozzle shall face the street. Hydrants shall be braced to the side of the excavation opposite the connection with a concrete kick block as detailed on the Plans. Excavation, backfill, concrete, and piping work shall be accomplished as specified in other sections of these Specifications. Each installation shall be approved prior to backfilling.

Hydrants shall have 6-inch auxiliary gate valves attached by a flanged joint to the hydrant, with the bell end of the valve facing the supply pipe. The auxiliary valve shall be supplied with a cast iron valve box. Valve and valve box shall conform to the specifications for VALVES AND WATER MAIN ACCESSORIES herein.

One hydrant wrench shall be furnished and shall be turned over to the City at the end of the job. At no time shall any hydrant be operated with other than a standard hydrant wrench.

FENCING

GENERAL

As indicated on the Plans, chain link fence and one double 10-foot swing gate shall be erected to enclose the Bell Butte tank site. The fence shall be a 6-foot high chain link item surmounted by three lines of barbed wire on battered extensions. The fence installation shall be complete with all appurtenances.

MATERIALS

FENCE FABRIC: The fence fabric shall be 6-foot chain link, 9-gauge wire with 2-inch mesh, top and bottom selvages to have barbed finishes. Fabric shall be galvanized after weaving in accordance with ASTM A 392. Wire wickets shall have 70,000-pound per square inch tensile strength.

LINE POSTS: Line posts shall be 2-1/2 inch OD pipe weighing 3.65 pounds per foot or 2-1/4 inch H-beams weighing 4 pounds per lineal foot.

END, CORNER, AND GATE POSTS: End and corner posts shall be 3-inch OD pipe weighing 5.79 pounds per lineal foot or 3-inch I-beams weighing 6.5 pounds per lineal foot. Gate posts shall be 4-inch OD pipe weighing 9.11 pounds per lineal foot or 4-inch H-beams weighing 14 pounds per lineal foot.

GATE FRAMES: Gate frames shall be 2-inch OD pipe weighing 2.72 pounds per lineal foot, adequately braced and trussed, with the same fabric as in the fence.

TOP RAIL: Top rail shall be 1-5/8 inch OD weighing 2.27 pounds per foot.

FITTINGS AND GATE HARDWARE: Fittings and gate hardware shall consist of hinges and locking devices and other required fence fittings and shall be of malleable, wrought iron, or pressed steel as approved.

EXTENSION ARMS: Extension arms shall be 45-degree angle of pressed steel. End and corner arms shall be of heavy malleable iron. Arms shall accommodate three lines of barbed wire. Metal tongue fasteners will not be approved. Arms shall project outward.

BARBED WIRE: Two-strand, 12-1/2 gauge, galvanized wire with 4-point barbs spaced approximately 4 inches apart.

ERECTION

The Contractor shall install posts at no greater than 10-foot intervals in concrete, to a depth of 3 feet, of proper size to accommodate line posts and corner posts as indicated or as directed by the Engineer. Posts shall be set true to plumb and alignment before concrete is poured and held in place until concrete has set. Gate and corner post encasement shall be a minimum 12-inch diameter. Concrete shall be domed and smooth to drain water from post. Bottom of concrete shall not be less in diameter than top of concrete. Barbed wire shall be battered outwards from the tank site.

WIRE FENCING: Wire fencing shall be installed in accordance with the best standard practice, stretched and fastened securely to the posts in such manner as to insure no slack edges or warped sections. Fabric shall be secured to corner posts by heavy steel bands bolted to a 1/4" x 3/4" tension bar passing vertically through the fabric. Fabric shall be fastened to line posts at 14-inch intervals with noncorrosive bands. The three lines of barbed wire shall extend above the entire length of the fence and gates. Gates shall be rigidly braced and furnished with approved hinges, locking devices, and required fittings. Bays adjacent to gate posts and corner posts shall be braced with a 2-inch OD pipe attached to the gate or corner post 5' -6" above the ground at one end and attached to next line post 6 inches above the ground at the other end. All component parts of this fence shall be hot-dip galvanized after fabrication, except bolts and nuts which shall be cadmium plated. Galvanizing for pipe, fittings, rods, and hardware shall be in accordance with ASTM A 120, A 123, and A 153.

SHOP DRAWINGS

Shop drawings showing complete details of fabricating fence including type, size, and shape of materials used and methods of installation shall be submitted for approval.

MISCELLANEOUS

GENERAL

Any items not specifically covered in the Specifications shall be as indicated on the Plans.

WORK IN CONNECTION WITH EXISTING MAINS

At various locations, as indicated on the Plans, the new mains shall be connected to existing water mains; fittings are to be changed in existing water mains; some sections of existing water mains are to be removed and replaced with other pipe and fittings; or valves are to be installed in existing water mains. The Contractor shall carefully cut the pipe, cut out joints, and remove the pipe and fittings, making every effort to leave them in reusable condition. Salvaged pipe and fittings shall be turned over to the Owner at the City of Tempe yard on Hardy Drive.

In making connections between new and existing pipe, use may be made of Dresser couplings or cast iron sleeves, but no use shall be made of unions.

Work shall be so scheduled as to avoid cutting off water in any section of the existing mains for any prolonged period. The Contractor shall keep the City Engineer and the Fire Department advised daily of any valves that may be closed and that are reopened. Water shall not be shut off in any section without giving notice the day before to those officials and to all water customers affected. If any fire hydrants are to be cut off, the Fire Department shall be notified the day before.

MEASUREMENT AND PAYMENT

GENERAL

The method of measurement and payment for the various items comprising the completed work follows: Payment for the items shall be compensation in full for the furnishing of all overhead, labor, material, tools, equipment, and appurtenances necessary to complete the work in a good, neat, and satisfactory manner as indicated on the Plans or as specified, with all connections, testing, painting, cleanup, and related work completed. Each item, fixture, piece of equipment, etc, shall be complete with all necessary connections and appurtenances for the satisfactory use and/or operation of said item. No additional payment will be made for work related to each item unless specifically noted or specified. Measurement will be in place in the completed work with no allowance for waste.

ITEMS NO. 1 AND NO. 2 - CAST IRON PIPE

The length of all cast iron pipe will be measured through the fittings but not through the valves for payment under the above items.

The unit prices specified to be paid per lineal foot for cast iron pipe under Items No. 1 and No. 2 shall be compensation in full for excavating and backfilling trenches, for concrete thrust blocks, and for furnishing, handling, and installing the pipe in place.

ITEMS NO. 3 AND NO. 4 - STEEL PIPE

The length of steel pipe for the river crossing and the new tank supply main will be measured through the fittings but not through the valves for payment under the above items.

The unit price specified to be paid per lineal foot for steel pipe under Items No. 3 and No. 4 shall be compensation in full for excavating and backfilling trenches; for furnishing, handling, and installing the pipe and fittings in place; for installing concrete thrust blocks; and for furnishing, handling, and installing in place any couplings, flanges, or adapters used to connect the steel pipe to valves and fittings. No additional payment will be made for fittings or blind flanges under these items.

ITEMS NO. 5 THROUGH NO. 8 - BUTTERFLY VALVES

The unit price specified to be paid per each for butterfly valves under Items No. 5 through No. 8 shall be compensation in full for furnishing, handling, and installing the butterfly valves, adapters with base pads, supporting piers, gear operators, and valve boxes.

The 24-inch butterfly valve specified for payment under Item No. 25 shall not be included for payment under Item No. 7.

It will be necessary to provide a steel pipe transition in order to properly connect the flanged valves under the respective valve items to the pipeline. These transitions (two for each valve) shall be 10 feet long, cement mortar lined, of the pipeline size at one end, and uniformly reduced to the outside diameter steel pipe size at the flanged end. The transition (reducer) will be measured for payment under the pipeline item of which it is a part. Any difference in cost between the average pipeline installation and the transition installation shall be included for payment under the respective valve items.

ITEMS NO. 9, NO. 10, AND NO. 11 - GATE VALVES

The unit prices specified to be paid per each for gate valves under Items, No. 9, No. 10, and No. 11 shall be compensation in full for furnishing, handling, and installing the gate valves and adapters. Cast iron valve boxes shall be furnished at all locations.

Twelve-inch gate valves specified for payment under Items No. 20, No. 22, and No. 25 shall not be included for payment under Item No. 9.

ITEM NO. 12 - GATE VALVE (CUT IN ON EXISTING MAINS)

The unit price specified to be paid per each for gate valve to be cut in on existing mains under Item No. 12 shall be compensation in full for furnishing, handling, excavation, backfill, pavement replacement, cutting existing pipe, and installing the new gate valve on existing water mains. Valve boxes shall be furnished at all locations. Cast iron sleeves used for the cutin shall be paid for under Item No. 15 - Cast Iron Fittings.

ITEM NO. 13 - REMOVE EXISTING GATE VALVES AND CUT INTO EXISTING MAIN

The unit price specified to be paid for removing existing gate valves and cutting into existing mains under Item No. 13 shall be compensation in full for removing the gate valves and valve boxes from the existing mains, handling, excavation, backfill, pavement replacement, cutting existing pipe, and installing these gate valves and valve boxes at a new location on existing mains. Cast iron sleeves used for the cutin shall be paid for under Item No. 15 - Cast Iron Fittings.

ITEM NO. 14 - FIRE HYDRANTS

The unit price specified to be paid per each for fire hydrants under Item No. 14 shall be compensation in full for furnishing, handling, and installing the hydrants complete with 6-inch gate valve and valve box including excavating and backfilling, gravel bed, and removing and replacing any concrete sidewalk necessary for the hydrant installation.

ITEMS NO. 15 AND NO. 37 - CAST IRON FITTINGS

Weights of cast iron fittings for payment under the above items in the case of fittings 12 inches in size and under will be taken from the published tables for fittings in accordance with ASA 21.10 and in the case of fittings 14 inches and larger in size will be taken as actual weight not including bolts, nuts, and gaskets, except that in no case shall weights be used which exceed the weights given in the published tables for corresponding fittings in accordance with AWWA C100.

The unit prices specified to be paid per pound for cast iron fittings under Items No. 15 and No. 37 shall be compensation in full for furnishing, handling, and installing the fittings in place. Fittings not indicated on the Plans must be approved for payment by the Engineer prior to their installation, or else will not be paid for. Item No. 37 shall apply to cast iron fittings used in connection with the Ductile Cast Iron Pipe Alternate only.

ITEM NO. 16 - CONNECTIONS TO EXISTING MAINS

The unit price specified to be paid per each for connections to existing mains under Item No. 16 shall be compensation in full for additional excavating and backfilling involved, for any additional pavement removal and replacement, for cutting into the existing main and removing sections of pipe, for removing existing plugs, and for any extra work involved in installing the necessary new pipe and fittings. Pipe, fittings, valves, valve boxes, and pavement replacement above connecting pipelines will be paid for under other pay items. The connections to existing mains are indicated on the Plans with the number of connections to be paid for at each location.

ITEMS NO. 17 AND NO. 18 - PAVEMENT REPLACEMENT

The measure of pavement replacement for payment will be the area in square yards obtained by multiplying the minimum trench width indicated in the details on the Plans by the length of the pipe run, measured through valves and fittings, over which the pavement is being replaced.

No payment under these items will be made for any other pavement replacement than that over new mains. In the case of mains, the measured lengths will end at the extreme ends of the pipe or at the centerlines of fittings to which connected. In the case of connections to existing mains, payment will be made under these items for the strip of pavement directly over the new main, terminating at the centerline of the fitting in the existing main, but not for other paving replacement over the exposed part of the existing main. Pavement replacement in connection with installation of valves in existing mains will not be paid for under these items. Pavement broken out past the lines indicated on the details on the Plans will not be paid for. Where curb and gutters exist along the line of the new main, the width of the curb and gutters shall be included in the length of pavement to be paid for. No separate payment will be made for the replacement of curbs, gutters, and aprons.

The unit price specified to be paid per square yard for paving replacement under Items No. 17 and No. 18 shall be compensation in full for all work in connection with removing and disposing of the old pavement and replacing with new pavement.

ITEM NO. 19 - CONCRETE SIDEWALK AND DRIVEWAY REPLACEMENT

Portland cement concrete sidewalk and driveway replacement will be measured for payment in square feet under Item No. 19. The square footage to be paid for will be based on the area of the concrete sidewalk or driveway replaced where the water main passes under the sidewalk or driveway.

The unit price specified to be paid for per square foot for concrete sidewalk and driveway replacement under Item No. 19 shall be compensation in full for cutting the sidewalk or driveway, disposing of broken concrete, and furnishing and placing all materials necessary to complete the work as specified.

ITEM NO. 20 - ALTERATION OF EXISTING BUTTERFLY VALVE AT PAPAGO PARK TANK

The lump sum price specified to be paid for alteration of existing butterfly valve at Papago Park tank under Item No. 20 shall be compensation in full for the installation of all specified piping, gate valves, check valve, altitude control system including air receiver, compressor, and controls, earthwork and excavation, concrete, painting, tank modification, and sterilization of the new work. The lump sum price shall also include the charge for calibration and approval of the completed work by a representative of the manufacturer of altitude control assembly.

ITEM NO. 21 - NEW TANK FOR BOOSTER PUMP STATION AT WELL

The lump sum price specified to be paid for the new steel ground storage tank for booster pump station at the well site under Item No. 21 shall be compensation in full for furnishing and erecting the steel ground storage tank complete on the prepared base as specified and shall include specified painting, cleaning, and sterilization.

ITEM NO. 22 - BOOSTER PUMP AND CONTROLS FOR BOOSTER PUMP STATION AT WELL

The lump sum price specified to be paid for booster pump motor and controls for booster pump station at well under Item No. 22 shall be compensation in full for furnishing all labor and materials necessary to install the concrete base for the pump, pump and motors, and all controls and electrical work to complete the work as specified.

ITEM NO. 23 - BOOSTER PUMP STATION SHELTER, PIPING, METER, AND CHLORINATOR

The lump sum price specified to be paid for booster pump station shelter, piping, meter, and chlorinator under Item No. 23 shall be compensation in full for furnishing all labor and materials for erecting the building at the pump station site, for furnishing all labor and materials for piping, valves, pump control valve, concrete bases and footings, meter and chlorinator unit, all as indicated on the Plans and specified. Preparation of the base for the new steel ground storage tank and general site work for the booster pump station shall be included under this item.

ITEM NO. 24 - BELL BUTTE TANK FOUNDATION AND ACCESS ROAD

The lump sum price specified to be paid for Bell Butte tank foundation and access road under Item No. 24 shall be compensation in full for furnishing all labor, equipment, and materials for excavation for the access road and tank foundation, for a gravel cushion and subdrain cover, for a vitrified clay pipe subdrain, for the concrete drain box, for approximately 150 feet of overflow drain piping, and for overflow ditches and culverts, all as indicated on the Plans and as specified.

ITEM NO. 25 - BELL BUTTE 2 MG STEEL STORAGE TANK

The lump sum price specified to be paid for Bell Butte 2 million gallon steel storage tank under Item No. 25 shall be compensation in full for all labor, equipment, plant, appliances, and materials for the furnishing, erecting, painting, and sterilizing of the 2 million gallon steel ground storage tank, and for the installation of approximately 150 feet of

overflow drain piping and chain link fence, all as indicated on the Plans and as specified. This item shall include the furnishing and installation of the butterfly valve, gate valves, check valve altitude control system, air receiver, compressor, and other hydraulic specialties, fittings, piping, thrust anchor, and all miscellaneous work incidental thereto.

ITEM NO. 26 - MISCELLANEOUS

The lump sum price specified to be paid for miscellaneous under Item No. 26 shall be compensation in full for anything indicated on the Plans, specified, or necessary to a complete job, but not specifically included for payment under any other item.

ITEMS NO. 27 TO NO. 30 INCLUSIVE - STEEL PIPE

The length of all steel pipe will be measured through the fittings but not through the valves for payment under the above items, except as modified herein. The 24-inch steel pipe to be installed between the new main on Broadway Road and the new 2 million gallon ground storage tank on Bell Butte and the 30-inch steel pipe to be installed at the river crossing on Scottsdale Road will be paid for under other items.

The unit price specified to be paid per lineal foot for steel pipe under Items No. 27 to No. 30 inclusive shall be compensation in full for excavating and backfilling trenches, for concrete kick blocks, for furnishing, handling, and installing the pipe in place, and for furnishing, handling, and installing in place any couplings, fittings, flanges, or adapters used to connect the steel pipe to valves and fittings.

ITEMS NO. 31 TO NO. 34 INCLUSIVE - CONCRETE STEEL CYLINDER PIPE

The length of all concrete steel cylinder pipe will be measured through the fittings but not through the valves for payment under the above items.

The unit prices specified to be paid per lineal foot for concrete steel cylinder pipe under Items No. 31 to No. 34 inclusive shall be compensation in full for excavating and backfilling trenches, for concrete kick blocks, for furnishing, handling, and installing the pipe in place, and for furnishing, handling, and installing in place any couplings, fittings, flanges, or adapters used to connect the concrete steel cylinder pipe to valves and fittings.

ITEMS NO. 35 AND NO. 36 - DUCTILE CAST IRON PIPE

The length of all ductile cast iron pipe will be measured through the fittings but not through the valves for payment under the above items.

The unit prices specified to be paid per lineal foot for ductile cast iron pipe under Items No. 35 and No. 36 shall be compensation in full for excavating and backfilling trenches, for concrete thrust blocks, and for furnishing, handling, and installing the pipe in place.

PROPOSAL

Place _____

Date _____

Proposal of _____
(Name)

a corporation organized and existing under the laws of the State of

_____ ; a partnership consisting of _____

(Names)

or an individual trading as _____
(Name)

TO THE HONORABLE MAYOR AND COUNCIL
CITY OF TEMPE
TEMPE, ARIZONA

GENTLEMEN:

The undersigned hereby proposes and agrees to furnish any and all required labor, material, construction equipment, transportation, and services for the construction of WATER WORKS IMPROVEMENTS, MAINS AND STORAGE TANKS, in strict conformity with the Plans and Specifications, for the following unit prices:

(Extension of these unit prices on the basis of estimated quantities and the totaling of these extensions are for the purpose of comparing bids only. The mathematics of such extensions and totaling will be checked and corrected by the Engineer before evaluating the bids, and the lowest of such corrected and checked totals will determine the lowest bid.)

BASE BID

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
1	2,700 LF	For 12-inch cast iron pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
2	10 LF	For 6-inch cast iron pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
3	920 LF	For 30-inch steel pipe for river crossing, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
4	550 LF	For 24-inch steel pipe, Broadway Road to new Bell Butte tank, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
5	1 Ea	For 36-inch butterfly valve, the sum of _____ Dollars and _____ Cents per each	_____	_____

BASE BID, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
6	5 Ea	For 30-inch butterfly valve, the sum of _____ Dollars and _____ Cents per each	_____	_____
7	3 Ea	For 24-inch butterfly valve, the sum of _____ Dollars and _____ Cents per each	_____	_____
8	3 Ea	For 16-inch butterfly valve, the sum of _____ Dollars and _____ Cents per each	_____	_____
9	7 Ea	For 12-inch gate valve, the sum of _____ Dollars and _____ Cents per each	_____	_____
10	3 Ea	For 8-inch gate valve, the sum of _____ Dollars and _____ Cents per each	_____	_____

BASE BID, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
11	8 Ea	For 6-inch gate valve, the sum of _____ Dollars and _____ Cents per each	_____	_____
12	1 Ea	For 4-inch gate valve (cutin on existing main), the sum of _____ Dollars and _____ Cents per each	_____	_____
13	2 Ea	For removing existing gate valves and cutin to existing mains, the sum of _____ Dollars and _____ Cents per each	_____	_____
14	3 Ea	For 5-inch V.O. fire hydrants, the sum of _____ Dollars and _____ Cents per each	_____	_____
15	16,000 Lb	For cast iron fittings, the sum of _____ Dollars and _____ Cents per pound	_____	_____

BASE BID, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
16	30 Ea	For connections to existing mains, the sum of _____ Dollars and _____ Cents per each	_____	_____
17	100 SY	For pavement replacement, Type A, the sum of _____ Dollars and _____ Cents per square yard	_____	_____
18	140 SY	For pavement replacement, Type B, the sum of _____ Dollars and _____ Cents per square yard	_____	_____
19	1,000 SF	For concrete sidewalk and con- crete driveway replacement, the sum of _____ Dollars and _____ Cents per square foot	_____	_____
20	1 LS	For alteration of existing butter- fly valve at the Papago Park tank, the sum of _____ Dollars and _____ Cents lump sum	_____	_____

BASE BID, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
21	1 LS	For new tank for booster pump station at well, the sum of _____ Dollars		
		and _____ Cents lump sum	_____	_____
22	1 LS	For booster pump and controls for booster pump station at well, the sum of _____ Dollars		
		and _____ Cents lump sum	_____	_____
23	1 LS	For booster pump station shelter, piping, meter, and chlorinator, the sum of _____ Dollars		
		and _____ Cents lump sum	_____	_____
24	1 LS	For Bell Butte tank foundation and access road, the sum of _____ Dollars		
		and _____ Cents lump sum	_____	_____
25	1 LS	For Bell Butte 2 mg steel storage tank, the sum of _____ Dollars		
		and _____ Cents lump sum	_____	_____

BASE BID, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
26	1 LS	For miscellaneous, the sum of _____ Dollars and _____ Cents lump sum	\$	\$
SUBTOTAL - Items No. 1 to No. 26 inclusive				
_____ Dollars				
and _____ Cents				
			\$	_____

STEEL PIPE ALTERNATE

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
27	90 LF	For 36-inch steel pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
28	5,860 LF	For 30-inch steel pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
29	1,840 LF	For 24-inch steel pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
30	1,380 LF	For 16-inch steel pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
		SUBTOTAL - Items No. 27 to No. 30 inclusive	_____	_____
		_____ Dollars		
		and _____ Cents		
			\$ _____	

STEEL PIPE ALTERNATE, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
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TOTAL -

Items No. 1 to No. 26 inclusive
(Base Bid) \$ _____

Items No. 27 to No. 30 inclusive _____

TOTAL STEEL PIPE ALTERNATE

_____ Dollars

and _____ Cents
\$ _____

CONCRETE STEEL CYLINDER PIPE ALTERNATE

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
31	90 LF	For 36-inch concrete steel cylinder pipe, the sum of _____ Dollars and _____ Cents per lineal foot		
32	5,860 LF	For 30-inch concrete steel cylinder pipe, the sum of _____ Dollars and _____ Cents per lineal foot		
33	1,840 LF	For 24-inch concrete steel cylinder pipe, the sum of _____ Dollars and _____ Cents per lineal foot		
34	1,380 LF	For 16-inch concrete steel cylinder pipe, the sum of _____ Dollars and _____ Cents per lineal foot		
		SUBTOTAL - Items No. 31 to No. 34 inclusive _____ Dollars and _____ Cents \$ _____		

CONCRETE STEEL CYLINDER PIPE ALTERNATE, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
TOTAL -				
Items No. 1 to No. 26 inclusive (Base Bid)			\$ _____	
Items No. 31 to No. 34 inclusive			_____	
TOTAL CONCRETE STEEL CYLINDER PIPE ALTERNATE				
_____			Dollars	
_____			Cents	
and _____			\$ _____	

DUCTILE CAST IRON PIPE ALTERNATE

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
			\$	\$
35	1,840 LF	For 24-inch ductile cast iron pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
36	1,380 LF	For 16-inch ductile cast iron pipe, the sum of _____ Dollars and _____ Cents per lineal foot	_____	_____
37	15,000 Lb	For additional cast iron fittings, the sum of _____ Dollars and _____ Cents per pound	_____	_____
		SUBTOTAL - Items No. 35, No 36, and No. 37	_____ Dollars and _____ Cents	\$ _____
		TOTAL -		
		Items No. 1 to No. 26 inclusive (Base Bid)	\$ _____	
		Items No. 27 and No. 28	_____	
		Items No. 35, No. 36, and No. 37	_____	

DUCTILE CAST IRON PIPE ALTERNATE, Continued

Item No.	Quantity	Item (Prices to be written in words)	Unit Price	Total
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TOTAL DUCTILE CAST IRON
PIPE ALTERNATE

_____ Dollars
and _____ Cents \$ _____

The Undersigned understands that the Contract will not necessarily be awarded on the basis of the lowest possible bid but on the basis of the lowest bid for the alternate which the City selects.

The Undersigned hereby declares that he has visited the site and has carefully examined the Contract Documents relating to the work covered by the above bid.

The Undersigned understands that any quantities stated or implied in the Specifications or elsewhere in the Contract Documents are approximate only and are subject to increase or decrease, and hereby proposes to perform all quantities of work as either increased or decreased, in accordance with the provisions of the Specifications, at the unit price bid in the Proposal schedules.

Upon receipt of notice of the acceptance of this bid, the Undersigned will execute the formal Contract attached within ten (10) days and will deliver a one hundred percent (100%) surety Bond for the Faithful Performance of this Contract, together with a fifty percent (50%) Labor and Material Bond.

The Bid Security attached, without endorsement, in the sum of ten percent (10%) of the total bid is to become the property of the City of Tempe, Arizona, in the event the Contract and Bonds are not executed within the time set forth, as liquidated damages for the delay and additional work caused thereby.

The Undersigned has checked carefully all the above figures and understands that the City of Tempe, Arizona, will not be responsible for any errors or omissions on the part of the Undersigned in making up this bid.

The Undersigned understands that the City of Tempe, Arizona, reserves the right to accept or to reject any or all bids and to waive informalities.

Respectfully submitted,

Contractor

By _____

Title _____

SEAL - If Bidder a Corporation

Complete Business Address

Arizona Contractor's
Classification and License No.

Bidder shall signify here receipt of all Addenda (if any):

Addenda No. _____

CONTRACT

THIS AGREEMENT, made and entered into this _____ day of _____, 1964, by and between the City of Tempe, Arizona, a municipal corporation, organized and existing under and by virtue of the laws of the State of Arizona, party of the first part, hereinafter designated the "Owner," and _____

_____ of the City of _____, County of _____ and State of _____, party of the second part, hereinafter designated the "Contractor."

WITNESSETH: That the said Contractor has covenanted, contracted, and agreed and by these presents does covenant, contract, and agree with the said Owner, for and in consideration of the payments made as provided for herein, to the Contractor by the said Owner, and under the penalty expressed in the Bond hereto attached, at his proper cost and expense to do all the work and furnish all materials, tools, labor, and all appliances and appurtenances called for by the Agreement, free from all claims, liens, and charges whatsoever, in the manner and under the conditions hereinafter specified, that are necessary for the construction of

(Fill in alternate selected)

of WATER WORKS IMPROVEMENTS, MAINS AND STORAGE TANKS, in the City of Tempe, County of Maricopa, and State of Arizona.

The work done and materials and equipment furnished shall be strictly pursuant to and in conformity with the Specifications and Plans. The specifications and drawings furnished by the Contractor with his proposal and the additional drawings or prints and other information to be furnished by the Contractor in accordance with the Specifications are made a part of this Agreement when and as approved by the Engineer. The said Specifications and Plans prepared by JOHN CAROLLO ENGINEERS, for the said City of Tempe, Arizona, are intended to be complementary, and all specifications, plans, drawings, or prints furnished by the Contractor and approved by the Engineer shall be complementary therewith. Any work appearing in or upon the one and not mentioned in

the others shall be executed according to the true intent and meaning of the said Specifications and Plans, Drawings, or Prints, the same as though the said work was contained and described in all.

The "Notice to Contractors," "Information for Bidders," "General Conditions," "Specifications," "Proposal," "Bid Bond," "Labor and Material Bond," "Performance Bond," "Plans," and "Addenda" thereto are hereby understood to be a part of this Contract.

It is further covenanted and agreed that the work shall be executed under the direction and supervision of the Engineer of the City of Tempe, Arizona, or his properly authorized agents, by whose calculations the quantities and amounts of the work performed under this Contract shall be determined and on whose inspection all work shall be accepted or rejected. The said Engineer shall have full power to reject or condemn all materials furnished or work performed under this Contract which do not conform to the terms and conditions herein expressed.

To prevent all disputes and litigation, it is further agreed by and between the said City of Tempe, Arizona, and said Contractor that said Engineer shall determine all questions in relation to the work and the construction thereof, and he shall in all cases decide all questions which may arise relative to the execution of the work under this Contract on the part of the said Contractor, and his estimates and decision shall be final and conclusive; and such estimates and decisions, in case any question may arise, shall be a condition precedent to the right of said Contractor to receive any money or compensation for anything done or furnished under this Contract.

IN WITNESS WHEREOF, two (2) identical counterparts of this Contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the date and year first herein written.

CITY OF TEMPE, ARIZONA
Party of the First Part (Owner)

ATTEST:

City Clerk

By _____
Mayor

Party of the Second Part
(Contractor)

By _____

Official Title

Witnesses

Approved:

City Attorney

PERFORMANCE BOND
(100% of the Contract Price)

KNOW ALL MEN BY THESE PRESENTS: That

WHEREAS, the City of Tempe, Arizona, by Resolution No. _____,
passed _____, 1964, has awarded to _____

hereinafter designated as the "Principal," a Contract for constructing
WATER WORKS IMPROVEMENTS, MAINS AND STORAGE TANKS; and

WHEREAS, said Principal is required under the terms of said
Contract to furnish a bond for the faithful performance of said Contract,

NOW, THEREFORE, we, the Principal, and _____
_____, as Surety, are held and firmly bound
unto the City of Tempe, Arizona, hereinafter called the Obligee, in the
penal sum of _____

_____ Dollars and _____ Cents

(\$ _____), lawful money of the United States, for the pay-
ment of which sum well and truly made, we bind ourselves, our heirs,
executors, administrators, and successors, jointly and severally, firmly
by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the
above bounded Principal, his or its heirs, executors, administrators,
successors, or assigns, shall in all things stand to and abide by, and
well and truly keep and perform the covenants, conditions, and agree-
ments in the said Contract and any alteration thereof made as therein
provided, on his or their part, to be kept and performed at the time and
in the manner therein specified, and in all respects according to their
true intent and meaning, and shall indemnify and save harmless the
Obligee, its officers and agents, as therein stipulated, then this obliga-
tion shall become null and void; otherwise it shall be and remain in full
force and virtue.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the Specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety named,

on the _____ day of _____, 1964.

Principal

By _____

Surety

By _____

LABOR AND MATERIAL BOND
(50% of the Contract Price)

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ as Principal, and _____

as Surety, are held and firmly bound unto the City of Tempe, Arizona, (hereinafter called the Obligee) in the penal sum of

_____ Dollars and _____ Cents

(\$ _____) lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representative, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has entered into a certain Contract with said Obligee, dated _____, 1964 (hereinafter called the "Contract") for constructing WATER WORKS IMPROVEMENTS, MAINS AND STORAGE TANKS, which Contract shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, the condition of this obligation is such that if said Principal and all subcontractors to whom any portion of the work provided for in said Contract is sublet and all assignees of said Principal and of such subcontractors shall promptly make payment for all labor performed and services rendered and materials furnished in the prosecution of the work provided for in said Contract, or in any amendment or extension of or addition to said Contract, then the above obligation shall be void; otherwise to remain in full force and effect; PROVIDED, HOWEVER, that this Bond is subject to the following conditions and limitations:

(a) All persons who have performed labor or rendered services or furnished materials as aforesaid shall have a direct right of action against the Principal and Surety on this Bond, which right of action shall be asserted in proceedings instituted in the state in which such labor was performed or services rendered or materials furnished (or, where labor has been performed or services rendered or materials furnished under said Contract in more than one state, then in any such state). Insofar

as permitted by the laws of such state, such right of action shall be asserted in a proceeding instituted in the name of the Obligee to the use and benefit of the person instituting such action and of all other persons having claims hereunder and any other person having a claim hereunder shall have the right to be made a part to such proceedings (but not later than nine (9) months after the complete performance of said Contract and final settlement thereof) and to have such claim adjudicated in said action and judgment rendered thereon.

(b) The Surety shall not be liable hereunder for any damages or compensation recoverable under any workmen's compensation or employer's liability statute.

(c) In no event shall the Surety be liable for a greater sum than the penalty of this Bond, or subject to any suit, action, or proceeding thereon that is instituted later than nine (9) months after the complete performance of said Contract and final settlement thereof, and the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or the work or to the Specifications.

SIGNED, SEALED, AND DELIVERED IN IDENTICAL COUNTER-PARTS, this _____ day of _____, 1964.

Principal

By _____

Surety

By _____

