

Pittsburg County, Oklahoma
COUNTY PURCHASING OFFICE
Pittsburg County Court House
McAlester, Oklahoma
Phone: (918) 423-4934

INVITATION TO BID

PLEASE REVIEW TERMS AND CONDITIONS ON REVERSE
SIDE RELATING TO SUBMISSION OF THIS BID.

Notarized Affidavit completions and signature required on reverse side.

DATE ISSUED

23-Aug-21

PAGE 1 OF

BID NUMBER

BID # 3

BID CLOSING DATE AND HOUR

September 17th, 2021 @ 5:00PM

REQUIRED DELIVERY DATE

Days after award of Purchase Order

TERMS:

DATE OF DELIVERY:

Item	Quantity	Unit of issue	DESCRIPTION	Unit Price	Total
			<p>Board of County Commissioners wish to re-advertise for the following:</p> <p>the Swinging Bridge Project, located 0.25 miles south of Savage Road, Job Piece No. 32927(04) in District 2:</p> <p>See Specifications Attached</p> <p><u>PLEASE MARK CLEARLY ON FRONT OF SHIPPING ENVELOPE BID & BID NUMBER</u></p>		

TERMS AND CONDITIONS

1. Sealed bids will be opened in the Commissioner's Conference Room, Pittsburg County Courthouse, McAlester, Oklahoma, at the time and date shown on the invitation to bid form.
2. Late bids will not be considered. Bids must be received in sealed envelopes (one to an envelope) with bid number and closing date written on the outside of the envelope.
3. Unit prices will be guaranteed correct by the bidder.
4. Firm prices will be F.O.B. destination.
5. Purchases by Pittsburg County, Oklahoma, are not subject to state or federal taxes.
6. This bid is submitted as a legal offer and any bid when accepted by the County constitutes a firm contract.
7. Oklahoma laws require each bidder submitting a bid to a county for goods or services to furnish a notarized sworn statement of non-collusion. A form is supplied below.
8. Bids will be firm until delivered.

(DATE)

6.1291E+19

AFFIDAVIT: I, the undersigned, of lawful age, being first duly sworn on oath say that he (she) is the agent authorized by the bidder to submit the above bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any state official or employee as to quantity; quality or price in the prospective contract or any other terms of said prospective contract; or in any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract; that the bidder/contractor has not paid, given or donated or agreed to pay, give or donate to any officer or employee of the State of Oklahoma (or other entity) any money or other thing of value, either directly or indirectly in the procuring of the award of a contract pursuant to this bid.

Subscribed and sworn before this _____ day
of _____ 20_____ (seal)

Firm: _____

My commission expires _____ Signed by: _____ Title: _____

(MANUAL SIGNATURE OF UNDERSIGNED)

NOTARY PUBLIC (CLERK OR JUDGE)

Address: _____ Phone: _____

City: _____ State _____

Zip _____

NOTE: Other terms and conditions can be added at the discretion of the county officers.

RESOLUTION

22-032

To Advertise

The Board of County Commissioners, Pittsburg County, met in regular session on Monday, August 23, 2021.

WHEREAS, the Board of County Commissioners wish to re-advertise for the following:

the Swinging Bridge Project, located 0.25 miles south of Savage Road,
Job Piece No. 32927(04) in District 2:

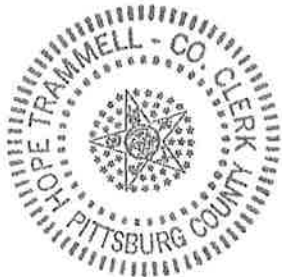
A bid package containing complete specifications and an "Invitation to Bid" are available at the Pittsburg County Clerk's Office, 115 E. Carl Albert Pkwy, Room 103, McAlester, Oklahoma 74501 or online at pittsburg.okcounties.org.

THEREFORE, each competitive bid submitted to the County must be accompanied with an affidavit for filing with the competitive bid form, as required by 19 O.S. § 421.1(C).

Sealed bids will be received and filed with the Pittsburg County Clerk until Friday, September 17, 2021 at 5:00 p.m. All bids received after 3:00 p.m. on Friday, September 17, 2021 WILL NOT BE OPENED. Bids will be opened on Monday, September 20, 2021 at 10:00 a.m. in the Board of County Commissioners Conference Room, 115 E. Carl Albert Pkwy, McAlester, Oklahoma. The Board of County Commissioners, Pittsburg County, reserves the right to reject any and all bids and re-advertise.

BOARD OF COUNTY COMMISSIONERS
PITTSBURG COUNTY, OKLAHOMA

ATTEST:



CHAIRMAN

Ron Selinger

VICE CHAIRMAN

[Signature]

MEMBER

[Signature]

COUNTY CLERK

JoPe Trammell

**CONTRACT AND SPECIFICATIONS
FOR THE**

**SWINGING BRIDGE WATER MAIN
RELOCATION**

to serve the users of

**SARDIS LAKE WATER AUTHORITY
PITTSBURG COUNTY, OKLAHOMA**

For

**THE
SARDIS LAKE WATER AUTHORITY
&
PITTSBURG COUNTY, OKLAHOMA**

MAY 2021

**BY
VAUGHN ENGINEERING, LLC
4100 SILVER CREEK ROAD
FORT WORTH, TEXAS 76108**

PROJECT #21192



TABLE of C O N T E N T S

<u>TITLE</u>	<u>PAGES</u>
DIVISION A Advertisement for Bids	
Advertisement for Bids	1/1
Addenda	1/1
Information For Bidders	1/3
DIVISION B Bidder's Proposal	
Bidder's Proposal	1/3
Schedule of Bids	1/2
Business Relationships Affidavit	1/1
Noncollusion Affidavit	1/1
Bid Bond	1/2
DIVISION C Contract Agreement	
Contract Agreement	1/4
Performance Bond	1/2
Statutory Bond - Use of Trusts, Authorities, RWD's	1/1
Maintenance Bond	1/2
Insurance Requirements	1/1
Certificate of Insurance	1/1
State of Oklahoma Hold Harmless Clause	1/1
Notice of Award	1/1
Notice to Proceed	1/1
DIVISION GC General Conditions	
General Conditions	1/20
Enumeration of Plans and Specifications	1/2
Special Conditions	1/1
Special Conditions Pertaining to Hazards, Safety Standards and Accident Prevention	1/1
General Provisions	1/7
DIVISION GS General Specifications	
Water Main Installation	GS-1-1/29
Cast-In-Place Concrete	GS-5-1/21
Crushed Stone Base Course	GS-6-1/3
Gravel Base Course	GS-7-1/3
DIVISION DS Detailed Specifications	
Detailed Specifications	DS - 1/ 19
APPENDIX	
Release of Claimants	



ADVERTISEMENT FOR BIDS

Advertisement for Bids
Addenda
Information for Bidders

ADVERTISEMENT FOR BIDS

Sardis Lake Water Authority c/o Pittsburg County, Oklahoma

Owner

P.O. Box 430 / 115 East Carl Albert Pkwy

Address

Clayton, Oklahoma 74536 / McAlester, Oklahoma 74501

Separate sealed BIDS for the construction of: **Swinging Bridge Water Main Relocation**

1,700 L.F. of 3" Water Main and Appurtenances

10 L.F. of 2" Water Main and Appurtenances

will be received by Pittsburg County Commissioners at the meeting place of The County Commission, 115 East Carl Albert Pkwy, McAlester, Oklahoma, until **3:00 p.m.**, C.S.T. on **September 17th**, 2021, and then at said office publicly opened and read aloud at the County Commissioner's Meeting on September 20, 2021 at 10:00 a.m., C.S.T.

The CONTRACT DOCUMENTS may be examined at the following locations:

Office of the County Commissioners

Southwest Construction News Service; 3616 NW 58th St., Oklahoma City, OK 73112

Electronic copies of the CONTRACT DOCUMENTS may be obtained at the Office of the Engineer by sending a requesting email to office@vaughneng.com. There is no deposit required for electronic copies. Each Bidder shall deposit with his bid, security in the amount for and subject to the conditions stated in the Information for Bidders.

The Owner reserves the right to waive any informalities or to reject any or all bids.

No bidder may withdraw his bid within thirty days after the actual date of the opening thereof.

August 26th, 2021

DATE

Ross Selman

Presiding Commissioner

(RESERVED FOR ADDENDA)

INFORMATION FOR BIDDERS

BIDS will be received by Pittsburg County Commissioners and Sardis Lake Water Authority herein called the ("Owner"), at office of The County Commission, 115 East Carl Albert Pkwy, McAlester, Oklahoma 74501 until 3:00 P.M., local time on September 17th, 2021 and then at said location, publicly opened and read aloud at the County Commissioner's Meeting on September 20th, 2021 at 10:00 a.m. C.S.T.

Each BID must be submitted in a sealed envelope, addressed to:

Pittsburg County Commissioners / Sardis Lake Water Authority
115 East Carl Albert Pkwy
McAlester, Oklahoma 74501

Each sealed envelope containing a BID must be plainly marked on the outside as BID for:

Swinging Bridge Water Main Relocation

and outside of the envelope shall bear the BIDDER'S name, address, license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at:

Pittsburg County Commissioners / Sardis Lake Water Authority
115 East Carl Albert Pkwy
McAlester, Oklahoma 74501

ALL BIDS shall be stated on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The Owner may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above-scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the bidders.

The Owner may make such investigations as deemed necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by or investigation of such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the agreement and to complete the work contemplated therein.

BIDDERS shall satisfy themselves of the accuracy of the estimated quantities in the BID SCHEDULE by examination of the site and a review of the drawings and specifications including

ADDENDA. After BIDS have been submitted, the BIDDER shall not declare that there was a misunderstanding concerning the nature of the WORK to be done or the quantities of WORK.

Prior to bidding, the Owner shall provide bidders with all information that is pertinent to and delineates and describes the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the CONTRACTOR from fulfilling any of the conditions of the CONTRACT.

Each BID must be accompanied by a BID bond payable to the OWNER for five (5) percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three (3) lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PERFORMANCE and PAYMENT BOND have been executed and approved, after which it can be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND, MAINTENANCE BOND and a PAYMENT/STATUTORY BOND, each in the amount of 100 percent of the contract price and each with a corporate surety approved by the Owner, will be required for the faithful performance of the contract. An escrow bond or qualified bond is not acceptable.

Attorneys-in-fact who sign bid bonds are payment bonds, maintenance bonds and performance bonds must file with each bond a certified copy of their Power of Attorney bearing the effective date.

The party to whom the contract is awarded will be required to execute the agreement and obtain the performance bond, maintenance bond and statutory bond within ten (10) calendar days from the date when Notice of Award is delivered to the bidder. The Notice of Award shall be accompanied by the necessary agreement and bond forms. In case of failure of the bidder to execute the agreement, the Owner may consider the bidder in default, in which case the bid bond accompanying the proposal shall become the property of the Owner.

The Owner, within ten (10) days of receipt of acceptable performance bond, maintenance bond, statutory bond and agreement signed by the party to whom the agreement was awarded, shall sign the agreement and return to such party an executed duplicate of the agreement. Should the Owner not execute the agreement within such period, the bidder may, by written notice, withdraw the signed agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The Notice to Proceed shall be issued within ten (10) days of the execution of the agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and contractor. If the Notice to Proceed has not been issued within the ten-day period or within the period mutually agreed upon, the contractor may terminate the agreement without further liability on the part of either party.

A condition or qualified bid will not be accepted. Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply throughout the contract.

Each bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the contract documents. The failure or omission of any bidder to do any of the foregoing shall in no way relieve any bidder from any obligation with respect to its bid.

When alternate bids are taken, they will be listed in numerical order with the highest priority being number one, second priority being number two, etc.

When alternates are used, the low bidders will be selected by the lowest and best bid, considering all bids, which include the selected alternate bids.

The alternates will be listed in consecutive priority order to remain within the funds available for the project.

The low bidder shall supply the names and addresses of major material suppliers and subcontractors when required to do so by the Owner.

Inspection trips for prospective bidders will leave from the office of the

Will not be conducted

The engineer is Vaughn Engineering, Greg A. Vaughn, P.E.,

Address: 4100 Silver Creek Road, Fort Worth, Texas 76108 (817) 975-1367.

Email Address: office@vaughneng.com.

SPECIAL NOTE TO BIDDERS:

As a part of the bid on this project, the successful bidder will be required to meet all requirements of the Underground Facilities Damage Prevention Act when engaged in work within the public right-of-way in the same manner as in private right-of-way.

Contractor shall comply with the BUY AMERICA requirements of the Federal Regulations (23 U.S.C. 313 and 23 CFR 635.410). The Contractor shall provide to the Utility Owner a completed **“Certificate of Materials Origin”** form for each steel or iron product incorporated into the project.

B

BIDDER'S PROPOSAL

Bidder's Proposal
Schedule of Bids
Business Relationship Affidavit
Noncollusion Affidavit
Bid Bond

BIDDER'S PROPOSAL
For The
SWINGING BRIDGE WATER MAIN RELOCATION
To serve
THE SARDIS LAKE WATER AUTHORITY
PITTSBURG COUNTY, OKLAHOMA

Pittsburg County, Oklahoma
Water Distribution
Sardis Lake Water Authority

PLACE: Pittsburg County Commissioner's Office
DATE: Due Sep. 17th / Opened Sep. 20th, 2021

Proposal of _____

(hereinafter called "Bidder"), organized and existing under the laws of the State of _____

, doing business as _____*, to The

Pittsburg County Commissioners, Pittsburg County, Oklahoma (hereinafter called "Owner").

In compliance with your Advertisement for Bids, Bidder hereby proposes to perform all work for the construction of **Swinging Bridge Water Main Relocation** in strict accordance with the contract documents within the time set forth therein and at the listed at the unit prices shown for each bid item on the following Schedule of Bids. (The Schedule of Bids attached lists the various divisions of construction contemplated in the Plans and Specifications, together with an estimate of the units of each. With these units as the basis, the bidder will extend each item, using the cost he inserts in the unit column. Any total cost found inconsistent with the unit cost when the bids are examined will be deemed in error and corrected to agree with the unit cost which shall be considered correct.)

By submission of this bid, each Bidder certifies and stipulates that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same work, and that it is made in pursuance of and subject to all the terms and conditions of the Information for Bidders, the Contract Agreement, General Conditions, Supplemental General Conditions, Special Conditions, Federal Requirements, General Specifications, the Detailed Specifications, and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.

The unit prices must be specified in both words and figures, e.g. \$100.00, one hundred dollars. In case of discrepancy, the amount shown in words will govern.

* Insert "a corporation", "a partnership" or "an individual", as applicable.

Accompanying this proposal is a certified check or standard bid bond in the sum of _____
** dollars
(\$_____) in accordance with the Information for Bidders.

The undersigned bidder agrees to execute the Agreement and a performance bond and a payment bond for the amount of the total of this bid within 10 calendar days from the date when the written notice of the award of the contract is delivered to him at the address given on this proposal. The bid security attached in the sum of \$_____ is to become the property of the Owner in the event the contract and bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby. The name and address of the corporate surety with which the Bidder proposes to furnish the specified performance bond and payment bond is as follows:

The undersigned bidder agrees to abide by the requirements of Executive Order No. 11246, as amended. He agrees to execute the Equal Opportunity Clause as part of the Construction Contract. If the proposed contract is for \$50,000 or more and the bidder has 50 or more employees, he further agrees to develop a written affirmative action compliance program and, if he has 100 or more employees, to file the report required after the contract award.

All the various phases of work enumerated in the Detailed Specifications with their individual jobs and overhead, whether specifically mentioned or included by implication or appurtenant thereto, are to be performed by the Contractor under one of the items listed in the Schedule of Bids, irrespective of whether or not it is named in said list.

Payment for work performed will be in accordance with the Schedule of Bids subject to changes as provided for in the Construction Agreement.

The Contractor acknowledges the following addenda to the plans and specifications:

No. _____, dated _____

No. _____, dated _____

Award will be made to the lowest responsive responsible BIDDER.

Unbalanced bidding to increase early construction payments on the basis of percent completion of large cost items is not acceptable.

Contractor shall comply with the BUY AMERICA requirements of the Federal Regulations (23 U.S.C. 313 and 23 CFR 635.410. The Contractor shall provide to the Utility Owner a completed **"Certificate of Materials Origin"** form for each steel or iron product incorporated into the project.

** 5% amount bid

The Bidder hereby agrees to commence work under this contract within 10 days after receiving a Notice to Proceed from the Board and to Substantially complete all work within 60 consecutive calendar days thereafter as stipulated in the specifications. If the Contractor shall fail to complete the work within the Contract Time, or extension of time granted by OWNER, then the Contractor will pay the OWNER the amount of liquidated damages in the amount of \$200.00 for each calendar day that the Contractor shall be in default after the time stipulated in the contract documents. The bidder shall also have all work completed and ready for final payment in accordance with the General Conditions within 15 calendar days after the date of Substantial Completion. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in the above paragraph for completion and readiness for final payment or any extension granted by OWNER, CONTRACTOR shall pay OWNER \$100.00 for each calendar day that expires after the time specified in the above paragraph for completion of all work and readiness for final payment.

The Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding. The Bidder also agrees that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the bid opening.

NOTE: Bids shall include sales tax and all other applicable taxes and fees.

(Contractor)

BY: _____

(Title)

Employer I.D. Number

(Business Address)

Telephone Number

Date

ATTEST:

Secretary/Witness

SCHEDULE OF BIDS
Swinging Bridge Water Main Relocation
Sardis Lake Water Authority
Pittsburg County, Oklahoma

Item #	Estimated Quantity	Description and Price in Words	Unit Price Each*	Total*
1.	Lump Sum	Bonding, Mobilization, and Stormwater Pollution Prevention Plan Implementation furnished and completed for _____ Dollars and _____ cents.		
2.	1,000 L.F.	3" DR 11, Polyethylene Pipe, Water Main with Tracer Wire installed by open-cut for _____ Dollars and _____ cents per lineal foot.		
3.	700 L.F.	3" DR 11, Polyethylene Pipe, Water Main with Tracer Wire installed by directional bore for _____ Dollars and _____ cents per lineal foot.		
4.	10 L.F.	2" PVC, Class 250, Water Main with Tracer Wire installed for _____ Dollars and _____ cents per lineal foot.		
5.	1 EA.	2" Gate Valve with Valve Box and marker furnished and installed for _____ Dollars and _____ cents each.		
6.	1 EA.	2" Blow-off Valve Assembly furnished and installed for _____ Dollars and _____ cents each.		
7.	200 LB.	Ductile Iron Fittings with all accessories furnished and installed for _____ Dollars and _____ cents per pound.		
8.	1 EA.	6" X 3" Tapping Sleeve, 3" Gate Valve and Valve Box furnished and installed for _____ Dollars and _____ cents each.		
9.	50 L.F.	3" Encased County Road Crossing installed for _____ Dollars and _____ cents per lineal foot.		
10.	1 EA.	Connection to Existing Main furnished and installed for _____ Dollars and _____ cents each.		

BIDDER'S NAME: _____

SCHEDULE OF BIDS
Swinging Bridge Water Main Relocation
Sardis Lake Water Authority
Pittsburg County, Oklahoma

Item #	Estimated Quantity	Description and Price in Words	Unit Price Each*	Total*
11.	10 EA.	2" Cut and Cap Existing Main furnished and installed for _____ Dollars and _____ cents each.		
12.	100 L.F.	Bedding Material furnished and installed for _____ Dollars and _____ cents per lineal foot.		
13.	5 C.Y.	Rock Excavation completed for _____ Dollars and _____ cents per cubic yard.		
14.	1 L.S.	Provide a 500-Foot, 2" DR-11, Polyethylene Pipe for a temporary water main furnished, sterilized and connected; then after completion of construction, salvaged to the Sardis Lake Water Authority; furnished, installed and salvaged for _____ Dollars and _____ cents.		

* The unit prices and total price must be specified in both words and figures, e.g., \$100.00, one-hundred dollars. In case of discrepancy, the amount shown in words will govern.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the complete project.

TOTAL AMOUNT BASE BID\$ _____.

BID ADJUSTMENT ITEM (Addition) or (Deduction)\$ _____.

TOTAL AMOUNT BASE BID\$ _____.

To allow the Contractor to make last minute adjustments to the Schedule of Bids, the "Bid Adjustment Item" is provided for lump sum changes after the Schedule of Bids has otherwise been completed. The BIDDER shall clearly state whether the "Bid Adjustment Item" is an addition or a deduction. Once the bids are opened, the apparent low bidder shall file with the Owner a distribution of the addition or deletion item into the appropriate bid items within 24 hours of the Bid Opening.

BIDDER'S NAME: _____

BUSINESS RELATIONSHIPS AFFIDAVIT

STATE OF OKLAHOMA

)

) ss.

COUNTY OF _____)

_____, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached bid.

Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the architect, engineer, or other party to the project is as follows:

Affiant further states that any such business relationship presently in effect or which existed within (1) year prior to the date of this statement between any officer or director of the bidding company and any officer or director of the architectural or engineering firm or other party to the project is as follows:

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

(If none of the business relationships hereinabove mentioned exist, affiant should so state)

Subscribed and sworn to before me this _____ day of _____, 2021.

Notary Public

My Commission Expires

Note: This form is to be submitted with the BID.

NONCOLLUSION AFFIDAVIT

STATE OF OKLAHOMA)
) ss.
COUNTY OF _____)

_____, of lawful age, being first
duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached
bid. Affiant further states that the bidder has not been a party to any collusion among bidders in
restraint of freedom of competition by agreement to bid at a fixed price or to refrain from
bidding; or with any state official or employee as to quantity, quality or price in the prospective
contract, or any other terms of said prospective contract, or in any discussions between bidders
and any state official concerning exchange of money or other thing of value for special
consideration in the letting of a contract.

SUBSCRIBED AND SWORN to before me this _____ day of _____, 2021.

Notary Public

My Commission Expires:

The review of this affidavit will be made no later than the review and approval of the completed
contract documents.

NOTE: This form is to be submitted with the BID.

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal,
and _____ as Surety,
are hereby held and firmly bound unto The Pittsburg County Commissioners, Pittsburg County,
Oklahoma, as Owner, in the penal sum of _____

for the payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this _____ day of _____, 20____.

The condition of the above obligation is such that whereas the Principal has submitted to _____
_____ a certain Bid, attached hereto and hereby made a
part hereof to enter into a contract in writing, for the _____

Swinging Bridge Water Main Relocation

NOW, THEREFORE.

- A. If said Bid shall be rejected, or in the alternate,
- B. If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract specified (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Surety

Surety's Agent

Principal

Seal

Note: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570, as amended) as authorized to transact business in Oklahoma and have underwriting authority in an amount equal to or greater than the bid amount.

C

CONTRACT AGREEMENT

Contract Agreement
Performance Bond
Statutory Bond (Use of Trusts, Authorities, RWD's)
Maintenance Bond
Insurance Requirements
Certificate of Insurance
State of Oklahoma Hold Harmless Clause
Notice of Award
Notice to Proceed

CONTRACT AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 2021, by and between The Pittsburg County Commissioners, Pittsburg County, Oklahoma hereinafter called "OWNER" and _____ doing business as a (corporation, L.L.C., partnership or individual) of _____, County of _____, State of _____ hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned, to be made and performed by the OWNER:

1. The CONTRACTOR will commence and complete the construction of

Swinging Bridge Water Main Relocation

Pittsburg County, Oklahoma

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" of the OWNER and to fully complete the project as follows:
The Work will be substantially completed within **60** calendar days after the date when the Contract Completion Time commences to run as provided in the General Conditions, and all work completed and ready for final payment in accordance with the General Conditions within **15** calendar days after the date of Substantial Completion.

4. *Liquidated Damages.* OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in the paragraph above, plus any extensions allowed in accordance with the General Conditions. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER two hundred dollars (**\$200.00**) for each calendar day that expires after the time specified in the above paragraph for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in the above paragraph for completion and readiness for final payment or any extension granted by OWNER, CONTRACTOR shall pay OWNER one hundred dollars (**\$100.00**) for each calendar day that expires after the time specified in the above paragraph for completion of all work and readiness for final payment.

5. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of _____, \$ _____ or as shown in the Bid Schedule for the Base Bid.

6. The term "CONTRACT DOCUMENTS" means and includes the following:

- | | |
|--------------------------------------|-------------------------------|
| (A) Advertisement For Bids, | (B) Information For Bidders, |
| (C) Bidder's Proposal, | (D) Schedule of Bids, |
| (E) Business Relationships Affidavit | (F) Noncollusion Affidavit |
| (G) Claim for Invoice Affidavit, | (H) Bid Bond, |
| (I) Insurance Requirements, | (J) General Conditions, |
| (K) Special Conditions, | (L) General Provisions, |
| (M) Statutory Bond, | (N) Performance Bond, |
| (O) Maintenance Bond, | (P) Certificate of Insurance, |

(Q) Notice of Award,
(S) Change Orders,

(R) Notice to Proceed,
(T) Other Regulatory Requirements,

(U) DRAWINGS prepared by Vaughn Engineering numbered 1 through 5, and dated May 2021,

(V) SPECIFICATIONS prepared or issued by Vaughn Engineering, dated May 2021,

(W) ADDENDA:

No. _____, dated _____, 2021,

No. _____, dated _____, 2021,

(X) OTHER ATTACHMENTS

7. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

8. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

9. Contractor shall comply with the Underground Facilities Damage Prevention Act (63 O.S. 42.1 et seq.).

10. Contractor shall comply with the BUY AMERICA requirements of the Federal Regulations (23 U.S.C. 313 and 23 CFR 635.410. The Contractor shall provide to the Utility Owner a completed **“Certificate of Materials Origin”** form for each steel or iron product incorporated into the project.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in six (6) copies each of which shall be deemed an original on the date first above written.

OWNER: Sardis Lake Water Authority c/o Pittsburg County Commissioners, Pittsburg Co., Oklahoma

BY:_____

Name: Ross Selman

(SEAL)

Title: Presiding Commissioner

ATTEST:

Name: Hope Trammell

Title: County Clerk

CONTRACTOR:

BY:_____

(SEAL)

Name:_____

ATTEST:

(Please Type)

Title:_____

Name:_____

(Please Type)

Address:_____

Title:_____

PERFORMANCE BOND

_____, as Principal, and _____
_____, a corporation organized under the laws of the State of _____, as surety, are held and firmly
bound unto The Pittsburg County Commissioners, Pittsburg County, Oklahoma, in the penal sum
of _____ Dollars (\$_____), in lawful money of
the United States of America, for the payment of which, well and truly to be made, we bind ourselves and
each of us, our heirs, executors, administrators, trustees, successors and assigns, jointly and severally,
firmly by these presents.

The condition of this obligation is such that, whereas said Principal entered into a written contract
with The Pittsburg County Commissioners, Pittsburg County, Oklahoma, dated _____,
2021, for Swinging Bridge Water Main Relocation, all in compliance with the plans and specifications
therefor, made a part of said contract and on file in the office of The Sardis Lake Water Authority,
161552 Highway 2 North, Clayton, Oklahoma 74536.

(Name and Address of Agency)

NOW, THEREFORE, if said Principal shall, in all particulars, well, truly and faithfully perform
and abide by said contract and each and every covenant, condition and part thereof and shall fulfill all
obligations resting upon said Principal by the terms of said contract and said specifications and if said
Principal shall protect and save harmless said Pittsburg County, Pushmataha County Commissioners
and Sardis Lake Water Authority from any pecuniary loss resulting from the breach of any of the
items, covenants and conditions of said contract resting upon said Principal, then this obligation shall be
null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in
said contract and no deviations from the plan or mode of procedures herein fixed shall have the effect of
releasing the sureties, or any of them, from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly-authorized officers and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its Attorney-In-Fact, duly authorized to do so, the day and year set forth below.

Dated this _____ day of _____, 2021.

PRINCIPAL:

By:_____

ATTEST:

SURETY:

By:_____
Attorney-In-Fact

STATUTORY BOND

No. _____

We, _____, as Principal, and _____
_____, a corporation organized under the laws of the State of _____, as
Surety, are held and firmly bound unto the State of Oklahoma in the amount of _____
_____ Dollars (\$ _____)

) for the payment of which we hereby bind ourselves, our heirs, executors, administrators and assigns,
jointly and severally, firmly by these presents.

Dated this _____ day of _____, 2021.

WHEREAS, the said _____
did on _____ enter into a certain contract
with The Pittsburg County Commissioners, Pittsburg County, Oklahoma for the construction of
Swinging Bridge Water Main Relocation ;

AND WHEREAS, this bond is given in compliance with Oklahoma Statutes Annotated, 194, Title
61, Sections 1 and 2, as amended;

NOW, THEREFORE, the condition of the above obligation is such that, if the Principal shall pay
all indebtedness incurred for labor, materials or rental of machinery or equipment furnished in the
construction of said public building or in making said public improvements, then this obligation shall be
void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF we have hereunto set our hands and seals the day and year first above
written.

By: _____
Bonding Company

ATTEST (If by corporation)

By: _____
Attorney

MAINTENANCE BOND
(Defect Bond)

_____, as Principal, and _____
, a corporation organized under the laws of the State of _____ and
authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound unto _____
The Pittsburg County Commissioners, Pittsburg Co., Oklahoma and The Sardis Lake Water Authority,
(City, Town or Trust Authority)

in the penal sum of _____
Dollars (\$_____) in lawful money of the United States of America, said
sum being equal to one hundred percent (100%) of the contract price, for payment of which, well and
truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees,
successors and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that, whereas said Principal entered into a written contract
with _____ The Pittsburg County Commissioners, Pittsburg County, Oklahoma
(City, Town or Trust)
dated _____, 2021, for _____

_____ Swinging Bridge Water Main Relocation
all in compliance with the plans and specifications therefor, made a part of said contract and on file in the
office of _____ The Pittsburg County Commissioners / The Sardis Lake Water Authority ;

NOW, THEREFORE, if said Principal shall pay or cause to be paid to _____ The Pittsburg County
Commissioners, Pittsburg County / The Sardis Lake Water Authority, Clayton, Oklahoma all damage,
loss and expense which may _____ (City, Town or Trust Authority)
result by reason of defective materials and/or workmanship in connection with said work occurring within
a period of one (1) year from and after the acceptance of said project by _____
_____ The Sardis Lake Water Authority, Clayton, Pushmataha County, Oklahoma,
(City, Town or Trust Authority)

then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties that no changes or alterations in said contract and no deviations from the plan or mode of procedures herein fixed shall have the effect of releasing the sureties, or any of them, from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly-authorized officers and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its Attorney-In-Fact, duly authorized so to do, the day and year set forth below.

DATED this _____ day of _____, 2021.

PRINCIPAL:

By:_____

ATTEST:

SURETY:

By:_____ Attorney-In-Fact

INSURANCE REQUIREMENTS

Name of Insured: Pittsburg County, Sardis Lake Water Authority & Vaughn Engineering, LLC.

Description of Work: Relocation of an existing water main and appurtenances

Location of Work: Swinging Bridge Road, Pittsburg County, Oklahoma

<u>Kind of Insurance</u>	<u>Minimum Coverage</u>	<u>Expected Dates Coverage Needed</u>	
		<u>From</u>	<u>To</u>
Workers' Compensation	Legal Amount	<u>Sep. '21</u>	<u>Dec. '21</u>
General Public Liability and property Damage, Including Vehicle Coverage:			
Bodily Injury - Each Person	\$500,000	<u>Sep. '21</u>	<u>Dec. '21</u>
Bodily Injury - Each Accident	\$500,000	<u>Sep. '21</u>	<u>Dec. '21</u>
Property Damage - Each Person	\$200,000	<u>Sep. '21</u>	<u>Dec. '21</u>
Property Damage - Aggregate Limit	\$1,000,000	<u>Sep. '21</u>	<u>Dec. '21</u>
Builder's Risk (If Required)	Full Coverage	<u>N/A</u>	

Note: This covers all motor-driven vehicles such as cars, trucks, graders, etc.

In the event of any material change or cancellation of said policies, the insurance company will give fifteen (15) days' written notice to Pittsburg County, Vaughn Engineering, LLC. and The Sardis Lake Water Authority, Owner.

Statements such as "**will endeavor to**" and "**but failure to notify Owner shall impose no obligation or liability of any kind upon the company**" shall not be allowed.

Coverage shall be indicated by checking all boxes applicable. Insurance shall cover any hazards involved with the planned construction. Special coverage for blasting operations shall be listed separately on the certificates.

The Owner and the Engineer shall be listed as the certificate holders.

Reserved for

CERTIFICATE OF INSURANCE

STATE OF OKLAHOMA HOLD HARMLESS CLAUSE

Contractor shall, within limitations placed on such entities by State law, save harmless the State of Oklahoma, its agents, officers and employees from all claims and actions and all expenses defining same that are brought as a result of any injury or damage sustained by any person or property in consequence of any act or omission by the Contractor. Contractor shall, within limitations placed on such entities by State law, save harmless the State of Oklahoma, its agents, officers and employees from any claim or amount recovered as a result of infringement of patent, trademark or copyright or from any claim or amounts arising or recovered under Workers' Compensation law or any other law. In any agreement with any subcontractor or any agent for Contractor, Contractor will specify that such subcontractors or agents shall hold harmless the State of Oklahoma, its agents, officers and employees for all the hereinbefore-described expenses, claims action or amounts recovered.

NOTICE OF AWARD

TO: _____

PROJECT DESCRIPTION:

Swinging Bridge Water Main Relocation
Pittsburg County, Oklahoma

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated September, 2021, and Information for Bidders.

You are hereby notified that your BID has been accepted in the amount of \$ _____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance and Payment BONDS and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the ENGINEER and OWNER.

Dated this _____ day of _____, 2021.

The Pittsburg County Commissioners
Pittsburg County, Oklahoma
Owner

By: _____
Ross Selman

Title: _____
Presiding Commissioner

ACCEPTANCE OF NOTICE

Receipt of the NOTICE OF AWARD is hereby acknowledged by _____,
this _____ day of _____, 2021.

By: _____

Title: _____

NOTICE TO PROCEED

TO: _____

Date: _____
Project: Swinging Bridge Water Main Relocation
Pittsburg County, Oklahoma

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2021 on or before _____, 2021 and you are to complete the WORK within 60 consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 2021.

The Pittsburg County Commissioners
Pittsburg County, Oklahoma
Owner

By: _____
Ross Selman

Title: Presiding Commissioner

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____,
this _____ day of _____, 2021.

By: _____

Title: _____

Employer Identification Number _____

GC

GENERAL CONDITIONS

General Conditions
Enumeration of Plans and Specifications
Special Conditions
Special Conditions Pertaining to Hazards, Safety Standards
and Accident Prevention
General Provisions

GENERAL CONDITIONS

1.0	Definitions.....	GC - 1
2.0	Drawings and Specifications.....	GC - 4
3.0	Additional Instructions and Detail Drawings	GC - 4
4.0	Materials, Services and Facilities	GC - 4
5.0	Surveys, Permits, Regulations	GC - 5
6.0	Protection of Work, Property, and Persons.....	GC - 5
7.0	Subsurface Conditions	GC - 6
8.0	Assignments.....	GC - 6
9.0	Separate Contracts	GC - 6
10.0	Subcontracting	GC - 7
11.0	Land and Rights-of-way	GC - 7
12.0	Engineer's Authority	GC - 7
13.0	Supervision by Contractor	GC - 8
14.0	Contract Security	GC - 8
15.0	Insurance	GC - 9
16.0	Indemnification	GC - 10
17.0	Time for Completion and Liquidated Damages.....	GC - 11
18.0	Changes in the Work.....	GC - 11
19.0	Changes in Contract Price.....	GC - 12
20.0	Correction of Work	GC - 12
21.0	Suspension of Work, Termination, and Delay	GC - 12
22.0	Payment to Contractor	GC - 14
23.0	Acceptance of Final Payment as Release.....	GC - 15
24.0	Guarantee	GC - 15
25.0	Schedules, Reports and Records	GC - 16
26.0	Shop Drawings.....	GC - 16
27.0	Substitutions.....	GC - 17
28.0	Patents	GC - 17
29.0	Inspection and Testing	GC - 17
30.0	Prevailing Wage Law.....	GC - 18
31.0	Arbitration By Mutual Agreement.....	GC - 20
32.0	Taxes	GC - 20

1.0 DEFINITIONS

1.0.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated and shall be applicable to both the singular and plural thereof:

1.1 ADDENDA

1.1.1 Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions or deletions, clarifications, or corrections.

1.2 AGREEMENT/CONTRACT

1.2.1 The written agreement between the OWNER and CONTRACTOR covering the WORK to be performed; the other CONTRACT DOCUMENTS are attached to the AGREEMENT.

1.3 BID

1.3.1 The offer or Proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER

1.4.1 Any person, firm, or corporation submitting a BID for the WORK.

1.5 BONDS

1.5.1 Bid, Performance, and Payment Bonds and other instruments of surety, furnished by the CONTRACTOR and the CONTRACTOR'S surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER

1.6.1 A written order to the CONTRACTOR authorizing an addition, deletion, or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS

1.7.1 The contract, including Advertisement For BIDS, Information For BIDDERS, BID, BID BOND, AGREEMENT, Payment BOND, Performance BOND, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, these GENERAL CONDITIONS, SPECIAL CONDITIONS, SPECIFICATIONS, ADDENDA and other documents and attachments.

1.8 CONTRACT PRICE

1.8.1 The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME

1.9.1 The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR

1.10.1 The person, firm, or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS

1.11.1 The parts of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and that have been prepared or approved by the ENGINEER.

1.12 ENGINEER

1.12.1 The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER

1.13.1 A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction for clarification or interpretation.

1.14 NOTICE OF AWARD

1.14.1 The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED

1.15.1 Written communication issued by the OWNER to the CONTRACTOR authorizing him/her to proceed with the WORK and establishing the date for commencement of the WORK.

1.16 OWNER

1.16.1 A public or quasi-public body or authority, corporation, association, partnership, or an individual for whom the WORK is to be performed.

1.17 PROJECT

1.17.1 The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE

1.18.1 The authorized representative of the OWNER and ENGINEER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS

- 1.19.1 All drawings, diagrams, illustrations, brochures, schedules or other data which are prepared by the CONTRACTOR, SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIAL CONDITIONS

- 1.20.1 All special requirements applicable to the work and the project site.

1.21 SPECIFICATIONS

- 1.21.1 A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.22 SUBCONTRACTOR

- 1.22.1 An individual, firm, or corporation having a direct contract with CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.23 SUBSTANTIAL COMPLETION

- 1.23.1 That date certified by the ENGINEER when construction of the PROJECT or as specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, to the point the PROJECT or specified part can be utilized for the purposes intended.

1.24 SUPPLEMENTAL GENERAL CONDITIONS

- 1.24.1 Modifications to General Conditions required by a Federal or State agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements imposed by applicable state laws.

1.25 SUPPLIER

- 1.25.1 Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.26 WORK

- 1.26.1 All labor, materials and equipment necessary to perform the construction required by the CONTRACT DOCUMENTS and all materials and equipment to be incorporated in the PROJECT.

1.27 WRITTEN NOTICE

- 1.27.1 Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at their last given address, or delivered in person to said party or their authorized representative on the WORK.

2.0 DRAWINGS AND SPECIFICATIONS

- 2.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.
- 2.2 In case of conflict between DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over general DRAWINGS.
- 2.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

3.0 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

- 3.1 The CONTRACTOR may be furnished additional instructions and detail drawings by the ENGINEER as needed to perform the WORK required by the CONTRACT DOCUMENTS.
- 3.2 The additional drawings and instructions thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

4.0 MATERIALS, SERVICES AND FACILITIES

- 4.1 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, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.
- 4.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.
- 4.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
- 4.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.
- 4.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

5.0 SURVEYS, PERMITS, REGULATIONS

- 5.1 The OWNER shall furnish all boundary surveys and establish all baselines for locating the principal component parts of the WORK with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.
- 5.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes. In cases of willful or careless destruction, the CONTRACTOR shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.
- 5.3 Temporary permits and licenses necessary for the performance of the WORK shall be paid and secured by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITION or SPECIAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be paid and secured by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as shown and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENT are at variance therewith, the CONTRACTOR shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 18, CHANGES IN THE WORK.

6.0 PROTECTION OF WORK, PROPERTY, AND PERSONS

- 6.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR will take all necessary precautions for the safety of, will provide the necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- 6.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. The CONTRACTOR will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. The CONTRACTOR will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone directly or indirectly employed by any of them or anyone of whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER, of the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

- 6.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instructions or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. The CONTRACTOR will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

7.0 SUBSURFACE CONDITIONS

- 7.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:
- 7.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or
- 7.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.
- 7.2 The OWNER shall promptly investigate the conditions, and if it is found that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless the required WRITTEN NOTICE has been given; provided that the OWNER may, if the OWNER determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

8.0 ASSIGNMENTS

- 8.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of any right, title or interest therein, or any obligations thereunder, without written consent of the other party.

9.0 SEPARATE CONTRACTS

- 9.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK and shall properly connect and coordinate the WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.
- 9.2 The OWNER may perform additional WORK related to the PROJECT or the OWNER may let other contracts provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if the OWNER is performing the additional WORK) reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK and shall properly connect and coordinate the WORK with theirs.

- 9.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves it in additional expense or entitles it to an extension of the CONTRACT TIME, the CONTRACTOR may make a claim thereof as provided in Sections 17 and 19.

10.0 SUBCONTRACTING

- 10.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.
- 10.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.
- 10.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of its SUBCONTRACTORS and of persons either directly or indirectly employed by them, as the CONTRACTOR is for the acts and omissions of persons directly employed by it.
- 10.4 The CONTRACTOR shall utilize appropriate provisions in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.
- 10.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

11.0 LAND AND RIGHTS-OF-WAY

- 11.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.
- 11.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.
- 11.3 The CONTRACTOR shall provide at its own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities or for storage of materials.

12.0 ENGINEER'S AUTHORITY

- 12.1 The ENGINEER shall act as the OWNER'S representative during the construction period. The ENGINEER shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed and shall interpret the intent of the CONTRACT

DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

- 12.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship, and execution of the WORK. Inspections may be at the factory or fabrication plant of the source of material supply.
- 12.3 The ENGINEER will not be responsible for the construction methods, controls, techniques, sequences, procedures or construction safety.
- 12.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

13.0 SUPERVISION BY CONTRACTOR

- 13.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

14.0 CONTRACT SECURITY

- 14.1 The CONTRACTOR shall within ten (10) days after receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS and the prompt payment by CONTRACTOR to all persons supplying labor and materials in the performance of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If a surety on any such BOND ever is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal Bonds, CONTRACTOR shall within ten (10) days after notice from the OWNER to substitute an acceptable BOND(S) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

15.0 INSURANCE

- 15.1 The CONTRACTOR shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by the CONTRACTOR, any SUBCONTRACTOR, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
- 15.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts;
- 15.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of employees;
- 15.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than employees;
- 15.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained: (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and
- 15.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.
- 15.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. **These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.**
- 15.3 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, Liability insurance as hereinafter specified:
- 15.3.1 The **OWNER and the ENGINEER** shall be named and protected in the CONTRACTOR'S liability insurance policy from all claims arising out of or in connection with any operations conducted in connection with this contract by the CONTRACTOR or his SUBCONTRACTORS. CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting the CONTRACTOR from all claims for personal injury, including death, and all claims for destruction of or damage to property arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by the CONTRACTOR or by any SUBCONTRACTOR employed by the CONTRACTOR or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR employed by the CONTRACTOR. Insurance shall be written with a limit of liability of not less than \$2,000,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$1,000,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$1,000,000 for all property damage sustained by any one person in any one accident; and a limit of liability of

not less than \$2,000,000 aggregate for any such damage sustained by two or more persons in any one accident.

- 15.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance for the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligation under the CONTRACT DOCUMENTS to fully complete the PROJECT.
- 15.4 The CONTRACTOR shall procure and maintain at the CONTRACTOR'S own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of the CONTRACTOR'S employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of its employees not otherwise protected.
- 15.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR and the OWNER.

16.0 INDEMNIFICATION

- 16.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.
- 16.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

- 16.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, its agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

17.0 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- 17.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.
- 17.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.
- 17.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages of the amount stated in the AGREEMENT for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.
- 17.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.
- 17.4.1 To any preference, priority or allocation order duly issued by the OWNER.
- 17.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and
- 17.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 17.4.1 and 17.4.2 of this article.

18.0 CHANGES IN THE WORK

- 18.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.
- 18.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that

such FIELD ORDER entitles the CONTRACTOR to a change in CONTRACT PRICE or TIME, or both, in which event the CONTRACTOR shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

19.0 CHANGES IN CONTRACT PRICE

19.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

19.1.1 Unit prices previously approved.

19.1.2 An agreed lump sum.

20.0 CORRECTION OF WORK

20.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not. The CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

20.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

21.0 SUSPENSION OF WORK, TERMINATION, AND DELAY

21.1 The OWNER may suspend the WORK or any portion thereof for a period not to exceed ninety (90) days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the fixed date. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

21.2 If the CONTRACTOR is adjudged as bankrupt or insolvent, or makes a general assignment to the benefit of its creditors, or if a trustee or receiver is appointed for the CONTRACTOR or any of his property, or if CONTRACTOR files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or applicable laws, or repeatedly fails to supply adequate skilled workers, suitable materials or equipment, or consistently fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment, or disregards laws, ordinances, rules, regulations or orders of a public body having jurisdiction over the WORK or disregards the authority of the ENGINEER, or otherwise violates any provision of the CONTRACT

DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and its surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method the OWNER may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

- 21.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.
- 21.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.
- 21.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until paid all amounts then due, in which event and upon resumption of the WORK CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.
- 21.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

22.0 PAYMENT TO CONTRACTOR

- 22.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect the OWNER'S interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage. The retainage shall be an amount equal to 10% of said estimate until 50% of the work has been completed. At 50% completion, further partial payments shall be made in full to the CONTRACTOR and no additional amounts may be retained unless the ENGINEER certifies that the job is not proceeding satisfactorily, but amounts previously retained shall not be paid to the CONTRACTOR. At 50% completion or any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained but in no event shall the total retainage be more than 10% of the value of the work completed. Upon substantial completion of the work, any amount retained may be paid to the CONTRACTOR. When the WORK has been substantially completed except for WORK which cannot be completed because of weather conditions, lack of materials or other reasons which in the judgment of the OWNER are valid reasons for non-completion, the OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the WORK still to be completed.
- 22.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site. The CONTRACTOR shall provide receipts or lien waivers to the ENGINEER for the previous month's materials stored at the following month's progress meeting. If the receipts or lien waivers are not provided by that meeting, the ENGINEER or OWNER shall have the option to deduct the amount of the previous month's amount of materials stored.
- 22.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.
- 22.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

- 22.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.
- 22.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demand of SUBCONTRACTORS, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, the CONTRACTOR'S Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.
- 22.7 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

23.0 ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- 23.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically accepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or its sureties from any obligations under the CONTRACT DOCUMENTS or the Performance and Payment BONDS.
- 23.2 Before final payment is released, the CONTRACTOR shall provide the OWNER with a lien waiver for the total amount of the CONTRACT. The CONTRACTOR shall also provide lien waivers from all SUBCONTRACTORS listed by the CONTRACTOR.

24.0 GUARANTEE

- 24.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION unless otherwise stated in the CONTRACT DOCUMENTS. The CONTRACTOR warrants

and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of the damage of other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

25.0 SCHEDULES, REPORTS AND RECORDS

- 25.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.
- 25.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which the CONTRACTOR proposes to carry on the WORK, including dates at which the various parts of the WORK will be started, estimated date of completion of each part and as applicable:
 - 25.2.1 The dates at which special detail drawings will be required; and
 - 25.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.
- 25.3 The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the WORK.

26.0 SHOP DRAWINGS

- 26.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the performance of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.
- 26.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.
- 26.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

27.0 SUBSTITUTIONS

- 27.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue numbers, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered unless otherwise stated. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACTOR DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such materials, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

28.0 PATENTS

- 28.1 The CONTRACTOR shall pay all applicable royalties and license fees and shall defend all suits or claims for infringement of any patent rights and save the OWNER and ENGINEER harmless from loss on account thereof. If the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, the CONTRACTOR shall be responsible for such loss unless the CONTRACTOR promptly gives such information to the ENGINEER.

29.0 INSPECTION AND TESTING

- 29.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards as required and defined in the CONTRACT DOCUMENTS.
- 29.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.
- 29.3 The CONTRACTOR shall provide at the CONTRACTOR'S expense the testing and inspection services required by the CONTRACT DOCUMENTS.
- 29.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER **timely notice** of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.
- 29.5 Inspections, tests, or approvals by the ENGINEER or others shall not relieve the CONTRACTOR from the obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

- 29.6 The ENGINEER and the ENGINEER'S representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records or personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.
- 29.7 If any WORK is covered contrary to the instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for the ENGINEER'S observation and replaced at the CONTRACTOR'S expense.
- 29.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

30.0 PREVAILING WAGE LAW

30.1 GENERAL STATEMENT

- 30.1.1 On projects involving Public Works or Public Funds, it is the statutory policy of the State of Arkansas that: a wage not less than the prevailing hourly rate of wages for Work of a similar character in the locality in which the Work is performed shall be paid to all workmen employed by or on behalf of any public body engaged in Public Works, exclusive of maintenance Work. In compliance with Arkansas State Law, the following stipulations are made a part of this Contract:

30.2 SCHEDULE OF OCCUPATIONAL CLASSIFICATIONS

- 30.2.1 The schedule of occupational classifications and minimum hourly wage rates applicable to this Project are bound in these Contract Documents and made a part thereof.

30.3 PREVAILING RATES FOR LEGAL HOLIDAYS AND OVERTIME

- 30.3.1 The general prevailing rate for legal holidays and overtime Work, as determined by the Division of Labor Standards and as set forth in the Contract Documents, shall be paid to all workers.

30.4 PENALTY FOR NON-COMPLIANCE

- 30.4.1 The Contractor shall forfeit as a penalty to the State, county, city and county, city, town, district, or other political subdivision on whose behalf the Contract is made or awarded, \$10.00 for each workman employed, for each calendar day, or portion thereof, such worker is paid

less than the said stipulated rates for any Work done under the Contract, by him or by any subcontractor under him.

30.5 BONDS

30.5.1 All Bonds furnished by this Contractor shall include such provisions as will guarantee the faithful performance of the prevailing hourly wage clause as provided by this Contract.

30.6 PREVAILING WAGE RATES POSTED

30.6.1 A clearly legible statement of all prevailing hourly wage rates to be paid all workmen employed, in order to execute this Contract, shall be kept posted in a prominent and easily accessible place at the site of the Work by each Contractor and subcontractor engaged on this Project. Such notice shall remain posted during the full time that any workmen shall be employed on the Project.

30.7 CONTRACTOR'S AFFIDAVIT OF COMPLIANCE

30.7.1 Before final payment can be made for this Project, the Contractor must file an affidavit stating that he fully complied with the Prevailing Wage Law. No payment can be made unless and until this affidavit is filed in proper form and order.

30.8 NO CONTRACT PRICE CHANGE

30.8.1 The Contractor is advised of the fact that the prevailing hourly rate of wages, State or Federal, is subject to change during the life of this Contract, and such change shall not be the basis of any claim by the Contractor against the Owner nor will deductions be made by the Owner against sums due the Contractor by reason of any such change, or by overtime expenses incurred or by reason of penalties levied against the Contractor for non-compliance with the applicable regulations. The Contractor shall pay the prevailing wage rates as established, amended, changed or revised throughout the Contract for the amount bid and for the Contract or Bid Price awarded. There shall be no increase or decrease in the Contract or Bid Price as a result of any changes made in the wage rates made in the wage rates by the Department of Labor and Industrial Relations or by any court decision relevant to the wage rates. The Contractor shall pay the prevailing wage rates and shall comply with all requirements of the Department of Labor and Industrial Relations concerning wage rates paid to workmen for Work previously performed under the Contract or remaining to be performed under the requirements of the Contract; and any such changes in the wage rates shall not be a basis for any claim against the Owner for a change in the Contract of Bid price or amounts.

30.9 PREVAILING HOURS STANDARD

30.9.1 The "prevailing hours of labor" for all classifications of laborers, workmen and mechanics to be employed in the Work are eight (8) hours per day and forty (40) hours per week.

30.10 PREVAILING WAGE STATUTES

30.10.1 The Contractor shall comply with all of the State of Arkansas' statutes dealing with and relating to the prevailing wage law and Public moneys.

31.0 ARBITRATION BY MUTUAL AGREEMENT

- 31.1 All claims, disputes, and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by the making an acceptance of final payment as provided by Section 23, may be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.
- 31.2 Notice of the request for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and a copy shall be filed with the ENGINEER. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.
- 31.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

32.0 TAXES

- 32.1 The CONTRACTOR will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the WORK is performed.

ENUMERATION OF PLANS, SPECIFICATIONS

1.0 ENUMERATION OF PLANS, SPECIFICATIONS

Following are the Plans, Specifications which form a part of this contract, as set forth in the General Conditions, "Contract and Contract Documents";

DRAWINGS:

General Construction: Nos. 1 Through 5

SPECIFICATIONS:

General Specifications: Nos. GS-1 through GS-7

Detailed Specifications: Nos. DS-1 to DS-19

2.0 STATED ALLOWANCES

2.1 Pursuant to the General Conditions, the Contractor shall include the following cash allowances in his proposal:

2.1.1 For ____ (Page ____ of Specifications) \$ _____

2.1.2 For ____ (Page ____ of Specifications) \$ _____

2.1.3 For ____ (Page ____ of Specifications) \$ _____

3.0 SPECIAL HAZARDS

3.1 The Contractor's and his Subcontractor's Public Liability and Property Damage Insurance shall provide adequate protection against the following special hazards: Blasting Operations.

4.0 CONTRACTOR'S AND SUBCONTRACTOR'S PUBLIC LIABILITY, VEHICLE AND LIABILITY AND PROPERTY DAMAGE INSURANCE

As required in the General Conditions, the Contractor's Public Liability Insurance and Vehicle Insurance shall be in an amount not less than \$1,000,000 for injuries, including accidental death, to any one person, and subject to the same limit for each person, in an amount not less than \$500,000 on account of one accident, and the Contractor's Property Damage Insurance in an amount not less than \$500,000.

The Contractor shall either require each of his subcontractors to procure and to maintain during the life of his subcontract, Subcontractor's Public Liability and Property Damage of the type and in the same amounts as specified in the preceding paragraph, or insure the activities of his subcontractors in his own policy.

5.0 PHOTOGRAPHS OF PROJECT

As provided in the General Conditions, the Contractor will furnish photographs in the number, type, and stage as enumerated below: **Not Required.**

6.0 SCHEDULE OF OCCUPATIONAL CLASSIFICATIONS AND MINIMUM HOURLY WAGE RATES AS REQUIRED IN THE GENERAL CONDITIONS

Contained in the Instructions to Bidders and the Appendix.

7.0 BUILDER'S RISK INSURANCE

As provided in Bonds and Certificates, the Contractor will/will not* maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portions of the project for the benefit of the Owner, the Contractor, and all subcontractors, as their interests may appear.

END OF SECTION

SPECIAL CONDITIONS

1.0 STARTING POINT

- 1.1 Contractor shall begin by installing the temporary water line across the existing bridge. After safe, potable water, then the directional boring can proceed.

2.0 QUALITY OF WORK

- 2.1 All work shall be first class work and shall have a good appearance. The Work shall also be functional for its intended purpose for which it was designed.
- 2.2 All work found not to be first class shall be replaced if so desired by the Owner.

3.0 CONTRACTOR'S SUPERINTENDENT

- 3.1 The Contractor's representative shall be pleasant and have the ability to work with all parties. The representative shall communicate and coordinate all actions with the Engineer or Engineer's Representative and District Personnel.

4.0 PUBLIC FACILITIES

- 4.1 Contractor shall furnish all of the public facilities needed for his personnel.

5.0 BUY AMERICAN CLAUSE

Contractor shall comply with the BUY AMERICA requirements of the Federal Regulations (23 U.S.C. 313 and 23 CFR 635.410). The Contractor shall provide to the Utility Owner a completed "**Certificate of Materials Origin**" form for each steel or iron product incorporated into the project.

SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS AND ACCIDENT PREVENTION

1. Lead-Based Paint Hazards (Applicable to Contract for Construction or Rehabilitation of Residential Structures:

The construction or rehabilitation of residential structures is subject to the U.S. Department of Housing and Urban Development Lead-Based Paint regulations, 24 CFR 35. The Contractor and subcontractors shall comply with the provisions for the elimination of lead-based paint hazards under Subpart B of said regulations. The Owner will be responsible for the inspections and certifications required under Section 35.14(f) thereof.

2. Use of Explosives:

- a. When the use of explosives is necessary for the performance of the work, the Contractor shall observe all local, State and Federal laws in purchasing and handling explosives. The Contractor shall take all necessary precautions to protect completed work, neighboring property, waterlines or other underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats.
- b. At least eight (8) hours before blasting is done, the Contractor shall notify all owners of public utility property of the intent to use explosives close to such property. Any supervision or direction of use of explosives by the Engineer does not in any reduce the responsibility of the Contractor or his surety for damages that may be caused by such use.

GENERAL PROVISIONS

1.0	General.....	GP - 1
2.0	Contractor Definition.....	GP - 1
3.0	Intent	GP - 1
4.0	Inspection of Site	GP - 1
5.0	Conflict	GP - 2
6.0	Codes, Standards and Regulations.....	GP - 2
7.0	Permits and Fees	GP - 3
8.0	Utilities Locations and Connections.....	GP - 3
9.0	Temporary Construction Power.....	GP - 3
10.0	Plans	GP - 3
11.0	Materials	GP - 4
12.0	Workmanship.....	GP - 4
13.0	Superintendent	GP - 4
14.0	Standards.....	GP - 4
15.0	Coordination and Cooperation.....	GP - 5
16.0	Storage of Materials.....	GP - 5
17.0	Damaged and Defective Work.....	GP - 5
18.0	Safety	GP - 5
19.0	Clean Up	GP - 5
20.0	Submittal of Catalog Data and Shop Drawings.....	GP - 6
21.0	Manuals.....	GP - 6
22.0	Tests and Adjustments	GP - 6
23.0	As-Built Drawings	GP - 7
24.0	Guarantee	GP - 7

1.0 GENERAL

- 1.1 It shall be the responsibility of the Contractor(s) to familiarize themselves with all parts of a complete set of Plans and Specifications. Failure to understand the Contract Documents shall not relieve any responsibility of the Contractor(s) fulfillment of the Contract in any respect.
- 1.2 The Work proposed and included in these Specifications shall include the furnishing of all labor, materials, and supervision necessary for the complete installation of systems, as specified herein or as shown on the Plans, simultaneously with all necessary auxiliaries and appurtenances included in the Work.
- 1.3 The Contractor shall furnish and install complete systems, ready to operate. The Contractor shall supply all miscellaneous items and accessories required for installations, even if each such item or accessory is shown or not on the Plans or mentioned in these Specifications.

2.0 CONTRACTOR DEFINITION

- 2.1 Where the word "Contractor" is stated in connection with the Work included in these Specifications, reference is made to the Contractor who is engaged to execute the Work included under that Section of the Specifications. This Contractor may be either the Prime Contractor, General Contractor or his Subcontractor.

3.0 INTENT

- 3.1 The Contractor(s) shall furnish all labor and materials, equipment and transportation necessary for the proper execution of the work which is the intent of the Plans and Specifications. The work required (related to other trades) is shown in its majority on the Plans. The Contractor shall thoroughly examine the Plans and Specifications relating to other trades in order to include all necessary work. Additional compensation will not be considered for a failure to properly interpret the responsibilities to other trades. The Contractor(s) shall complete all work shown on the Plans, described in the Specifications and all included incidental documents. The Engineer has the authority to make any reasonable changes in locations indicated without additional compensation to the Contractor(s).
- 3.2 In certain cases, the Plans are diagrammatic. Therefore, offsets, fittings, valves, and accessories could be not shown. Work should be planned around building details and other trades.

4.0 INSPECTION OF SITE

- 4.1 The Contractor(s) before submitting his proposal shall inspect the work-site of the proposed construction and become fully aware as to the facilities, difficulties, and restrictions accompanying the execution of the Work. Additional compensation will not be allowed for work or items omitted from the Contractor's proposal because of his failure to apprise himself of the conditions affecting the performance or necessary to carry on and complete satisfactorily the Work included in the Contract.
- 4.2 Determination of soil conditions shall be before bidding. The Plans and Specifications do not imply as to condition of soil to be encountered in the Work.

5.0 CONFLICT

- 5.1 If a conflict occurs between the Drawings and Specifications, the most stringent provisions shall control. If a conflict occurs between the General Specifications of the Contract or any modifications thereof and the Detailed Specifications, the Detailed Specifications shall control. The Plans and Specifications shall complement one another. Any work required by one, but not the other, shall be completed as though required by both.
- 5.2 If interferences between trades occur, the Engineer will decide whose work shall take precedence, regardless of work that could be installed.

6.0 CODES, STANDARDS AND REGULATIONS

- 6.1 All workmanship and materials specified shall meet the codes, standards and regulations having jurisdiction over the work in every respect. If a difference between the various codes, specifications, local ordinances, industry standards and other regulations occurs, the situation shall be brought to the attention of the Engineer. Either the most stringent or the regulation or standard selected by the Engineer shall govern.
- 6.2 The Contractor shall arrange for all inspection and testing of systems by the authorities as required by local codes and ordinances. The Contractor shall obtain and deliver to the Engineer final certificates of acceptance from all authorities.
- 6.3 If the Contractor performs any work that does not comply with the requirements of the applicable codes, standards and regulations, he will bear all costs associated with the deficiencies.
- 6.4 Unless otherwise stated in a specific General Specification section, the following codes, standards and regulations in effect on the date of the invitation to bid will be considered a part of these specifications:

State Public Health Department Regulations

State Plumbing Code

Local, City, State and Federal Codes and Standards

American Society for Testing Materials

American Water Works Association Standards

National Electrical Code

National Electrical Safety Code

OSHA-Occupational Safety and Health Standards

Manual of Accident Prevention in Construction-Associated General Contractors

American Association of State Highway and Transportation Officials Specifications

Arkansas Fire Prevention Code

National Electrical Manufacturers Association

National Fire Protection Association

American Society of Mechanical Engineers

Air Conditioning and Refrigeration Institute

7.0 PERMITS AND FEES

- 7.1 The Contractor shall furnish all necessary notices and all permits, pay all taxes, file all necessary plans and obtain all necessary approvals in connection with the Work required for the Project, unless otherwise noted for a specific item in the Specifications.
- 7.2 Work shall be inspected and executed in accordance with local and state codes, laws, ordinances, rules and regulations applicable to the type of work. Any fees in connection with the Work are to be paid by the Contractor.
- 7.3 Also the Contractor shall arrange with City, County or State, in accordance with ordinances covering work, for complete inspection and pay all charges associated with these ordinances.

8.0 UTILITIES LOCATIONS AND CONNECTIONS

- 8.1 Utility's location and elevation given on the Plans are from utility maps or other reliable sources. These are offered as only a general guide with no guarantee as to accuracy. The Contractor shall verify the location and elevation of all utilities affecting work.
- 8.2 The Contractor shall coordinate with proper authorities and utility companies for service connections, verifying locations and arrangements.
- 8.3 The Contractor shall install meters as shown on Plans when not furnished by the utility company and shall include meter loops and bypasses.
- 8.4 Voltage shown on the Plans and elsewhere in these Specifications has been gotten from the serving utility company. Before ordering equipment and beginning the job, the Contractor shall verify the voltage with the utility company. The Engineer shall be notified immediately, if the voltage differs from that shown on the Plans and in the Specifications. The Contractor shall provide and install an acceptable and operable system at no additional cost to the Owner, if the Engineer is not notified before equipment is ordered or construction has begun.

9.0 TEMPORARY CONSTRUCTION POWER

- 9.1 The Contractor shall install and furnish temporary power, water, heating, and lighting as required for construction and safety purposes. To obtain and pay for all utility charges shall be the General or Prime Contractor responsibility.

10.0 PLANS

- 10.1 In general, the accompanying Plans indicate the approximate locations of pipes, pumps, fans, duct work, feeders, circuits, outlets, switches, etc., except in cases where specific notes are shown. Exact locations of appurtenances shall be by references to the general plans and detailed shop drawings, by building measurements, and in cooperation with other Contractors and the Engineer.
- 10.2 Exact locations are subject to the Engineer's approval and may differ a reasonable amount from the locations shown on the Plans without additional compensation to the Contractor.

- 10.3 Major changes resulting in labor or material savings shall initiate only in accordance with a Contract Change Order. Major deviations shall initiate only when necessary to avoid interferences and only after drawings showing the proposed deviations are submitted to and approved by the Engineer.

11.0 MATERIALS

- 11.1 The Contractor shall provide new and excellent materials and equipment. Where the Underwriters' Laboratories have established standards and issued labels for a particular group, class, or type of equipment, the Underwriters' label shall be required for all equipment in that category. Each component supplied shall have a nameplate giving the name and address of the manufacturer, catalog number and designation.
- 11.2 When the words "or approved equivalent" are used in the Specifications or on the Plans, it will be understood that the Engineer is the sole judge of what is equivalent. In cases where more than one manufacturer or material is specified, the Contractor shall be permitted to furnish any of those specified. However, power equipment, panels, transformers, safety switches, etc., should be from the same manufacturer. The intention is not to discriminate against an "equal" product of other manufacturers, but to definitely set a standard of quality and shall not limit competition. Any proposed substitution shall be submitted for comparison. No substitution will be assumed acceptable without specific written authorization from the Engineer. If a substitution is accepted and the substitution proven defective or otherwise unsatisfactory for the intended service within the warranty period, the Contractor shall replace the substitution with the equipment or material specified originally. If this occurs, the Specifications require him to replace the equipment or material at no additional cost to the Owner.
- 11.3 The Engineer shall be the final decision as to whether or not a specific piece of equipment meets specifications.
- 11.4 Where the furnished substitute equipment requires larger, more or differently arranged connections, such connections will be installed without additional cost to the Owner to complete satisfaction of the Engineer.

12.0 WORKMANSHIP

- 12.1 All Work shall be installed in a careful, neat, safe and workmanlike manner by craftsmen skilled in the various trades.

13.0 SUPERINTENDENT

- 13.1 The Contractor shall provide an experienced, competent Superintendent who is in charge of all work and shall be at the work-site during all installations.

14.0 STANDARDS

- 14.1 The Contractor shall install all work such that the many unit components will function as a complete workable system. This shall include any accessories required to make such installations. The Contractor shall install all work in compliance with acceptable industry standards, except if other standards or procedures are specified herein exceed the industry standards.

- 14.2 The Contractor shall install and arrange any exposed work specified under these specifications such as devices, fixtures, panels, safety switches, etc., to fit in and harmonize with work otherwise specified to the satisfaction of the Engineer.

15.0 COORDINATION AND COOPERATION

- 15.1 The Contractor shall coordinate all work with architectural, structural, mechanical, electrical, and other trades to insure proper execution of the work, insure general progress for the entire project and to avoid delaying any other Contractor. The Contractor shall cooperate with all trades so that the Work will not be hindered, handicapped or delayed. The Contractor shall assist other trades for space conditions to permit satisfactory work installation. Extra compensation will not be allowed for any remedial work required to eliminate interferences due to lack of coordination and cooperation by the Contractor.

16.0 STORAGE OF MATERIALS

- 16.1 All materials and apparatus shall be protected by the Contractor to prevent damage to them. Unless approved by the Engineer, material or apparatus shall not be exposed to the elements or stored outside. Apparatus shall be covered with tarps or other protective coverings. Pallets and other methods shall be provided to raise materials above the floor. As directed barriers or guard rails shall be provided to protect the materials. If the Contractor fails to comply with the above statements to the complete satisfaction of the Engineer or his representative, that would be sufficient cause for rejection of the piece of apparatus exposed or otherwise unprotected.
- 16.2 The Contractor shall keep the ends of the pipe and conduits (including those extending through roofs) and openings in equipment closed with caps or plugs to prevent foreign materials from entering them during construction.

17.0 DAMAGED AND DEFECTIVE WORK

- 17.1 The Contractor shall remove and replace at his expense damaged and defective Work as directed by the Engineer. All repairs shall utilize new materials or a completely new piece of equipment shall be furnished and installed as directed by the Engineer.

18.0 SAFETY

- 18.1 The Contractor will provide all necessary precautions for the safety of life and property. All construction work shall comply with the standards of the Occupational Safety and Health Act. The Contractor shall install an approved ground-fault interrupter devices on all electrical construction devices consuming power, including temporary lighting systems.

19.0 CLEAN UP

- 19.1 The Contractor shall keep his work area clean constantly. The Contractor shall remove all equipment, excess materials and debris from the area and leave clean upon completion of Work. The Contractor shall protect all equipment during painting, plastering, cutting or drilling and any like operation which could damage equipment. Upon completion of the Work, the Contractor shall remove all equipment, excess material, scrap and debris from the work-site. The work-site shall look clean and finished.

20.0 SUBMITTAL OF CATALOG DATA AND SHOP DRAWINGS

- 20.1 The Contractor shall submit to the Engineer for review shop drawings for all equipment and materials for installation on the project. Equipment or materials shall not be installed until the Shop Drawings have been approved, even though the material submitted is identical to that specified originally. Consideration for materials substituted will not be approved if Shop Drawings are not received within 30 days after the award of the Construction Contract, unless otherwise allowed.
- 20.2 The Contractor will assume any additional charges, including engineering charges and charges for changes in the work, resulting from substitutions.
- 20.3 Rough-in materials including pipe, wire, conduits, connectors, and boxes can be submitted in a list form. The list shall include the names of manufacturers and catalog type or number. All other equipment and material shall be submitted with detailed drawings. Prints or drawings shall be permanent reproductions and not Thermo-fax copies. The total of Shop Drawings and lists submitted shall not be less than five (5).
- 20.4 If the Contractor proposes to submit items other than those specified, he shall include submittals of both the specified item and the proposed "equal item" and the "proposed substitution" shall be clearly marked.
- 20.5 Where the Specifications or Plans state that the Work shall be installed in accordance with the manufacturer's specifications; recommendations or directions, copies of the same shall be submitted to the Engineer for review.

21.0 MANUALS

- 21.1 The Contractor shall provide to the Engineer three (3) copies of bound manuals for the Work ten (10) days prior to final acceptance of the completion of the project. The manuals shall include copies of all corrected and approved shop drawings, schedules, catalog data, illustrations, performances curves and rating data, wiring and control diagrams, manufacturers recommendations, operating and maintenance instructions, including safe operating procedures and requirements, spare parts lists and other pertinent information for the specified equipment and systems. The manual shall also include a typewritten schedule of each motor; giving nameplate data, switch and fuse or breaker sizes, voltage and phase at motor terminals.

22.0 TESTS AND ADJUSTMENTS

- 22.1 The Contractor shall demonstrate and test each and every system in the presence of and to the complete satisfaction of the Engineer, the Engineer's representative and the Owner. Prior to the demonstration, the Contractor shall start all equipment and make necessary tests and adjustments to achieve a first class operating condition of the system.
- 22.2 The Contractor shall furnish all services, instruments, equipment and personnel required for the tests. In addition, the Contractor shall submit a typewritten test report to the Engineer for approval prior to final acceptance where applicable and recorded data is taken.
- 22.3 No piping, work fixtures or equipment shall be concealed or covered until they have been inspected and approved by a representative of the Engineer. All work shall be installed completely and tested

as required by this section, the State Ordinances and State Safety Orders. These tests shall be repeated, upon request, to the complete satisfaction of those making an inspection. Tests will be applied for a minimum period of four hours or until tests are completed.

22.4 Upon installation completion of the equipment, the Contractor shall coordinate with other trades to start all equipment, make necessary adjustments and tests to achieve a first-class operating system condition.

22.5 All defects and failures shall be corrected to the satisfaction of the Engineer or his representative.

23.0 AS-BUILT DRAWINGS

23.1 Before the project will be finally accepted, a set of permanent "as-built" drawings shall be submitted to the Engineer. The Contractor shall certify accuracy by an endorsement. The "as built" drawings must be correct in every detail to ensure that the Owner can properly operate, maintain, and repair exposed and concealed Work.

23.2 All underground Work shall be dimensioned. All change orders, field changes, equipment, circuit numbers, motors, feeders, breakers and starters shall be **CLEARLY** indicated on the Drawings. "As built" drawings shall be submitted on tracings, sepias or other reproducible forms, unless directed otherwise.

24.0 GUARANTEE

24.1 The Contractor shall furnish to the Engineer a typewritten guarantee to the effect that all work or equipment installed under this Contract shall be free from any or all defects for a period of one (1) year from the date of final acceptance or period as stated in the Detailed Specifications. Should any defect develop in any system or piece of equipment within this period, due to faulty equipment, poor installation or workmanship, the Contractor will agree to repair or replace same with new and like material without additional compensation as a part of the warranty.

GS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

WATER MAIN INSTALLATION

1.0	GENERAL.....	1
2.0	MATERIAL SPECIFICATIONS	1
2.1	INSPECTION AND REJECTION OF PIPE.....	1
2.2	ULTRA BLUE MOLECULAR ORIENTED PVC PIPE	2
2.3	POLYVINYL CHLORIDE (PVC) PIPE.....	3
2.4	DUCTILE IRON PIPE	5
2.5	HDPE POLYETHYLENE PIPE.....	6
2.6	VALVES.....	7
2.7	VALVE BOXES.....	7
2.8	FIRE HYDRANTS.....	8
2.9	FLUSH HYDRANTS	8
3.0	HYDROSTATIC TESTING OF WATER MAINS.....	9
3.1	GENERAL.....	9
3.2	CROSS-CONNECTION CONTROL.....	9
3.3	PVC PRESSURE AND LEAKAGE TEST	9
3.4	DUCTILE IRON PRESSURE AND LEAKAGE TEST	11
4.0	RESPONSIBILITY FOR MATERIAL	14
5.0	HANDLING OF MATERIAL.....	14
6.0	ALIGNMENT AND GRADE	15
7.0	EXCAVATION AND PREPARATION OF THE TRENCH	16
8.0	WATER MAIN INSTALLATION.....	20
9.0	INSTALLING VALVES AND FITTINGS.....	20
10.0	INSTALLING HYDRANTS	21
11.0	ANCHORAGE	22
12.0	BACKFILLING.....	23
13.0	REMOVAL, RESTORATION AND MAINTENANCE OF SURFACE	24
14.0	OTHER INSTALLATION REQUIREMENTS	26
15.0	PROTECTION AND PAINTING	28
16.0	DISINFECTION OF PIPE.....	28
17.0	PAYMENT	29

1.0 GENERAL

- 1.1 All pipe shall be of the type, weight, class and/or designed working pressures shown on the plans, described in the Detailed Specifications or as described in the proposal and accepted by the Owner. The Contractor shall, unless otherwise specified, furnish all equipment, tools and labor necessary to do the work required under this contract as specified.
- 1.2 This shall include, but shall not be limited to the following: haul and distribute the pipe, fittings, valves, hydrants and excavate the trenches and pits to the required dimensions, excavate all bell holes, construct and maintain all bridges for traffic, brace and support the adjoining ground or structures where necessary, handle all drainage or ground water, provide barricades, guards and warning lights, lay and test pipe, fittings, valves, hydrants and accessories, backfill and consolidation of the trenches and pits, restore the roadway surface unless otherwise stipulated, remove surplus excavated material, clean the work site, and maintain the street or other surface over the trenches as specified.
- 1.3 The Contractor shall also furnish all equipment, tools, labor and materials required to rearrange branch connections to sewer mains, or to rearrange sewers, conduits, ducts, pipes or other structures in accordance with the contract drawings and stipulations included therein.
- 1.4 **PERSONAL PROPERTY**
 - 1.4.1 The Contractor shall inform affected property owners, even though easements have been obtained, before construction occurs on their property.
 - 1.4.2 The Contractor shall move equipment through existing openings when possible. If no access is possible, the Contractor shall obtain permission from the Owner before cutting fences. The Contractor shall install a "sturdy" gate or wire gap at the opening until cleanup operations are complete. Upon completion of the project, the gate or wire gap shall be removed and the fences shall be repaired to original or better condition. An original or better condition includes obtaining proper wire tensions to corner posts on both sides of the cut. Refer to typical detail for proper wire repair.

2.0 MATERIAL SPECIFICATIONS

2.1 INSPECTION AND REJECTION OF PIPE

- 2.1.1 The quality of all materials, the process of manufacture, and the finish pipe shall be subject to inspection and approval by the Engineer. Such inspection may be made at the place of manufacture or at the site after delivery, or both places. The pipe shall be subject to rejection any time that the materials have failed to meet any of the specification requirements. This can happen even though satisfactory samples may have been accepted at the place of manufacture.
- 2.1.2 The Engineer shall have the right to cut cores from such pieces of the finished pipe as he desires for such inspection and tests as he may wish to apply. Holes left by the removal of cores shall be filled in an approved manner by and at the expense of the manufacturer of the pipe.

2.1.3 Any pipe which has been damaged after delivery will be rejected. If such pipe has already been laid, it shall be removed and replaced at the Contractor's expense.

2.2 **ULTRA BLUE MOLECULAR ORIENTED POLYVINYL CHLORIDE (PVC) PIPE**

2.2.1 This specification designates the general requirements and installation of Ultra Blue Molecular Oriented Polyvinyl Chloride (PVC) pipe and fittings used for conveying potable water under pressure. All PVC shall be rubber gasket O-ring joint pipe.

2.2.2 SIX-INCH and LARGER PVC PIPE

- a. The pipe shall be manufactured from National Sanitation Foundation (NSF) approved materials that conforms to ASTM D-1784, latest revision, Class 12454-B resins, and the pipe shall be stamped with the NSF seal of approval and permanently marked.
- b. The pipe shall have a pressure rating of at least 200 psi at 73° F. and conform to the requirements of specifications ASTM D-2241 and Product Standard PS 22-70 as amended and/or revised and with Standard Dimension Ratio SDR-21. Pipe with extruded bells shall be furnished in not more than 20 foot lengths. Pipe with double gasket type couplings may be furnished in 40 foot joints. Only molded and machined double gasket couplings shall be allowed in pipe in 20 foot and longer joints.
- c. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint.
- d. The pipe shall be permanently marked by the manufacturer and coded for the date, batch and shift in which the pipe was made along with other required marking as set forth in ASTM and PS standard specifications.
- e. The pipe manufacturer shall furnish to the Engineer certified copies of test results performed in accordance with the following paragraphs of Appendix A-4 of ASTM 2513, latest revision, "Recommended In-Plant Quality Control Program for Plastic Pipe and Fittings."

A-4.1 Introduction	A-4.2 Material
A-4.3 Pipe Tests	A-4.5 Method of Tests
A-4.6 Marking	
- f. The pipe manufacturer shall be a member of the Plastic Pipe Institute or American Water Works Association (AWWA), and shall have manufactured the pipe and joint proposed for use for not less than five (5) years.
- g. All fittings and specials used in connection with the pipe shall conform to AWWA short or long bodied ductile-iron fittings using a mechanical joint system with hardened or duck tipped type of rubber gaskets in accordance with AWWA Specifications C-110 and C-111, latest revisions. The fittings shall be coated with 6-8 mils thickness of fusion bonded epoxy conforming to the requirements of AWWA Specification C-550 and C116/A21.116, latest revision. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and Engineer or his representative. The use of torque type wrench shall be mandatory to tighten up the glands as required.

2.2.3 RUBBER GASKET JOINT PIPE

- a. Gasket joint pipe and couplings shall conform to the specifications previously outlined. The rubber O-ring joints for plastic pressure pipe shall conform with the latest requirements of ASTM D 3139, latest revisions. The joint shall have been tested and approved by the NSF and certification of that approval shall be submitted.

2.2.4 CONTRACTOR'S GUARANTEE

- a. Pipe furnished by the Contractor shall be guaranteed against rot, electrolytic corrosion and production defects.

2.2.5 PIPE BEDDING

- a. Ultra Blue Molecular Oriented Polyvinyl chloride (PVC) pipe shall be bedded in accordance with the provisions of these general specifications, using material excavated from the trench and obtained along the right-of-way insofar as is practical. Where required by the Engineer or his representative, bedding material shall be hauled in and used. This material shall consist of fine river sand, silt loam or a No. 6 gradation (ASTM C33, latest revision) of a quality approved by the Engineer. The maximum particle size shall not exceed $\frac{3}{4}$ inch. At least 30% of the material shall pass the $\frac{1}{2}$ inch sieve. Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of PVC pipe.

2.3 POLYVINYL CHLORIDE (PVC) PIPE

- 2.3.1 This specification designates the general requirements and installation of Polyvinyl Chloride (PVC) pipe and fittings used for conveying potable water under pressure. All PVC shall be rubber gasket O-ring joint pipe, except for the Schedule 80 PVC chlorine injection line.

2.3.2 FOUR-INCH and SMALLER DIAMETER PVC PIPE

- a. The pipe and fittings shall be manufactured from National Sanitation Foundation (NSF) approved Class 12454-A or 12454-B, PVC conforming to the resin specifications ASTM D 1784 as amended and/or revised and shall be stamped with the NSF seal of approval and permanently marked.
- b. The pipe shall have a pressure rating of at least 200 psi at 73° F. and conform to the requirements of specifications ASTM D 2241, latest revisions, and Product Standard, PS 22-70, latest revisions, and with Standard Dimension Ratio SDR-21 unless otherwise noted on the Plans or in the Detailed Specifications.
- c. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint and integral bell or equivalent.
- d. Schedule 80 PVC pipe shall meet all the requirements of SDR pipe and shall conform in all respects to the Commercial Standards CS-207-60, latest revision. The outer diameter shall equal that of ductile iron pipe.

- e. All fittings and specials used in connection with the pipe shall conform to AWWA short or long bodied ductile-iron fittings using a mechanical joint system with hardened or duck tipped type of rubber gaskets in accordance with AWWA Specifications C-110 and C-111, latest revisions. The fittings shall be coated with 6-8 mils thickness of fusion bonded epoxy conforming to the requirements of AWWA Specification C-550 and C116/A21.116, latest revision. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and Engineer or his representative. The use of torque type wrench shall be mandatory to tighten up the glands as required.
- f. The pipe manufacturer shall be a member of the Plastic Pipe Institute or American Water Works Association (AWWA).

2.3.3 SIX-INCH and LARGER PVC PIPE

- a. The pipe shall be manufactured from National Sanitation Foundation (NSF) approved materials that conforms to ASTM D-1784, latest revision, Class 12454-A or 12454-B (PVC 1120) resins, and the pipe shall be stamped with the NSF seal of approval and permanently marked.
- b. The pipe shall have a pressure rating of at least 200 psi at 73° F. and conform to the requirements of specifications ASTM D-2241 and Product Standard PS 22-70 as amended and/or revised and with Standard Dimension Ratio SDR-21. Pipe with extruded bells shall be furnished in not more than 20 foot lengths. Pipe with double gasket type couplings may be furnished in 40 foot joints. Only molded and machined double gasket couplings shall be allowed in pipe in 20 foot and longer joints.
- c. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint.
- d. The pipe shall be permanently marked by the manufacturer and coded for the date, batch and shift in which the pipe was made along with other required marking as set forth in ASTM and PS standard specifications.
- e. The pipe manufacturer shall furnish to the Engineer certified copies of test results performed in accordance with the following paragraphs of Appendix A-4 of ASTM 2513, latest revision, "Recommended In-Plant Quality Control Program for Plastic Pipe and Fittings."

A-4.1 Introduction

A-4.2 Material

A-4.3 Pipe Tests

A-4.5 Method of Tests

A-4.6 Marking

- f. The pipe manufacturer shall be a member of the Plastic Pipe Institute or American Water Works Association (AWWA), and shall have manufactured the pipe and joint proposed for use for not less than five (5) years.
- g. All fittings and specials used in connection with the pipe shall conform to AWWA short or long bodied ductile-iron fittings using a mechanical joint system with hardened or duck tipped type of rubber gaskets in accordance with AWWA Specifications C-110 and C-111, latest revisions. The fittings shall be coated with 6-8 mils thickness of fusion bonded

epoxy conforming to the requirements of AWWA Specification C-550 and C116/A21.116, latest revision. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and Engineer or his representative. The use of torque type wrench shall be mandatory to tighten up the glands as required.

2.3.4 RUBBER GASKET JOINT PIPE

- a. Gasket joint pipe and couplings shall conform to the specifications previously outlined. The rubber O-ring joints for plastic pressure pipe shall conform with the latest requirements of ASTM D 3139 and ASTM 1869, latest revisions. The joint shall have been tested and approved by the NSF and certification of that approval shall be submitted.

2.3.5 CONTRACTOR'S GUARANTEE

- a. Pipe furnished by the Contractor shall be guaranteed against rot, electrolytic corrosion and production defects.

2.3.6 PIPE BEDDING

- a. Polyvinyl chloride (PVC) pipe shall be bedded in accordance with the provisions of these general specifications, using material excavated from the trench and obtained along the right-of-way insofar as is practical. Where required by the Engineer or his representative, bedding material shall be hauled in and used. This material shall consist of fine river sand, silt loam or a No. 6 gradation (ASTM C33, latest revision) of a quality approved by the Engineer. The maximum particle size shall not exceed $\frac{3}{4}$ inch. At least 30% of the material shall pass the $\frac{1}{2}$ inch sieve. Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of PVC pipe.

2.4 DUCTILE IRON PIPE

- 2.4.1 Ductile iron pipe and fittings as furnished by the Contractor shall be installed according to the manufacture's recommendations and these specifications.

2.4.2 PIPE

- a. Unless otherwise shown on the plans or specified in the technical specifications, ductile iron pipe shall be of the class shown on the plans or stipulated in the proposal.
- b. Ductile iron pipe shall meet the requirements of AWWA C151, latest revision, "Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids," and AWWA C150, latest revision, "Thickness Design of Ductile-Iron Pipe."
- c. All flanged ductile iron pipe shall conform to AWWA C115, latest revision, "Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges."

2.4.3 FITTINGS

- a. All fittings used on ductile iron pipe shall conform to AWWA C110, latest revision, "Ductile-Iron Fittings, 3 inches through 48 inches, for Water and Other Liquids" or C153, latest revision, "Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and

Other Liquids." The fittings shall be coated with 6-8 mils thickness of fusion bonded epoxy conforming to the requirements of AWWA Specification C-550 and C116/A21.116, latest revision.

2.4.4 JOINTING

- a. Joints for ductile iron pipe shall be in accordance with AWWA Specification C111, latest revision, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."

2.4.5 LAYING

- a. Ductile iron pipe shall be laid in accordance with AWWA C600, latest revision, "Installation of Ductile-Iron Water Mains and Appurtenances."

2.4.6 LINING

- a. Ductile iron pipe shall be lined in accordance with AWWA C104, latest revision, "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water."

2.5 HDPE POLYETHYLENE PIPE

- 2.5.1 High Density Polyethylene Water transmission and distribution pipe shall meet the specifications and requirements of AWWA C906, latest revision, in sizes 2" to 10" and be joined by means of a zero leak rate, butt fusion and approved mechanical joints. The polyethylene pipe and fittings shall be made from prime virgin resins exhibiting a cell classification of PE 345434C as defined in ASTM D3350 with an established hydrostatic design basis of 1600 psi for water at 73° F. The resin shall be listed by the PPI in its pipe grade registry "TR-4". Pipe O.D. sizes shall be the same as ductile iron pipe.

- 2.5.2 **The net pressure capability shall be the working pressure rating as follows:**

DR 13.5 = Class 200 DR 11 = Class 250 DR 9 = Class 350

- 2.5.3 The wall thickness shall follow the DR system prescribed in AWWA C906. The pipe is to be joined by heat fusion or mechanical joints systems proven for HDPE pipe. Both pipe and fittings must be NSF approved, be listed and marked. All pipe is to be welded using the manufacturer's recommended procedures.

- 2.5.4 All pipe and fittings shall be marked as prescribed by AWWA C906, latest revision, which includes the nominal size, O.D. base, DR, pressure class, WPR, manufacturer's name, manufacturer's production code; including day, month and year extruded. All pipe and fittings shall have a date stamp less than six (6) months old.

2.6 VALVES

- 2.6.1 The resilient seat gate valves shall mostly comply with the latest revision of AWWA C509, and shall be UL listed and FM approved. All valves shall have been tested to 250 psig working pressure and 500 psig hydrostatic test pressure (AWWA). Certification of test shall be provided upon demand. The valves shall be non-rising stem for buried applications unless otherwise shown on the plans or in the Detailed Specifications.

- 2.6.2 The valves shall be open left and be provided with a 2" square operating nut. The valves shall have stainless steel bolts for the stuffing box and bonnet. The valves stem shall be lead free and be made of stainless steel with rolled threads. A bronze stem is unacceptable. The structural design of the valves shall be such that if excessive torque is applied to the stem in the closing direction with the disc seated, failure shall be the ductile iron flange on the top of the valve. The stem material shall provide a yield strength of 64,000 psi.
- 2.6.3 The valves shall have a stuffing box that is O-ring sealed. Two O-rings shall be placed above and one O-ring below the stem thrust collar. The thrust collar shall be factory lubricated. Valves without at least three stem O-rings are unacceptable. The valve disc and guidelugs shall be ductile iron and shall be fully (100%) encapsulated in **EPDM rubber** material. The disc shall have a cast low zinc bronze stem nut to prevent twisting or angling of the stem. Designs with loose stem nuts are unacceptable.
- 2.6.4 The NRS valves shall be AVK series 25 or approved equivalent. When mains are to be tapped under pressure, tapping valves shall conform to the above specifications and shall be fitted with a hub extension for connection to tapping saddle.

2.7 VALVE BOXES

- 2.7.1 Unless otherwise shown on the plans, all underground valves shall include a valve box. The cost of such valve box shall be included in the unit price bid for valves of the various sizes, complete in place.
- 2.7.2 Unless otherwise specified in the Detailed Specifications, the valve box shall be of an extension-type, cast iron box, consisting of three (3) pieces, suitable for the depth of covering over the pipe lines as shown on the plans. The valve box shall have a diameter of not less than five (5) inches and the minimum thickness of metal shall not be less than three-sixteenths (3/16) of an inch. The valve boxes shall be painted inside and out with asphaltum paint. Covers shall be recessed, flush with top and marked with the word "WATER" in raised letters.
- 2.7.3 Valve boxes shall be mounted vertically, centered over the valve nut, to provide easy access with a valve wrench and have a non-binding operation. A valve box shall be provided for every valve which has no gearing or operating mechanism or in which the gearing or operating mechanism is fully protected with a cast iron grease case.
- 2.7.4 A two (2) feet square by six (6) inch thick concrete collar shall also be constructed around all valve boxes as shown on the plans.

2.8 FIRE HYDRANTS

- 2.8.1 Unless otherwise specified on the plans or in the Detailed Specifications, fire hydrants shall be classified according to the diameter of the pipe and the number and size of hose connections. Caps and nozzles shall be threaded to the National Standard thread for the sizes shown on the plans or specified in the proposal.

- 2.8.2 Fire hydrant lengths shall be adjusted by a hydrant riser to correspond to the depth of the trench of established grades, and the cost of such risers shall be included in the price set out in the proposal for the hydrant complete in place.
- 2.8.3 The hydrant shall be equipped with a breakable coupling at the aboveground line unless otherwise specified on the plans or in the proposal. The hydrant shall be designed so as to make repairs to a broken hydrant without excavating the hydrant. The upper section of the barrel shall contain hose and pumper nozzles as specified.
- 2.8.4 The inlet to the hydrant shall be an elbow or hydrant shoe with a ball flange to fit branch from the main unless otherwise stated in the Detailed Specifications. The hydrant shoe shall be completely epoxy lined and coated. Drain openings shall be provided in the hydrant shoe to drain the hydrant after use.
- 2.8.5 The operating stem shall be made of epoxy coated steel and shall be sheathed in bronze or other suitable material where it passes through the stuffing box. All working parts, including main valve assembly, shall be removable through the barrel without excavating. The main valve shall be one piece and shall be fully encapsulated with **EPDM rubber**. The stem shall be unable to be removed from the main valve without the removal of a stainless steel pin. All steel and ductile iron materials shall be epoxy coated inside and out. The operating nut shall be ductile iron and shall cover the top of the hydrant to prevent weather from entering the top of hydrant. The hydrant shall utilize grease instead of oil.
- 2.8.6 The six (6) inch hydrants shall all have one standard pump nozzle and two 2½-inch hose nozzles and shall be an AVK series 27 with auxiliary gate valve or approved equivalent. The four (4) inch hydrants shall have two 2½-inch hose nozzles and shall be an AVK series 27 with auxiliary gate valve or approved equivalent.
- 2.8.7 Each fire hydrant shall be tested to 300 pounds hydrostatic pressure supplied from the inlet side; first with main valve closed for testing valve seat; second, with main valve open for testing of drain valves and strength of entire hydrant. All fire hydrants shall receive two coats of shop paint. One coat shall be as specified by the Engineer.

2.9 FLUSH HYDRANTS

- 2.9.1 Flush hydrants shall have a compression shut-off valve, a 1½ inch pentagon operating nut and one 2½-inch hose nozzle with National Standard threads that open left. This hydrant shall be a Mueller A-411 or approved equivalent. The installation of flush hydrants shall be as specified for a regular fire hydrant.

3.0 HYDROSTATIC TESTING of WATER MAINS

3.1 GENERAL

- 3.1.1 To prevent pipe movement, sufficient backfill shall be placed prior to filling the pipe with water and field testing. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surfacing. The Contractor shall ensure

that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the water main.

3.2 CROSS-CONNECTION CONTROL

- 3.2.1 When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check-valve assembly between the test and supply main or by other means approved by the Engineer. Prior to pressure and leakage testing, the temporary backflow protection should be removed and the main under test isolated from the supply main.

3.3 PVC PRESSURE AND LEAKAGE TEST

3.3.1 PROCEDURE

- a. The following procedure is based on the assumption that the pressure and leakage tests will be performed at the same time. Separate tests can be performed, if desired. If separate tests are made, the pressure test shall be completed first. Tests shall be performed only after the pipeline has been properly filled, flushed, and purged of all air. The specified test pressure shall be applied by means of an approved pumping assembly connected to the main in a manner satisfactory to the Engineer.
- b. The test pressure shall not exceed pipe or thrust-restraint design pressures. If necessary, the test pressure shall be maintained by additional pumping for the specified time during which the system and all exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. All visible leaks shall be stopped. All defective elements shall be repaired or removed and replaced. The test repeated until the allowable leakage requirements have been met.

3.3.2 TEST METHOD

- a. The Contractor can perform simultaneous pressure and leakage tests or perform separate pressure and leakage tests on the installed water mains at test durations and pressures specified in Table 2. Tests shall be witnessed by the Engineer or his representative and the equipment used for the test shall be subject to the approval of the Engineer.
- b. Any testing performed not witnessed by the Engineer or his representative shall be retested from the start of the test.

TABLE 2 System Test Methods

Procedure	Pressure	Duration of Test
Simultaneous Pressure and leakage Tests	150% of Working pressure* at point of test, but not less than 125% of normal working pressure at lowest elevation.	2 hr.
Separate Pressure Test	150 % of working pressure* at point of test, but not less than 125% of normal working pressure at lowest elevation.	1 hr.
Separate Leakage Test	150% of working pressure* of segment tested.	2 hr.

*Working pressure is defined as maximum anticipated sustained operating pressure.

3.3.3 ALLOWABLE LEAKAGE

- The Contractor shall furnish the gauges and measuring device for the leakage test, pump, pipe, connections, and all other necessary apparatus, unless otherwise specified, and shall furnish the necessary assistance to conduct the test.
- The duration of each leakage test shall be two (2) hours, unless otherwise specified. During the test, the pipeline shall be subjected to the pressure listed in Table 2.
- Leakage shall be defined as the quantity of water that must be supplied into the pipe section being tested to maintain a pressure within 5 psi of the specified leakage-test pressure after the pipe has been filled with water and the air in the pipeline has been expelled.
- No installation will be accepted if the leakage is greater than that determined by the following formula:

$$Q = LD \sqrt{P} \div 148,000$$

Where:

- Q = quantity of makeup water, in gallons per hour
- L = length of pipe section being tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the hydraulic test, in PSI (gauge)

- This formula is based on an allowable leakage of 10.5 gpd/mi/in of nominal diameter at a pressure of 150 psi.
- When testing against closed metal-seated valves, an additional leakage per closed valve of 0.078 gph/in of nominal valve size shall be allowed.
- When hydrants are in the test section, the test shall be made against closed hydrant valves.
- All visible leaks shall be repaired, regardless of the amount of leakage.

3.4 DUCTILE IRON PRESSURE AND LEAKAGE TEST

3.4.1 TEST RESTRICTIONS

- a. Test pressure shall not be less than 1¼ times the working pressure at the highest point along the test section.
- b. Test Pressure shall not exceed pipe or thrust-restraint design pressures.
- c. The hydrostatic test shall be at least a two (2) hour duration.
- d. Test pressure shall not vary by more than ±5 psi (35 MPa or 0.35 bars) for the duration of the test.
- e. Valves shall not be operated in either direction at differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests at these pressures, the test setup should include provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened, if desired.
- f. Test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

3.4.2 PRESSURIZATION

- a. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1½ times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner. Valves shall not be operated in either direction at differential pressures above the rated pressure. Good practice allows the system to stabilize at the test pressure before conducting the leakage test.

3.4.3 AIR REMOVAL

- a. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the contractor shall install corporation stopcocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation stopcocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation stopcocks shall be removed and plugged or left in place at the discretion of the Owner.

3.4.4 EXAMINATION

- a. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, hydrants, or joints that are

discovered following the pressure test shall be repaired or replaced with new material, and the test shall be repeated until satisfactory to the Owner.

3.4.5 LEAKAGE DEFINED

- a. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi (35 MPa or 0.35 bars) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

3.4.6 ALLOWABLE LEAKAGE

- a. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test,
in pounds per square inch (gauge)

- b. This formula is based on an allowable leakage of 11.65 gpd/mi/in of nominal diameter at a pressure of 150 psi.
- c. Allowable leakage at various pressures is shown in Table I.
- d. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. (0.0012 L/h/mm) of nominal valve size shall be allowed.
- e. When hydrants are in the test section, the test shall be made against closed hydrant valves.

3.4.7 ACCEPTANCE OF INSTALLATION

- a. Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in Section 3.4.6, the Contractor shall, at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.
- b. All visible leaks are to be repaired, regardless of the amount of leakage.

TABLE I Allowable Leakage per 1000 ft (305 m) of Ductile Iron Pipeline*--gph†

		Nominal Pipe Diameter--in.															
Average. Pressure psi (bar)		3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	50
450	(31)	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400	(28)	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350	(24)	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300	(21)	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275	(19)	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250	(17)	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	(16)	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200	(14)	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	(12)	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	(10)	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125	(9)	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	(7)	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

* If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

† To obtain leakage in liters/hour, multiply the values in the table by 3.785.

4.0 RESPONSIBILITY FOR MATERIAL

4.1 Responsibility for material shall be as follows:

4.2 Responsibility When Furnished by Contractor

4.2.1 The Contractor shall be responsible for all materials furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed materials discovered defective prior to the final acceptance of the work.

4.3 Responsibility When Furnished by Owner

4.3.1 The Contractor's responsibility for material furnished by the Owner shall begin at the point of delivery thereof to said Contractor. Materials located at the site shall become the Contractor's responsibility on the day of the awarding of the Contract. The Contractor shall examine all material furnished by the Owner at the time and place of delivery to him and shall reject all defective material. Any material furnished by the Owner and installed by the Contractor without discovery of such defects will, if found defective prior to final acceptance of the work, replaced defective material. The Contractor shall at his own expense furnish all supplies, labor and facilities necessary to remove said defective material and install the sound material in a manner satisfactory to the Engineer.

4.4 Responsibility for Safe Storage

4.4.1 The Contractor shall be responsible for the safe storage of material furnished by or to him and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings and other accessories shall be kept in a manner that will protect them from damage by freezing.

4.5 Replacement of Damaged Material

4.5.1 Any material furnished by the Owner that becomes damaged after acceptance by the Contractor shall be replaced at his own expense.

5.0 HANDLING OF MATERIAL

5.1 All materials shall be handled as outlined herein.

5.2 Hauling

5.2.1 All materials furnished by the Contractor shall be delivered and distributed at the site by the Contractor. Materials furnished by the Owner shall be picked up by the Contractor at points designated and hauled to and distributed at the site.

5.2.2 Pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or skids so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against

pipe already on the ground. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

5.3 Care of Pipe Coating and Lining

- 5.3.1 Pipe shall be so handled that the coating and lining will not be damaged. If any part of the coating or lining is damaged, the repair shall be made by the Contractor at his own expense in a manner satisfactory to the Engineer.

6.0 **ALIGNMENT AND GRADE**

- 6.1 Water mains shall be located as shown on the drawings, or as directed by the Engineer or his representative. The water mains shall be laid and maintained to the required lines and grades with fittings, valves and hydrants at the required locations. All spigots shall be centered in bells and all valves and hydrant stems shall be plumb.

6.2 **DEVIATIONS CAUSED BY OTHER STRUCTURES**

- 6.2.1 Whenever obstructions not shown on the plans are encountered during construction and interfere to such an extent that an alteration in the plans is required, the Engineer or his representative shall have the authority to change the plans and order a deviation from the line as shown on the plans.
- 6.2.2 The Engineer may arrange with the Owners of the structure(s) for the removal, relocation or reconstruction of the obstructions. If a deviation in the plans results in a change in the amount of work to be performed by the Contractor, the altered work shall be done on the basis of payment to the Contractor for extra work or credit to the Owner for less work.

6.3 **EXCAVATION CAUTION**

- 6.3.1 The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of any underground structures, both known and unknown, may be determined. The Contractor shall be responsible for the repair of such structures or utilities when broken or otherwise damaged because of carelessness on his part or his representative's part.

6.4 **DEPTH OF PIPE**

- 6.4.1 All pipe shall be installed according to the depth shown on the contract drawings or as required in the Detailed Specifications. Any deviation therefrom shall be made only at the order of the Engineer or his representative. Greater depths will be required for smooth transitions at points of abrupt changes in the ground surface, or under railroads, streams, county roads and highways.
- 6.4.2 Unless otherwise noted, polyvinyl chloride (PVC) pipe shall be acceptable water line material for use under roads that are not under the jurisdiction of an agency requiring higher pipe standards. The pipe cover on the State highway, county and private road crossings shall be a minimum of forty-two (42) inches over the entire right-of-way.

7.0 EXCAVATION AND PREPARATION OF THE TRENCH

7.1 The trench shall be dug so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of pipe laying as specified or permitted by the Engineer or his representative. The trench shall be so braced and drained that the workmen may work therein safely and efficiently. The sides of the trenches shall be as nearly vertical as possible, or as shown on the plans. The discharge of the trench dewatering pumps shall flow to natural drainage channels, drains or storm sewers.

7.2 Hand methods for excavation shall be used in locations shown on the drawings. In other locations, the Contractor may use trench digging machinery or employ hand methods.

7.3 WIDTH of TRENCH

7.3.1 The width of the trench shall be sufficient to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted as specified. Trenches shall be of extra width, when required, to permit the convenient placing of supports, sheeting and bracing and handling of specials.

7.4 PIPE CLEARANCE in ROCK

7.4.1 A minimum clearance to rock of six (6) inches shall be provided below and on each side of all pipe, valves, hydrants and fittings for pipe less than twenty-four (24) inches in diameter. All rock, boulders, ledge rock and other large stones shall be removed to provide this minimum of six (6) inches clearance. These clearances shall increase to a minimum of nine (9) inches for pipe twenty-four (24) inches in diameter and larger. This minimum specified clearance is a minimum clear distance which will be permitted between any part of the pipe or pipe appurtenances being laid to a point of projection such as a rock, boulder or stone.

7.4.2 All irregularities of the rock shall be filled with earth or sand that has been well rammed into place and the bottom of the trench brought to the proper grade and shape before the pipe is laid. The subgrade shall be made in backfilling with an approved material in three (3) inch compacted layers. The preparation of the subgrade shall be in accordance with the provisions outlined in following.

7.5 TRENCH PREPARATION

7.5.1 The trench shall be excavated to a minimum of three (3) inches and not more than six (6) inches below the specified grade. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in three (3) inch uncompacted layers. The layers shall be thoroughly tamped as directed by the Engineer to provide a continuous and uniform bearing and support for the pipe at every point between bell holes. The only exception is that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of eighteen (18) inches near the middle of each length of pipe for the withdrawal of pipe slings or other lifting tackle. The finished subgrade shall be prepared accurately by means of hand tools. Excavations carried below the grade specified on the plans, by the Engineer or his representative shall be backfilled at the Contractor's expense with earth, sand, gravel, or concrete as directed by the Engineer or his representative and thoroughly compacted.

7.5.2 The subgrade beneath the centerline of the pipe shall be finished to within 0.03 feet of a straight line between pipe joints and all tolerances shall be above the specified grade. If, in the opinion of the Engineer, soil conditions are encountered at subgrade which require all or part of the work to be done in accordance with Section 7.7, the Engineer shall have the authority to order the work to be done and the Contractor will be allowed extra compensation for the additional work.

7.6 EXCAVATION in POOR SOIL and REFILLING to GRADE

7.6.1 Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetation or other organic materials, or large pieces or fragments of inorganic material which in the judgment of the Engineer or his representative should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. Before the pipe is placed, the subgrade shall be made by backfilling with an approved material in three (3) inch compacted layers. The remainder of the installation of the pipe and preparation of the subgrade shall be in accordance with the specifications outlined in Section 7.5 above.

7.7 SPECIAL FOUNDATION IN POOR SOIL

7.7.1 Where the bottom of the trench at subgrade is found to consist of material which is unstable to such a degree that, in the opinion of the Engineer, it cannot be removed and replaced with an approved material thoroughly compacted in place to support the pipe properly, the Contractor shall construct a foundation to support the pipe, consisting of piling or other materials, in accordance with plans prepared by the Engineer. Extra compensation will be allowed for the additional work.

7.8 SUBGRADE IN ROCK TRENCHES

7.8.1 Where excavation is made in rock or boulders and the clearance specified in Section 7.4 is provided, the subgrade shall be made in backfilling with an approved material in three (3) inch uncompacted layers. The preparation of the subgrade and the installation of the pipe shall be in accordance with the provisions outlined in Section 7.5 above.

7.9 ROCK EXCAVATION

7.9.1 Trench excavation will be unclassified unless the Detailed Specifications and proposal make a provision for payment for rock excavation. Otherwise, it is not a separate pay item and its cost shall be included in the unit prices bid for the various items of construction listed.

7.9.2 The word "rock", wherever used as the name of an excavated material, shall be defined as boulders and pieces of concrete or masonry exceeding 250 pounds in weight or solid ledge rock which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging or barring, or disintegrating with a power-operated hand tool.

7.9.3 No soft or disintegrated rock which can be removed with a hand pick or a 5/8 cubic yard backhoe, under reasonable operating procedures; no loose, shaked or previously blasted rock or broken stone in rock filling or elsewhere shall be considered "rock." Also, no rock

exterior to the minimum limits of measurement allowed which may fall into the excavation will be measured or allowed.

7.10 BLASTING

7.10.1 The use of dynamite or other blasting materials will be permitted upon approval of the Engineer. This approval will be contingent upon the Contractor having taken all adequate safety precautions to protect persons and property. The hours of blasting shall be fixed by the Engineer. Any damage resulting from any necessary blasting shall be paid by the Contractor at his own expense. The Contractor's methods and procedures shall conform to all local and State laws and ordinances.

7.11 OCCUPATIONAL SAFETY and HEALTH ACT of 1970

7.11.1 Requirement for protective systems. Contractor shall be comply with the Standard for Excavation and Trenches Safety Systems, 29 CFR, Part 1926, Subpart P, of the Occupational Safety and Health Administration.

7.12 SURFACE MATERIAL REUSE

7.12.1 All surface materials which, in the opinion of the Engineer or his representative, are suitable for reuse in restoring the surface shall be kept separate from the general excavation material as directed.

7.13 PILING EXCAVATED MATERIAL

7.13.1 All excavated material shall be stockpiled in a manner that will not endanger the work and will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible while work is being completed.

7.13.2 Gutters shall be kept clear or other satisfactory provisions made for street drainage. Natural water courses shall not be obstructed. In the event that it is necessary to place the excavated materials on any sidewalk, the Contractor shall keep the excavated materials a minimum of four (4) feet from the front of all buildings and from the inner portion of the sidewalk.

7.14 BARRICADES, GUARDS and SAFETY PROVISIONS

7.14.1 To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards, as required, shall be placed and maintained during the progress of the construction and until it is safe for traffic to use the roadway. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lighting when visibility is poor. The rules and regulations of the local authorities respecting safety provisions shall be observed and the contractor shall be in compliance with the Manual on "Uniform Traffic Control Devices."

7.15 TRAFFIC MAINTENANCE AND CLOSING OF STREETS

- 7.15.1 The Contractor shall perform the work which will cause the least interruption to traffic and may close to through travel not more than two (2) consecutive blocks, including the cross-street intersected. The Contractor shall post, where directed by the Engineer or his representative, suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic.
- 7.15.2 Where traffic must cross open trenches, the Contractor shall provide suitable bridges or bypasses, as required, for the proper handling of traffic on streets and driveways. Barricades and other warning devices shall be provided at such locations as required by the Engineer to provide safety for the general public.

7.16 STRUCTURE PROTECTION

- 7.16.1 Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his expense and under the direction of the Engineer. All structures which may have been disturbed shall be restored upon completion of the work.

7.17 PROTECTION OF PROPERTY AND SURFACE STRUCTURES

- 7.17.1 Trees, shrubbery, fences, poles and all other property and surfaces structures shall be protected unless their removal is shown on the plans or is authorized by the Engineer. When it is necessary to cut roots and tree branches, the cutting shall be done under the supervision and direction of the Engineer or his representative. No excavated material shall be placed that could injure trees or shrubs.
- 7.17.2 All broken branches shall be neatly cut off with a saw or approved method and stumps shall be treated, if the tree's health is threatened.
- 7.17.3 Trees or shrubs damaged or destroyed by the Contractor shall be replaced by him with new stock of a similar size and age and at the proper season. They shall be replaced at the sole expense of the Contractor.

7.18 LICENSES AND PERMITS

- 7.18.1 Unless otherwise stated in the Detailed Specifications, the Owner shall obtain the necessary permits for Street, Highway, County Road and Railroad Crossings required by the respective agencies and local ordinances. The Owner will pay any deposits required by the respective entities to insure satisfactory restoration of the properties involved. The Owner shall deduct that amount from the first payment due the Contractor until final approval and acceptance of the work by the Engineer at which time the deposit shall be refunded. In the event the Contractor posts the necessary bonds, no deposit will be withheld. Under no circumstances shall the Contractor proceed with any street, road, highway or railroad crossing until the required permit for such crossing has been obtained and the necessary bond posted.

- 7.18.2 The Contractor shall comply with all applicable laws, ordinances, rules and regulations relating to the work.

8.0 WATER MAIN INSTALLATION

8.1 LAYING PIPE

- 8.1.1 Every precaution shall be used to protect pipe against the entrance of foreign material before the pipe is placed in the new trench. At the close of the day's work, or whenever the workmen are absent from the job site, the end of the last laid section of pipe shall be plugged, capped or otherwise tightly closed to prevent the entry of any foreign material.
- 8.1.2 If the Contractor's pipe laying crew cannot put the pipe in place in the trench without getting soil into the pipe, the Engineer or his representative may require that before lowering the pipe into the trench, a canvas or plastic bag shall be placed over each end and left there until the connection is to be made to the adjacent pipe.

8.2 PREVENTION of TRENCH WATER from ENTERING PIPE

- 8.2.1 At times when pipe laying is not in progress, the open end of the pipe shall be closed by a watertight plug or other means approved by the Engineer or his representative. If water is in the trench, the seal shall remain in place until the trench is dewatered.

8.3 TRACER WIRE

- 8.3.1 Tracer wire shall be installed with all water mains and service lines. The tracer wire shall extend into and to the top of all valve boxes, underground vaults and any other water appurtenances where the tracer wire would be accessible to connecting an electronic locator device.
- 8.3.2 Tracer wire shall consist of a #14 AWG solid, single conductor, insulated copper wire and shall lay along the side of all piping and service lines and shall be within 6 inches on every side of the pipe installed as directed by the Engineer's Construction Observer.
- 8.3.3 All tracer wire connections are to be made by stripping the insulation from the wire and using Burndy crimp connections. All connections shall be waterproofed and protected using an epoxy filled, heat shrink wrap. Any other connection types shall be approved by the Engineer.
- 8.3.4 All tracer wire shall be tested using an Ohm meter once a section of water main has been installed and end points developed. This test shall be done in the presence of the Engineer's Representative. Also if a portion of the water main is uncovered (i.e. leak detection) the Contractor shall retest the tracer wire for continuity after all repairs are completed.

9.0 INSTALLING VALVES AND FITTINGS

- 9.1 Valves, fittings, plugs and caps shall be installed and jointed to pipe in the following manner specified for cleaning, laying and jointing pipe.

9.2 LOCATION OF VALVES

- 9.2.1 Valves in water mains shall, where possible, be located as shown on the plans, or as directed by the Engineer or his representative.

9.3 VALVE BOXES AND VALVE PITS

- 9.3.1 A valve box or a masonry pit shall be provided for each valve.
- 9.3.2 The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve to provide easy access with a valve wrench and operate with a non-binding operation. The box cover shall be flush with the surface of the finished pavement or other level as may be directed. A two (2) feet square by six (6) inch thick concrete collar shall be constructed around all valve boxes as shown on the plans.
- 9.3.3 A masonry valve pit shall be provided for every valve which has exposed gearing or operating mechanisms. The valve nut shall be readily accessible for operation through the opening of a manhole, which shall be set flush with the surface of the finished pavement or other such level as may be specified. Pits shall be so constructed as to permit minor valve repairs and afford protection to the valve and pipe from impact where they pass through the pit walls.

9.4 DRAINAGE OF MAINS

- 9.4.1 Drainage branches, blow-offs, air vents and appurtenances shall be provided with gate valves and shall be located and installed as shown on the plans. Drainage branches or blow-offs shall not be connected to any sewer, submerged in any stream or be installed in any other manner that will permit back-siphon into the water distribution system.

9.5 DEAD ENDS

- 9.5.1 All dead ends on new mains shall be closed with cast iron plugs or caps and a flush hydrant, or as shown on the drawings.

10.0 INSTALLING HYDRANTS

10.1 LOCATION

- 10.1.1 Hydrants and flush hydrants shall be located as shown on the plans or as directed by the Engineer, and in a manner to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. When placed beyond the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than six (6) inches nor more than twelve (12) inches from the back of the curb, unless otherwise approved. When set in the parkway between the sidewalk and the property line, no portion of the hydrant or hose nozzle cap shall be within six (6) inches of the sidewalk.

10.2 POSITION

- 10.2.1 All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb or roadway. Hydrants with a pumper nozzle shall face the curb or roadway.

Hydrants having two hose nozzles 90° apart shall be set with each nozzle facing the curb or roadway at an angle of 45°. Hydrants shall be set to the established grade, with the nozzles at least twelve (12) inches above the ground, as shown or as directed by the Engineer or his representative.

10.3 CONNECTION TO THE MAIN

10.3.1 Each hydrant shall be connected to the main with a six (6) inch ductile iron branch controlled by an independent six (6) inch gate valve, unless otherwise specified.

10.4 HYDRANT DRAINAGE IN IMPERVIOUS SOIL

10.4.1 Wherever a hydrant is set in clay or other impervious soil, a drainage pit two (2) feet in diameter and three (3) feet deep shall be excavated below each hydrant and filled with a compacted coarse gravel or crushed stone mixed with coarse sand, under and around the elbow of the hydrant and to a level of six (6) inches above the waste opening. No drainage pit shall be connected to a sewer.

10.5 HYDRANT USAGE

10.5.1 Hydrants shall remain covered with visqueen plastic until the water main has been approved for usage.

11.0 ANCHORAGE

11.1 ANCHORAGE FOR HYDRANTS

11.1.1 The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with concrete backing and shall be tied to the pipe with suitable restraining glands, metal tie rods or clamps, as shown or as directed by the Engineer.

11.2 ANCHORAGE FOR PLUGS, CAPS, TEES AND BENDS

11.2.1 All plugs, caps, tees and bends deflecting 22½° or more on mains eight (8) inches in diameter or larger shall be provided with a reaction backing and shall use suitable restraining gland, metal rods or clamps as shown or specified. All plugs, caps, tees and bends deflecting 22½° or more on mains less than eight (8) inches in diameter shall be backed as shown on the Typical Details sheet of the plans.

11.2.2 Backing shall be of concrete, as specified, and shall be placed between the solid wall of the trench and the fittings to be anchored. The reaction block on the unused branch of a fitting shall be poured separately from the block across the back of the fitting.

11.3 REACTION BACKING CONCRETE

11.3.1 Reaction backing shall be concrete of a mix not leaner than one part cement, two and one-half parts sand, and five parts stone, and having a compressive strength of not less than 3,000 psi at 28 days. Backing shall be placed between the solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground, in each instance, shall be that shown or directed by the Engineer or his representative. The backing shall, unless

otherwise shown or directed, be placed so the pipe, fitting joints and bolts will be accessible for repair. All fittings shall be enclosed in plastic before backing is placed so concrete will not attach to the fitting, glands and bolts.

11.4 METAL HARNESS

11.4.1 Metal harness of tie rods or clamps of adequate strength to prevent movement may be used instead of concrete backing, as directed by the Engineer. Steel rods or clamps shall be rustproof treated or shall be painted as directed by the Engineer.

11.5 RESTRAINING GLANDS

11.5.1 Restraining glands can be used to prevent movement instead of concrete backing or metal harnesses. The restraining glands shall be manufactured by EBAA Iron, Inc. or equivalent.

12.0 BACKFILLING

12.1 GENERAL

12.1.1 Backfilling shall follow close behind completed installation of water mains.

12.1.2 All backfill material shall be free from cinders, ashes, refuse, vegetation or organic material, boulders, rock or stone, or other material which in the opinion of the Engineer or his representative, is unsuitable. However, from one (1) foot above the top of the pipe to the subgrade of the pavement, material containing stones up to eight (8) inches in their greatest dimension may be used, unless specified otherwise herein.

12.2 USE of EXCAVATED MATERIAL as BACKFILL

12.2.1 When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material. This material shall consist of loam, clay, sand, gravel or other materials which, in the opinion of the Engineer or his representative, are suitable for backfilling. Where excavated material is indicated on the drawings or specified for backfill and there is a deficiency due to a rejection of part thereof by the Engineer or his representative, the Contractor shall furnish the required amount of sand, gravel or other approved material. The trench shall be backfilled with select materials by hand or by approved mechanical methods.

12.3 BEDDING MATERIAL

12.3.1 Where bedding material is indicated on the drawings or specified herein and in the opinion of the Engineer or his representative should be used in any part of the work, the Contractor shall furnish and backfill with bedding material as directed, as an extra. The bedding material shall be as a No. 6 (ASTM C33, latest revision) and shall have a maximum particle size of $\frac{3}{4}$ inch and have at least 30% passing the $\frac{3}{8}$ inch sieve.

12.4 BACKFILLING UNDER the PIPE

12.4.1 All trenches, whether the pipe, fittings and appurtenances are laid on a flat bottom at subgrade, laid on a fill or laid on blocking, shall be backfilled **“by hand”** from the bottom

of the trench to the centerline of the pipe with an approved material placed in layers of three (3) inches, and compacted by tamping. Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously.

12.5 BACKFILLING OVER the PIPE

12.5.1 From the centerline of the pipe, fittings and appurtenances to a depth of six (6) inches above the top of the pipe, the trench shall be backfilled with select materials by hand or by approved mechanical methods. The Contractor shall use special care in placing this portion of the backfill so as to avoid injury or moving of the pipe. The select material used for bedding over the pipe shall meet the criteria stated in Section 12.3.

12.6 BACKFILLING to GRADE

12.6.1 From a minimum of six (6) inches above the pipe to the grade shown on the drawings or specified herein, the trench shall be backfilled by hand or approved mechanical methods.

12.7 BACKFILLING UNDER PERMANENT PAVEMENT

12.7.1 Where the excavation is made through permanent pavement, curbs, driveways or sidewalks, or where such structures are undercut by the excavation, the entire backfill to the subgrade of the structures shall be made with select materials. The top twelve (12") inches of material shall be SB-2 baserock under these structures. Such material shall be thoroughly compacted with mechanical tamps to the base of the surface to be replaced. Walks and driveways consisting of broken stone, gravel, slag or cinders shall not be considered as being of permanent construction.

12.8 BACKFILLING WHERE SETTLEMENT is UNIMPORTANT

12.8.1 Unless otherwise specified, the Contractor may backfill the trench from one (1) foot above the pipe to the top of the trench with the excavated material, and the backfill shall be neatly rounded over the trench to a sufficient height to allow for settlement or grade after consolidation.

12.9 BACKFILLING in FREEZING WEATHER

12.9.1 Backfilling shall not be done in freezing weather except by permission of the Engineer, and shall not be made with frozen material. No fill shall be made where the material already in the trench is frozen.

13.0 REMOVAL, RESTORATION AND MAINTENANCE OF SURFACE

13.1 PAVEMENT REMOVAL

13.1.1 The Contractor shall remove pavement and road surfaces as part of the trench excavation. The amount removed shall depend upon the width of trench specified for the installation of the pipe and the width and length of the pavement area required to be removed for the installation of gate valves, specials, or other structures. The width of pavement removed along the normal trench for the installation of the pipe shall not exceed the width of the trench specified by more than six (6) inches on each side of the trench. The width and

lengths of the pavement removed for the installation of gate valves, specials, or other structures shall not exceed the maximum linear dimensions of such structures by more than six (6) inches each side.

- 13.1.2 Wherever, in the opinion of the Engineer, existing conditions make it necessary or advisable to remove additional pavement, the Contractor shall remove it as directed and shall receive extra compensation, provided such additional work is not shown on the drawings or specified.
- 13.1.3 The Contractor shall use such methods, either saw cut, drilling or chipping, as will assure the breaking of the pavement along straight lines. The cut surface of the remaining pavement shall be approximately vertical.
- 13.1.4 If the Contractor removes or damages pavement or surfaces beyond the limits specified above, such pavement and surfaces shall be replaced or repaired at the expense of the Contractor.

13.2 RESTORATION of DAMAGED PROPERTY and SURFACES

- 13.2.1 Where any pavement, trees, shrubbery, fences, poles or other property and surface structures have been damaged, removed or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the contract documents, State laws, municipal ordinances or the specified direction of the Engineer; or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor.

13.3 REPLACEMENT of STRUCTURES and PAVEMENT by the CONTRACTOR

- 13.3.1 The Contractor shall restore, unless otherwise stipulated, all pavement, sidewalks, curbing, gutters, shrubbery, fences, poles or other property and surface structures removed or disturbed as a part of the work to an equal to or better condition than before the work began, furnishing all labor and materials incidental thereto. In restoring pavement, the condition of the backfill shall be such as to properly support the pavement.

13.4 CLEAN UP

- 13.4.1 All surplus water main materials furnished by the Contractor and all tools and temporary structures shall be removed from the site by the Contractor. All dirt, rubbish and excess earth from the excavation site shall be hauled to a dump provided by the Contractor and disposed in accordance with State and local Solid Waste laws and ordinances. The work site shall be left clean to the satisfaction of the Engineer and Owner. All surplus water main materials furnished by the Owner and delivered to the site by the Contractor shall be removed and delivered by the Contractor to a location designated by the Owner.
- 13.4.2 The trenches shall be maintained for a period of one (1) year in such a manner that no standing water will occur over the trenches.

14.0 OTHER INSTALLATION REQUIREMENTS

14.1 HORIZONTAL & VERTICAL SEPARATION of WATER MAINS and SEWERS

14.1.1 Wherever water mains parallel existing or proposed sewer mains, there shall be ten (10) feet, horizontally, between the mains.

14.1.2 Whenever water mains must cross house sewers, storm or sanitary sewers, the water main shall be laid twenty-four (24) inches above the top of the drain or sewer. The vertical separation shall be maintained for that portion of the water main located within ten (10) feet horizontally of any sewer or drain the water main crosses. Said ten (10) feet to be measured as the normal distance from the water main to the storm or sanitary sewer.

14.1.3 No water main shall pass through or contact any part of a sewer or storm manhole.

14.2 CONNECTION TO EXISTING LINES

14.2.1 Where connections to existing lines are to be made, the fittings shown on the plans shall be installed. If fittings are not specified, then the fittings necessary to make the proper connections shall be installed. Wherever crosses or tees are installed for future connections, the section of the fitting not being used shall be plugged with a standard cast iron plug or cap and properly backed with concrete.

14.2.2 Whenever it is necessary to connect existing lines, the Contractor shall notify the Water and Sewer Superintendents of the Owner at least 24 hours prior to the time he is prepared to make the connection. Upon agreement with the Engineer and Owner, an agreed time shall be set for the connection to be installed. If water service is to be interrupted, the time for connection installation shall be at the discretion of the Water Superintendent and Engineer. Then the Contractor shall make the connection at the specified time.

14.2.3 When making connections to existing water lines, it is extremely important that the Contractor shall make the connections as quickly as possible. The water service shall not be interrupted until the Contractor is completely prepared to the satisfaction of the Engineer and/or Owner. No valves or hydrants in service shall be opened or closed by anyone other than persons authorized by the Owner.

14.2.4 Where connections, other than service taps, are to be made to water lines in service, standard cutting-in sleeves and valves shall be used. The sleeves shall be installed according to the recommendation of the manufacturer with all necessary equipment. The cut shall be performed in the presence of the Engineer and the Water Superintendent of the Owner to quickly assist if trouble arises.

14.2.5 Cutting-in sleeves and valves shall be Mueller or approved equivalent.

14.2.6 Where tees, valves, crosses or other fittings are to be installed in existing lines, a section of sufficient length of the existing line shall be removed to allow for the installation of the fittings, a short section of pipe and a connection sleeve. The use of so-called cutting-in valves, tees or crosses will not be permitted. In all cases, sufficient room for joints as herein specified shall be provided.

14.3 HIGHWAY & COUNTY CROSSINGS

- 14.3.1 Where water mains are to be constructed along and/or cross Townships, County, State or Federal highways, the Contractor shall have a permit from the governing highway department before commencing any work within the limits of the rights-of-way.
- 14.3.2 The Owner will obtain the necessary permits for the Contractor (unless stated otherwise in the Special Conditions). But it shall be the Contractor's responsibility to give the Engineer adequate notice of his need for the permit. The costs shall be as outlined in Section 7.18.
- 14.3.3 Unless special permission is given otherwise by the governing highway authority, the Contractor shall install all water mains crossing highways by boring and jacking methods to the lines and grades established in the plans. Casing pipe will be of the size and type as shown on the plans and/or specified by the Engineer. Casing vents shall be added to each end as required by the permit.
- 14.3.4 The methods of jacking shall be subject to the Engineer's approval. The casing shall be jacked into the fill as the boring auger drills out the fill. Once boring and jacking operations commence, they shall be continued in successive shifts until the boring and jacking operations have been completed.

14.4 RAILROAD CROSSINGS

- 14.4.1 Where water lines are to be constructed along and/or cross railroad right-of-way, the Contractor shall have a permit from the railroad to construct the proposed water mains.
- 14.4.2 The Owner will obtain the necessary permits for the Contractor (unless stated otherwise in the Special Conditions). But it shall be the Contractor's responsibility to give the Engineer adequate notice of his need for the permit. The costs shall be as outlined in Section 7.18.
- 14.4.3 The water main crossing railways shall be installed like highway crossings unless special permission is given otherwise by the railroad authority.

14.5 PIPELINE CROSSINGS

- 14.5.1 Where water lines are to be constructed along and/or cross pipeline right-of-way, the Contractor shall have a permit from the pipeline to construct the proposed water mains.
- 14.5.2 The Owner will obtain the necessary permits for the Contractor (unless stated otherwise in the Special Conditions). But it shall be the Contractor's responsibility to give the Engineer adequate notice of his need for the permit. The costs shall be as outlined in Section 7.18.
- 14.5.3 The locations and method of crossing shall be given by the Engineer and the pipeline company. The Contractor shall give proper notice (48 hours) of his intent to construct the crossing to the Engineer and the pipeline company so that the required representatives can be present during construction of the crossing.

14.6 RIVER CROSSINGS

- 14.6.1 The Contractor shall make special provisions for the river crossings shown on the plans. The water main shall be installed with the minimum of thirty (30) inches of cover below the river bed and shall be placed through a casing as shown on the plans.
- 14.6.2 The ends of the casing shall extend five (5) feet beyond the normal river bed limits or to a point where the ground elevation is three (3) feet higher than the normal water level.
- 14.6.3 A concrete anchor of at least three (3) cubic feet shall be placed over the casing at each end.

15.0 PROTECTION and PAINTING

- 15.1 All flanges shall be protected during shipment by wooden covers.
- 15.2 All ferrous parts of valves and appurtenances installed on piping shall have an epoxy coating of at least 10 mils of thickness to protect all surfaces. The interior coating shall comply with AWWA C550, latest revision, and be certified to NSF 61. The exterior coating must be suitable for field coats on the outside, applied in accordance with the instructions of the manufacturer and also comply with AWWA C550, latest revision.
- 15.3 Valve boxes shall be given two (2) shop coats of asphaltum varnish or coaltar coating.
- 15.4 All unfinished parts shall be coated with grease to prevent corrosion during shipment and installation.

16.0 DISINFECTION OF PIPE

- 16.1 Disinfection of water mains shall be in accordance with AWWA C651, latest revision and should be limited to sections less than 1,000 feet in length.
- 16.2 All pipe shall be disinfected after installation is complete by sustaining a chlorine solution of at least 50 ppm strength in the pipe for 24 hours. At the end of the 24-hour period, the treated water shall contain a minimum of 25 ppm chlorine through the length of the main.
- 16.3 Sterilization may be conducted in conjunction with the leak test, as outlined in Section 3.0.
- 16.4 After the water lines are sterilized, they shall be thoroughly flushed, filled with water from the system. Samples then shall be taken by the Contractor from each of the respective sections of the lines and tested by an approved laboratory. The lines shall not be accepted and placed in operation until two consecutive samples, a minimum of 24 hours apart, showing negative reports are received for each respective section.
- 16.5 During and after disinfection of the mains, the Engineer will give the Contractor reasonable notice to enable the Contractor to have a competent representative present whenever valves must be operated that will affect the pressure in any part of the work for which the Contractor is responsible.

17.0 PAYMENT

- 17.1 Unless otherwise spelled out in the proposal or the Detailed Specifications, payment for pipe shall be according to the actual measurements of lineal feet of pipe, completed in place. No deduction shall be made for valves, fittings, hydrants or other specials included in the length of the line. Measurements shall be made from centerline of connections to end of line or centerline of hydrant, valve or other fitting placed at the end of any main or branch line. If pipe is joined to fittings in place, then measurements shall be taken from the end of the first piece of pipe laid.
- 17.3 In special structures such as creek crossings or other items in which lump sum or other methods of payment include payment for pipe and fittings, these pipe and fittings shall not be included in the unit measured for payment for pipe in place.

GENERAL SPECIFICATIONS

CAST-IN-PLACE CONCRETE

GENERAL1

2.0	SUBMITTALS	1
3.0	QUALITY ASSURANCE	1
4.0	CONCRETE TESTING SERVICE	2
5.0	QUALITY CONTROL TESTING DURING CONSTRUCTION	2

PRODUCTS

1.0	FORM MATERIALS	3
2.0	REINFORCING MATERIALS	3
3.0	CONCRETE MATERIALS	4

CLASSIFICATION OF CONCRETE6

CLASSIFICATION AND PROPORTIONING6

1.0	GENERAL	6
2.0	PROPORTIONING AND DESIGN OF MIXES	7

EXECUTION

1.0	GENERAL	9
2.0	FORMS	9
3.0	PLACING REINFORCEMENT	10
4.0	ANCHOR BOLTS, DOWELS AND CORNER BARS	11
5.0	JOINTS	11
6.0	INSTALLATION OF EMBEDDED ITEMS	13
7.0	PREPARATION OF FORM SURFACES	13
8.0	CONCRETE PLACEMENT	13
9.0	FINISH OF FORMED SURFACES	16
10.0	MONOLITHIC SLAB FINISHES	16
11.0	CONCRETE CURING AND PROTECTION	17
12.0	REMOVAL OF FORMS	18
13.0	REUSE OF FORMS	18
14.0	MISCELLANEOUS CONCRETE ITEMS	19
15.0	CONCRETE SURFACE REPAIRS	19
16.0	MEASUREMENT	21
17.0	PAYMENT	21

1.0 GENERAL

- 1.1 Cast-in-place concrete in structures, tanks, bridges, culverts and miscellaneous work, including the concrete portions of steel, timber, stone masonry and composite structures, shall be prepared and constructed in accordance with these specifications and conform to the lines, grades, dimensions and designs shown on the plans.
- 1.2 This Section specifies all labor, materials, equipment and supervision necessary for cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes, plus requirements for submittals and testing included in the Contract. All materials making the composition of the concrete shall satisfy the requirements specified in this Section.

2.0 SUBMITTALS

- 2.1 GENERAL: Submit the following in accordance with General Conditions.
- 2.2 PRODUCT DATA: Submit product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, finishing materials and others as requested by Engineer.
- 2.3 REINFORCEMENT SHOP DRAWINGS: Submit shop drawings for reinforcement, prepared by registered Professional Engineer, for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (latest revision), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures. Contractor shall submit a certification as to the grade of all reinforcing.
- 2.4 SAMPLES: Submit samples of materials, including names, sources, and descriptions, as follows:
- | | |
|--------------------------|------------------------|
| Normal weight aggregates | Lightweight aggregates |
| Fibrous reinforcement | Reglets |
| Waterstops | Vapor retarder |
- 2.4.1 Any other products included in the Work related to concrete construction.
- 2.5 LABORATORY TEST REPORTS: Submit laboratory test reports for concrete materials and mix design test.
- 2.6 MATERIALS CERTIFICATES: Submit materials certificates instead of materials laboratory test reports when permitted by Engineer. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride complies with specification requirements.

3.0 QUALITY ASSURANCE

- 3.1 CODES AND STANDARDS: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

ACI 318, "Building Code Requirements for Reinforced Concrete."

4.0 CONCRETE TESTING SERVICE

- 4.1 Engage a testing laboratory acceptable to Engineer to perform material evaluation tests and design concrete mixes.
- 4.2 Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

5.0 QUALITY CONTROL TESTING DURING CONSTRUCTION

- 5.0.1 The Contractor will employ a testing laboratory to perform tests and to submit test reports.
- 5.0.2 Sampling and testing for quality control during placement of concrete may include the following, as directed by Engineer.
- 5.1 **SAMPLING FRESH CONCRETE:** ASTM C172 (latest revision) except modified for slump to comply with ASTM C94 (latest revision).
- 5.2 **SLUMP:** ASTM C143 (latest revision); one test at point of discharge for each twelve (12) cubic yards of concrete poured of each type of concrete; additional tests when concrete consistency seems to have changed.
- 5.3 **AIR CONTENT:** ASTM C173 (latest revision); volumetric method for lightweight or normal weight concrete; ASTM C231 (latest revision) pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- 5.4 **CONCRETE TEMPERATURE:** Test hourly when air temperature is 40°F(4°C) and below or when above 80°F (27°C) and each time compression test specimens are made.
- 5.5 **COMPRESSION TEST SPECIMEN:** ASTM C31 (latest revision); one set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
- 5.6 **COMPRESSIVE STRENGTH TESTS:** ASTM C39 (latest revision); one (1) set for each day's pour exceeding five (5) cubic yards plus additional sets for each fifty (50) cubic yards more than the first twenty-five (25) cubic yards of each concrete class placed in any one (1) day. A set shall consist of one (1) specimen tested at seven (7) days, two specimens tested at twenty-eight (28) days, and one (1) specimen retained for later testing, if required.
 - 5.6.1 When frequency of testing will provide fewer than five (5) strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch, if fewer than five (5) are used.
 - 5.6.2 Test results will be reported in writing to Engineer, Ready-Mix Producer, and Contractor within 72 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix

proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

- 5.7 NONDESTRUCTIVE TESTING: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- 5.8 ADDITIONAL TESTS: The testing service will make additional tests of in-place concrete when compression strength test results indicate specified concrete strengths or other characteristics have not been attained in the structure, as directed by Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 (latest revision) or by other methods as directed. Contractor shall pay for all such tests under this Section 5.8.

PRODUCTS

1.0 FORM MATERIALS

- 1.1 FORMS FOR EXPOSED FINISH CONCRETE: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaced. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- 1.2 FORMS FOR UNEXPOSED FINISH CONCRETE: Plywood, metal, lumber, metal, or other acceptable material. Provide lumber dressed on at least two (2) edges and one (1) side for tight fit.
- 1.3 FORM COATINGS: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- 1.4 FORM TIES: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spilling concrete upon removal. Provide units that will leave no metal closer than 1½ inches to exposed surface.
 - 1.4.1 Provide ties that, when removed, will leave holes less than one (1) inch diameter in concrete surface.

2.0 REINFORCING MATERIALS

- 2.1 REINFORCING BARS: ASTM A615 (latest revision) Grade 60, deformed.
- 2.2 STEEL WIRE: ASTM A82 (latest revision) plain, cold-drawn steel.
- 2.3 WELDED WIRE FABRIC: ASTM A185 (latest revision) welded steel wire fabric; 55,000 psi minimum tensile strength.
- 2.4 WELDED DEFORMED STEEL WIRE FABRIC: ASTM A497 (latest revision).

- 2.5 **SUPPORTS FOR REINFORCEMENTS:** Bolsters, chairs, spacers, and other devices shall be used for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
- 2.5.1 For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- 2.5.2 For exposed-to-view concrete surfaces, where support legs are in contact with forms, provide supports legs that are plastic coated (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

3.0 CONCRETE MATERIALS

- 3.1 **PORTLAND CEMENT:** ASTM C150 (latest revision) Type II. Use only one brand of cement throughout project unless otherwise acceptable to Engineer.
- 3.2 **FLY ASH:** ASTM C618 (latest revision) Type C.
- 3.3 **NORMAL WEIGHT AGGREGATES:** ASTM C33 (latest revision) and as herein specified. Provide aggregates from a single source for exposed concrete. For exterior exposed surfaces, do not use fine or coarse aggregates containing deleterious substances.
- 3.3.1 **FINE AGGREGATES:** Fine aggregate shall consist of sand having clean, hard, durable uncoated grains, free from deleterious substances, including lignite. Fine aggregate shall range in size from fine to coarse within the following percentage by weight:

Passing $\frac{3}{8}$ " Sieve	Not less than 100%
Passing #4 Sieve	95 to 100%
Passing #16 Sieve	50 to 85%
Passing #50 Sieve	10 to 30%
Passing #100 Sieve	2 to 10%

- 3.3.2 **COARSE AGGREGATE:** Coarse aggregate shall consist of a clean, well-graded, hard, durable crushed stone or washed gravel. It shall be free from soft, thin, elongated, or other deleterious matter. Coarse aggregate shall contain no lumps of frozen or partially cemented materials. Coarse aggregate shall be well-graded from coarse to fine within the following percentages by weight:

Passing $1\frac{1}{2}$ " Sieve	Not less than 100%
Passing 1" Sieve	90 to 100%
Passing $\frac{3}{4}$ " Sieve	20 to 55%
Passing $\frac{1}{2}$ " Sieve	0 to 10%
Passing $\frac{3}{8}$ " Sieve	0 to 5%

- 3.4 **LIGHTWEIGHT AGGREGATES:** ASTM C330 (latest revision), lightweight aggregates prepared by processing natural materials such as pumice, scoria, or tuff shall be used.
- 3.5 **WATER:** Potable
- 3.6 **GENERAL ADMIXTURES:** No admixtures for concrete shall contain more than 0.1% chloride ions.

- 3.7 AIR-ENTRAINING ADMIXTURE: ASTM C260 (latest revision) certified by manufacturer to be compatible with other required admixtures. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Darex AEA" or "Daravair," W.R. Grace & Co.

"MB-VR" or "Micro-Air," Master Builders, Inc.

- 3.8 WATER REDUCING ADMIXTURE: ASTM C494 (latest revision) Type A. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"WRDA," W.R. Grace & Co.

"Pozzolith Normal" or "Polyheed," Master Builders, Inc.

- 3.9 HIGH-RANGE WATER-REDUCING ADMIXTURE (Super Plasticizer): ASTM C494 (latest revision) Type F or G. Available Products: Subject to compliance requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Rheobuild," Master Builders, Inc.

"WRDA 19" or "Daracem," W.R. Grace & Co.

- 3.10 WATER-REDUCING, ACCELERATING ADMIXTURE: ASTM C494 (latest revision) Type E. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Daraset," W.R. Grace & Co.

"Pozzutec 20," Master Builders, Inc.

- 3.11 WATER-REDUCING, RETARDING ADMIXTURE: ASTM C494 (latest revision) Type D. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Dartard-17," W.R. Grace & Co.

"Pozzulith R," Master Builders, Inc.

3.12 RELATED MATERIALS

- 3.12.1 Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provided reglets of not less than 0.0217" thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

- 3.12.2 Waterstops: Provide flat, center bulb-type waterstops at all construction joints and other joints where as indicated. Vertical waterstops shall be split to allow mounting to vertical form. Size to suit joints. The minimum water stop size shall be six (6) inch.

- a. Under conditions where waterstops need to be attached to reinforcement, the waterstops shall be as manufactured by Murphy Plastics or equivalent.

- 3.12.3 Granule Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- 3.12.4 Vapor Barrier: 6 mil polyethylene sheeting in widest practical widths.
- 3.12.5 Expansion Joint Filler: Rigid closed cell plastic foam insulation board.
- 3.12.6 Curing Compound: ASTM C309 (latest revision) Type I certified compatible with adhesive or bonding for scheduled floor surfaces and finishes.

CLASSIFICATION OF CONCRETE

- 1.0 Seven (7) classes of concrete are noted in these specifications, four classes of non-air-entrained concrete and three classes of air-entrained concrete. Each class shall be used in the part of the structure where stated on the plans or where designated by the Engineer. The classes are as follows:

<u>Non-air-entrained Concrete</u>	<u>Air-entrained Concrete</u>
Class AA	Class AA (AE)
Class A	Class A (AE)
Class A (F)	Class A (F) (AE)
Class B	

- 2.0 When the class of concrete required is not expressly indicated on the plans, or provided for in the Proposal or Detailed Specifications, the following requirements shall govern:
- 2.1 Class AA - Slabs and girders without wearing surface, concrete piles, handrails, and bridge floors.
- 2.2 Class A - Slabs and girders with wearing surface, arch rings, spandrel walls, piers, abutments, retaining walls, culverts, building, floors, tanks and all reinforced concrete not requiring Class AA concrete.
- 2.3 Class B - Mass concrete in abutments, wingwalls, and pier concrete placed in the dry, when so indicated on the Plans. For mass concrete placed under water, use Class B with twenty-five percent (25%) additional cement.
- 2.4 Class A(F) - Will be used for thin sections, or in areas where heavy reinforcement makes it impractical to use Class A size aggregate.
- 2.5 The air-entrained classes will be used when specifically set out in the Detailed Specifications or shown on the Plans.

CLASSIFICATION AND PROPORTIONING

1.0 GENERAL

- 1.1 Concrete mixtures shall be proportioned so as to secure a workable and durable concrete for the various classes, as hereinafter specified. The Contractor shall submit a mix design to the Engineer for approval.

Class of Concrete	Designated Nominal Opening Size of Coarse Aggregate	Min. Cement Factor Bags per Cu. Yd.	Max. Net Water Content per Bag of Cement Gallons	Consistency Range in Slump Inches	Air Content (Range) Percent
AA	3/4" to No. 4	7	6-1/2	2-4	
AA (AE)	3/4" to No. 4	7	6-1/2	2-4	3-6
A	1-1/4" to No. 4	6	5-1/2	2-4	
A (AE)	1-1/4" to No. 4	6	5-1/2	2-4	3-6
A (F)	3/4" to No. 4	6	6	2-4	
A (F)(AE)	3/4" to No. 4	6	6	2-4	6-9
B	1-1/2" to No. 4	5	6-1/2	2-4	

- 1.2 The concrete material shall be proportioned using the Absolute Volume Method in accordance with the requirements for each class specified above. It is the intent of the above limits to produce a concrete for each class with a minimum strength as follows:

<u>Class of Concrete</u>	<u>Minimum Compressive Strength (28 days)</u>
AA or AA (AE)	4,500 psi
A or A (AE)	4,000 psi
A (F) or A (F) (AE)	3,000 psi
B	2,100 psi

- 1.3 When the Contractor proposes to use a new source of material, which has not been proved by past experience, he shall submit samples sufficiently in advance so that trial mixes can be prepared and the concrete tested as provided above.
- 1.4 When air-entrained concrete is specified, the air-entrainment shall be accomplished by adding to the mixing water the proper amount of air-entraining agent in solution.

2.0 PROPORTIONING AND DESIGN OF MIXES

- 2.1 Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs. The testing facility can be the same as used for field quality control testing.
- 2.2 Limit use of fly ash to not exceed 25% of cement content by weight.
- 2.3 Submit written reports to Engineer of each proposed mix for each class of concrete at least fifteen (15) days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.
- 2.4 Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
- 2.5 Provide 4000 psi, air-entrained for all concrete unless otherwise noted: All lightweight aggregates shall have a continuous sprinkler installed at the top of storage pile at the batch plant at least 48 hours prior to any pour. All lightweight concrete shall be 105 pcf and 28 day compressive strength shall meet or exceed 2500 psi.

	<u>Class A/A(AE)</u>
28 Day compressive strength	4000 PSI Minimum
Maximum water per sack cement	5½ gallons
Maximum aggregate size	1¼"
Maximum slump (2" prior to plasticizer)	4" *
Admixtures	6% air entrained
Admixtures	Plasticizer (when needed)
Minimum Cement Content	6 Bags

* The use of plasticizer will allow concrete maximum slump to be eight (8) inches.

- 2.6 When necessary to increase cement ratio to gain required strength, such adjustments shall be made and Contractor shall pay all costs for such increase.
- 2.7 **ADJUSTMENT TO CONCRETE MIXES:** Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted and accepted by Engineer before using in work.
- 2.8 **ADMIXTURES**
- 2.8.1 Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.
- 2.8.2 Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).
- 2.8.3 Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.30.
- 2.8.4 Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1½% within following limits:

Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:

4.5% (moderate exposure); 5.5% (severe exposure) 1½ inch max. aggregate.

4.5% (moderate exposure); 6.0% (severe exposure) 1 inch max. aggregate.

5.0% (moderate exposure); 6.0% (severe exposure) ¾ inch max. aggregate.

5.5% (moderate exposure); 7.0% (severe exposure) ½ inch max. aggregate.

Other concrete (not exposed to freezing, thawing, or hydraulic pressure) or to receive a surface hardener: 2% to 4% air.

- 2.8.5 Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

- 2.9 **WATER-CEMENT RATIO:** Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
- Subjected to freezing and thawing; W/C 0.35.
Subjected to deicers/watertight; W/C 0.30.
- 2.10 **SLUMP LIMITS:** Proportion and design mixes to result in concrete slump at point of placement as follows:
- 2.10.1 Ramps, slabs, and sloping surfaces: Not more than three (3) inches.
- 2.10.2 Reinforced foundation systems: Not less than one (1) inch and not more than three (3) inches.
- 2.10.3 Concrete containing HRWR admixture (Superplasticizer): Not more than eight (8) inches after addition of HRWR to site-verified two (2) inch to three (3) inch slump concrete.
- 2.10.4 Other concrete: Not more than four (4) inches.
- 2.11 **CONCRETE MIXING**
- 2.11.1 Ready-Mix Concrete: Comply with requirements of ASTM C94 (latest revision) and as specified. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1½ hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.
- 2.11.2 Batching, Mixing, Transporting: Plant batch mix and transport in compliance with above. Provide project superintendent with delivery tickets for each load showing Class, Batch No., maximum aggregate size, air content, time of loading, sacks of cement per yard, and slump. Obtain Engineer approval before any mixing on-site.

EXECUTION

1.0 GENERAL

- 1.1 Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

2.0 FORMS

- 2.1 Design, erect, support, brace and maintain formwork to support vertical and lateral, static and dynamic loads that could be applied until concrete can support such loads. Construct formwork so concrete structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- 2.2 Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chambers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

- 2.3 Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- 2.4 Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary opening and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- 2.5 Chamfer exposed corners and edges unless indicated otherwise, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- 2.6 **PROVISIONS FOR OTHER TRADES**
 - 2.6.1 Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- 2.7 **CLEANING AND TIGHTENING**
 - 2.7.1 Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Re-tighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.
- 3.0 **PLACING REINFORCEMENT**
 - 3.1 Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and support and as herein specified.
 - 3.2 Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
 - 3.3 Clean reinforcements of loose rust and mill scale, earth, ice and other materials that reduce or destroy bond with concrete.
 - 3.4 Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, so as reinforcing is not displaced during the concrete placement.
 - 3.5 Reinforcement shall be placed at the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - 3.6 The metal reinforcement shall be protected by the thickness of concrete indicated in the plans. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

- 3.6.1 Where concrete is deposited against the ground without the use of forms, not less than three (3) inches. Where concrete is exposed to the weather, or exposed to the ground but placed in forms, not less than two (2) inches for bars more than $\frac{5}{8}$ inches in diameter and $1\frac{1}{2}$ inches for bars $\frac{5}{8}$ inches or less in diameter.
- 3.6.2 In slabs and walls not exposed to the ground or to the weather, not less than $\frac{3}{4}$ inch.
- 3.6.3 In beams, girders and columns not exposed to the ground or to the weather, not less than $1\frac{1}{2}$ inch.
- 3.6.4 Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.
- 3.7 Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one (1) full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.8 CLEANING AND PLACING REINFORCING

- 3.8.1 All reinforcement shall be free from rust, scale or other coatings that will destroy or reduce the bond of the concrete to the steel. Where there may be a delay in depositing concrete, the reinforcement shall be reinspected and when necessary, cleaned to the satisfaction of the Engineer. All reinforcing bars shall be tied at alternating intersections both ways. Continuous bars shall be lapped not less than thirty-six (36) bar diameters unless noted otherwise on the drawings.

4.0 ANCHOR BOLTS, DOWELS AND CORNER BARS

- 4.1 Anchor bolts for all equipment shall be provided and placed in the concrete in accordance with the manufacturer's directions. Unless otherwise noted, dowels or continuous reinforcements, shall be provided at all construction joints. The dowels shall be of the same size as the largest reinforcing bar and shall provide a minimum lap of thirty-six (36) bar diameters. Corner bars shall be used at the outside of all corners. Corner bars shall be lapped a minimum of thirty-six (36) bar diameters. All dowels and anchor bolts must be positioned before concrete is placed. Pushing dowels and anchor bolts into fresh concrete is prohibited.

5.0 JOINTS

5.1 CONSTRUCTION JOINTS

- 5.1.1 Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer.
- 5.1.2 Provide keyways at least $1\frac{1}{2}$ inches deep in construction joints in walls and slabs, and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
- 5.2.3 Place construction joints perpendicular to main reinforcement. Continue full reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
- 5.2.4 Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

5.3 WATERSTOPS

- 5.3.1 Provide waterstops in all construction joints which are below grade and all water containing structures. Install waterstops to form continuous diaphragm in each joint. make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions. Waterstops shall have a minimum lap of eighteen (18) inches.

5.4 ISOLATION JOINTS IN SLABS-ON-GRADE

- 5.4.1 Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surface, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated. See Section 5.5.5 of these specifications for joint filler and sealant materials.

5.5 CONTRACTION (CONTROL) JOINTS IN SLABS-ON-GROUND

- 5.5.1 Construction contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts $\frac{1}{8}$ inch wide by $\frac{1}{4}$ slab depth or inserts $\frac{1}{4}$ inch wide by $\frac{1}{4}$ of slab depth, unless otherwise indicated.
- 5.5.2 Form contraction joints by inserting premolded plastic or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
- 5.5.3 Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
- 5.5.4 If joint pattern not shown, provide joints not exceeding fifteen (15) feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
- 5.5.5 Joint sealant material shall be Vulkem 921 sealant or approved equal. All construction and saw-cut joints shall have foam backer rod used before sealant.

5.5.6 Poured Joint Filler

- a. If approved by the Engineer, a poured joint filler which shall consist of a prepared mixture of asphalt and mineral filler can be used as a joint filler. The mineral filler shall be diatomaceous earth. The mixture shall be free from water and shall not foam when heated to the proper temperature range for application, 400 to 485 degrees F. It shall also comply with the following requirements:

Specific Gravity at 77°F.....	1.02 Min.
Softening Point	183° to 200°F.
Pen. at 77°F., 100 gm., 5 Sec	68 to 88
Pen. at 32°F., 200 gm., 1 Min	38 Min.
Pen. at 115°F., 50 gm., 5 Sec.	160 Max.
Flash Point	550°F. Min.
Ash.....	8% Min.
Settlement Ration.....	1.02 Max.
Ductility at 77°F.....	5 Min.
Flow at 140°F.....	0.5 cm. Max.

6.0 INSTALLATION OF EMBEDDED ITEMS

- 6.1 Set and build into work, anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- 6.2 Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- 6.3 Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

7.0 PREPARATION OF FORM SURFACES

- 7.1 Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.
- 7.2 Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- 7.3 Coat steel forms with a nonstaining, rust-preventative materials. Rust stained steel formwork is not acceptable.

8.0 CONCRETE PLACEMENT

8.1 INSPECTION

- 8.1.1 Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.

- 8.2 Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.

- 8.2.1 Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location. Concrete shall not be allowed to free fall more than six (6) feet without the use of an approved concrete tremie or concrete pump and hose.

8.3 PLACING CONCRETE IN FORMS

- 8.3.1 Deposit concrete in forms in horizontal layers not deeper than twenty-four (24) inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

- 8.3.2 Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
- 8.3.3 Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least six (6) inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other items without causing segregation of mix.
- 8.4 RETEMPERING
- 8.4.1 The concrete shall be mixed only in such quantities as are required for immediate use and any which has developed initial set shall not be used. Concrete which has partially hardened shall not be retempered or remixed.
- 8.5 VAPOR BARRIER/RETARDER INSTALLATION
- 8.5.1 Following leveling and tamping of granular base for slabs on grade, place vapor barrier/retarder sheeting with longest dimension parallel with direction of pour.
- 8.5.2 Lap joints six (6) inches and seal vapor barrier joints with manufacturer's recommended mastic and pressure-sensitive tape.
- 8.6 PLACING CONCRETE SLABS
- 8.6.1 Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- 8.6.2 Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- 8.6.3 Bring slab surfaces to correct level with straight edge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- 8.6.4 Maintain slab reinforcing in proper position during concrete placement. If welded wire fabric is used, fabric will be supported above subgrade by steel chairs or supports.
- 8.7 COLD-WEATHER PLACING
- 8.7.1 Comply with provisions of ACI 306 and as follows: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- 8.7.2 When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C) and not more than 80°F (27°C) at point of placement.

- 8.7.3 Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- 8.7.4 Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- 8.8 HOT WEATHER PLACING
- 8.8.1 When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- 8.8.2 Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
- 8.8.3 Cover reinforcing steel with water soaked burlap if it becomes hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
- 8.8.4 Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
- 8.8.5 Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Engineer.
- 8.9 DEPOSITING CONCRETE UNDER WATER
- 8.9.1 Concrete shall not be deposited in water except with the approval of the Engineer, and under his immediate supervision, and in this case the method of placing shall be as hereinafter designated.
- 8.9.2 Concrete deposited in water shall be seal concrete. To prevent segregation, it shall be carefully placed in a compact mass, in its final position, by means of a tremie, a bottom dump bucket or other approved method, and shall not be disturbed after being deposited. Still water shall be maintained at the point of deposit and the forms under water shall be watertight.
- 8.9.3 For parts of structures under water, when possible, concrete seals shall be placed continuously from start to finish. The surface of the concrete shall be kept as nearly horizontal as practical at all times. To ensure thorough handling, each succeeding layer of seal shall be placed before the preceding layer has taken initial set.
- 8.9.4 Tremie shall consist of a tube having a diameter of not less than 10 inches, constructed in sections having flanged couplings fitted with gaskets. The tremies shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and so as to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of work so as to prevent water entering the tube and shall be entirely sealed at all times. The tremie tube shall be kept full to the bottom of the hopper. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it in the deposited concrete. The flow shall be continuous until the work is completed.
- 8.9.5 Depositing of concrete by the drop-bottom bucket method shall conform to the following specifications: The top of the bucket shall be open. The bottom door shall open freely and

outward when tripped. The bucket shall be completely filled and slowly lowered to avoid backwash. It shall not be dumped until it rests on the surface upon which the concrete is to be deposited and when discharged shall be withdrawn slowly until well above the concrete. The slump of concrete shall be maintained between 4 and 8 inches.

- 8.9.6 Unwatering may proceed when the concrete seal is sufficiently hard and strong. All laitance or other unsatisfactory materials shall be removed from the exposed surface by scraping, chipping or other means which will not injure the surface of the concrete.

9.0 FINISH OF FORMED SURFACES

9.1 ROUGH FORM FINISH

- 9.1.1 For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

9.2 SMOOTH FORM FINISH

- 9.2.1 For formed concrete surfaces exposed to view or covered with a coating material or covering material applied directly to concrete; such as waterproofing, damp-proofing, veneer plaster, painting or other similar system. This is a concrete surface obtained with selected form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed. All exposed concrete surfaces shall be finished by wetting, thoroughly rubbing with a carborundum brick and rinsing with water.

9.3 RELATED UNFORMED SURFACES

- 9.3.1 At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

10.0 MONOLITHIC SLAB FINISHES

10.1 TROWEL FINISH

- 10.1.1 Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
- 10.1.2 After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20-F1 17. Grind smooth surface defects that would telegraph through applied floor covering system.

10.2 NONSLIP BROOM FINISH

- 10.2.1 Apply nonslip broom finish to exterior concrete platforms, steps, ramps and walks elsewhere as indicated.
- 10.2.2 Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristly broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

11.0 CONCRETE CURING AND PROTECTION

- 11.0.1 Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation control material. Apply in accordance with manufacturer's instruction after screening and bull floating, but before power floating and troweling.
- 11.0.2 Curing during temperatures below 32°F (0°C), the Contractor must maintain a 40°F (4°C) temperature above the concrete surface for a period of 72 hours. This shall be done using curing blankets or curing blankets and artificial heat.
- 11.0.3 Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than seven (7) days.

11.1 CURING METHODS

- 11.1.1 Perform curing of concrete by curing and sealing compound, by moist curing, by moisture retaining cover curing, or by any combinations thereof, as herein specified. Wet curing conditions must be maintained for seven (7) days for lightweight concrete.
- 11.1.2 Provide moisture curing by following methods.
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Use continuous water fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with four (4) inch lap over adjacent absorptive covers.
- 11.1.3 Provide moisture cover curing as follows:
 - a. Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least three (3) inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- 11.1.4 Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:

- a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within two (2) hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subject to heavy rainfalls within three (3) hours after initial application. Maintain continuity of coating and repair damage during the curing period.
- b. Use membrane curing compounds that will not affect surfaces to be covered with finished materials applied directly to concrete.

11.2 CURING FORMED SURFACES

- 11.2.1 Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

11.3 CURING UNFORMED SURFACES

- 11.3.1 Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- 11.3.2 Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

12.0 REMOVAL OF FORMS

- 12.1 Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after curing at not less than 50°F (10°C) for cumulative of twenty-four (24) hours after placing concrete, provided concrete is sufficiently hard to be damaged by form removal operations, and provided curing and protection operations are maintained.
- 12.2 Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than fourteen (14) days and until concrete has attained at least 75% of design minimum compressive strength at twenty-eight (28) days. Determine potential compressive strength of in-place concrete by testing field cured specimens representative of concrete location or members.
- 12.3 Form facing material may be removed four (4) days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

13.0 REUSE OF FORMS

- 13.1 Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- 13.2 When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Engineer.

14.0 MISCELLANEOUS CONCRETE ITEMS

14.1 FILLING IN

- 14.1.1 Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

14.2 CURBS

- 14.2.1 Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

14.3 EQUIPMENT BASES AND FOUNDATIONS

- 14.3.1 Provide machine and equipment bases and foundation, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

14.4 REINFORCED MASONRY

- 14.4.1 Provide concrete grout for reinforcement of masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

15.0 CONCRETE SURFACE REPAIRS

15.1 PATCHING DEFECTIVE AREAS

- 15.1.1 Repairs and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.
- 15.1.2 Cut out honeycomb, rock pockets, voids over ¼ inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than one (1) inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
- 15.1.3 For exposed to view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

15.2 REPAIR OF FORMED SURFACES

- 15.2.1 Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and

other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.

- 15.2.2 Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

15.3 REPAIR UNFORMED SURFACES

- 15.3.1 Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
- 15.3.2 Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
- 15.3.3 Correct high areas in unformed surfaces by grinding after concrete has cured at least fourteen (14) days.
- 15.3.4 Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.
- 15.3.5 Repair defective areas, except random cracks and single holes not over one (1) inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and exposed reinforcing steel with at least $\frac{3}{4}$ inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- 15.3.6 Repair isolated random cracks and single holes not over one (1) inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to $2\frac{1}{2}$ parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound had dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- 15.3.7 Perform structural repairs with prior approval of Engineer method and procedure, using specified epoxy adhesive and mortar.
- 15.3.8 Repair methods not specified above may be used, subject to acceptance of Engineer.

16.0 MEASUREMENT

- 16.1 All concrete shall be classified as shown on the plans and shall be measured in accordance with the dimensions shown on the plans unless changes are ordered in writing by the Engineer during construction. All columns shall be computed by the average end area method. No deduction shall be made for paneling less than six inches (6") in width.

17.0 PAYMENT

- 17.1 The various classes of concrete measured as provided for above will be paid for at the unit price bid per cubic yard. This unit price bid shall be full compensation for the furnishing, forming, placing and finishing of concrete, complete in place and this unit price shall include all material, falsework, expansion joints, equipment, labor, tools and all incidental work pertaining thereto, the construction of weep holes, placing of pipes, conduits, anchors, bolts, grillages and all other similar equipment and methods.

GENERAL SPECIFICATIONS
CRUSHED STONE BASE COURSE

1.0	GENERAL	1
2.0	MATERIAL SPECIFICATIONS	1
3.0	CONSTRUCTION EXECUTION	1
4.0	MEASUREMENT	3
5.0	PAYMENT	3

1.0 GENERAL

- 1.1 This item shall consist of a foundation course for surface courses or pavements. The base course shall be constructed on a prepared subgrade or other completed base course in accordance with these specifications and in substantial conformity with the lines, grades, compacted thicknesses and typical cross-sections shown on the plans.

2.0 MATERIAL SPECIFICATIONS

- 2.1 This material shall consist of crushed stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified. The mixture of crushed stone and natural fines shall contain a minimum of 90 percent crusher produced material. The stone shall be hard and durable with a percent wear determined by the Los Angeles Abrasion Test (AASHTO T96) not to exceed 45. Soft shale and slate are not considered to be stone under this specification. The material furnished shall not contain more than 5% by weight of shale, slate or other deleterious matter.
- 2.2 The class or classes of crushed stone base course material that can be used on any particular work-site will be those stated in the Proposal.

2.3 GRADING REQUIREMENTS

Total Retained Percent by Weight

Sieve	Class SB-2	Class SB-3
1½"	0	---
1"	---	0
¾"	10-50	0-35
No. 4	50-75	50-75
No. 40	70-90	70-90
No. 200	90-97	90-97

- 2.4 The fraction passing the No. 200 sieve shall not exceed $\frac{2}{3}$ the fraction passing the No. 40 sieve. The fraction passing the No. 40 sieve shall have a Liquid Limit not greater than 25 and a Plasticity Index not greater than 6.
- 2.5 When necessary to blend multiple materials, each material shall be proportioned separately through mechanical feeders to insure uniform proportioning. Premixing or blending in a pit to avoid separate feeding will not be permitted. The blending of materials on the roadway to obtain a mixture that will comply with the above requirements will not be permitted.

3.0 CONSTRUCTION EXECUTION

- 3.1 The base course material shall be placed on a completed and approved subgrade or existing base that has been graded to substantially the required grades and cross-sections shown on the plans. Base course material shall not be placed on a frozen subgrade or subbase.
- 3.2 The subgrade shall be prepared in accordance with the 1978 Arkansas State Highway Commission Standard Specifications for Highway Construction, Section 212, and shall be free from an excess or deficiency of moisture at the time of placing the base course. The subgrade shall also comply,

where applicable, with the requirements of other items that may be contained in the contract that provide for the construction, reconstruction or shaping of the subgrade or the reconstruction of the existing base course.

- 3.3 The crushed stone shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines so that when compacted it will have the thickness, width and cross section shown on the plans.
- 3.5 The maximum compacted thickness of any one layer shall not exceed six (6) inches. If the required compacted depth of the base course exceeds six (6") inches, the base course shall be constructed in two or more layers of approximate equal thickness. When approved compacting equipment is used, the compacted depth of a single layer of the base course may be increased to eight (8) inches upon approval.
- 3.6 The spreading shall be done the same day that the material is hauled. The spreading shall be performed in such manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping on the subgrade will exist. To insure proper mixing, the crushed stone shall be bladed across the entire roadbed before being spread. Care shall be taken to prevent mixing of subgrade or shoulder material with the base course material in the blading and spreading operation.
- 3.7 Each course shall be compacted by any satisfactory method that will produce the density hereinafter specified. The crushed stone shall be substantially maintained at optimum moisture during the mixing, spreading, and compacting operations, water added or material aerated as necessary. The specified grade and section shall be maintained by blading throughout the compaction operation. The material in each course shall be compacted to a density, as determined by ASTM D 6938, of 95 percent of the maximum density as obtained in the laboratory test ASTM D-1557 (modified proctor). The crushed stone shall be compacted across the full width of application.
- 3.8 The oven dry weight per cubic foot of the material at optimum moisture content is termed maximum density by the above procedure.
- 3.9 The Contractor shall arrange for the testing of the materials used under this item and a copy of the testing report shall be submitted to the Engineer for approval prior to installation of the material at the work site.
- 3.10 The compacted base course shall be tested for depth. Any deficiencies shall be corrected by scarifying, placing additional material, mixing, reshaping and recompacting to the specified density as directed.
- 3.11 When neither prime coat, surfacing, nor pavement are provided in the same contract with the base course, the density requirement for the base course will be waived. No compaction will be required beyond that obtained by systematic maintenance under traffic.
- 3.12 The Contractor shall maintain the base course in a satisfactory condition until accepted.

4.0 MEASUREMENT

- 4.1 Work performed and material accepted under this item will be measured either by the cubic yard in place or by the ton.

5.0 PAYMENT

- 5.1 Work performed under this item and measured as stated above, will be paid for at the contract unit price bid per ton or per cubic yard as stated in the Proposal for “Crushed Stone Base Course” of the particular class stated and furnished. The price shall be full compensation for preparing the subgrade; for furnishing and loading material; hauling and delivering on the site; spreading, finishing, watering, manipulating, and compacting; and for all labor, equipment, tools, and incidentals necessary to complete the work.

GENERAL SPECIFICATIONS

GRAVEL BASE COURSE

1.0 GENERAL1

2.0 MATERIAL SPECIFICATIONS1

3.0 CONSTRUCTION EXECUTION2

4.0 METHOD OF MEASUREMENT3

5.0 PAYMENT3

1.0 GENERAL

- 1.1 This item shall consist of a foundation course for surface courses, for other base courses or for pavements. It shall be constructed on the prepared subgrade or other completed base course in accordance with these specifications and in substantial conformity with the lines, grades, compacted thicknesses and typical cross sections shown on the plans.

2.0 MATERIAL SPECIFICATIONS

- 2.1 The material shall consist of a natural or artificial mixture of gravel and soil, uniformly well-graded from coarse to fine and proportioned to meet all the requirements hereinafter specified. The gravel shall consist of crushed or uncrushed hard pebbles, crushed boulders, crushed stone or crushed ledge rock with a percent of wear loss determined by the L.A. Abrasion Test (AASHTO T-96) not to exceed 45. The gravel shall have no objectionable, deleterious or other injurious matter.
- 2.2 The class or classes of gravel base course material that may be used on any particular job will be those stated in the Proposal.
- 2.3 Crushed stone meeting the requirements of Section 306 of the 1978 Arkansas State Highway Commission Standard Specifications for Highway Construction for Class SB-2, may be furnished instead of any class of gravel base course at the choice of the Contractor.

2.4 GRADING REQUIREMENTS

Total Retained Percent by Weight			
<u>Sieve</u>	<u>Class GB-2</u>	<u>Class GB-3</u>	<u>Class GB-4</u>
2"	0-5	---	---
1 1/2"	0-15	0	---
1"	---	---	0-5
3/4"	0-40	0-40	0-30
3/8"	20-60	20-60	15-50
No. 4	40-70	40-70	40-70
No. 10	55-80	55-80	55-80
No. 40	65-90	65-90	65-90
No. 200	88-97	88-97	88-97

- 2.5 In order to insure that the gravel is uniformly graded, the percent passing and retained on the various sieves shall be as follows:

<u>Sieve Sizes</u>	<u>Percent Retained by Weight</u>
3/4"	5 minimum
3/8"	5 minimum
No. 4	5 minimum
No. 10	4 minimum

- 2.6 The fraction passing the No. 200 sieve shall not be greater than the 2/3 the fraction passing the No. 40 sieve shall have a Liquid Limit not greater than 25 and a Plasticity Index not greater than 6.

- 2.7 When the source of gravel contains aggregate larger than allowed for the class stated in the Proposal, it must be removed by screening or by screening and crushing. The removal of large size aggregate by hand methods such as raking or forking will not be permitted.
- 2.8 When it is necessary to blend two or more materials, each material shall be proportioned separately through mechanical feeders to insure uniform production. Blending materials on the roadway to obtain a mixture that will comply with the above requirements will not be permitted, except for minor corrections allowed by written permission of the Engineer.
- 2.9 That portion of Class GB-3 retained on the No. 4 sieve shall contain a minimum of 15 percent crushed particles.

3.0 CONSTRUCTION EXECUTION

- 3.1 The base course material shall be placed on a completed and approved subgrade or existing base that has been graded to the required grades and cross-sections shown on the plans. Base course material shall not be placed on a frozen subgrade or subbase.
- 3.2 The subgrade shall be prepared as specified in Section 212 of the Arkansas State Highway Commission Standard Specifications for Highway Construction, 1978. It shall be free from any excess or deficiency of moisture at the time of placing the base course. The subgrade shall also comply, where applicable with the requirements of other items contained in the contract that provide for the construction, with reconstruction or shaping of the subgrade or the reconstruction of the existing base course.
- 3.3 Gravel shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines so that when compacted it will have the thickness, width and cross-section as shown on the plans.
- 3.4 The maximum compacted thickness of any one layer shall not exceed six (6) inches. If the required compacted depth of the base course exceeds six (6) inches, the base course shall be constructed in two or more layers of approximate equal thickness. When approved types of compacting equipment are used, the compacted depth of a single layer of the base course may be increased to eight (8) inches upon approval of the Engineer.
- 3.5 The spreading shall be done the same day that the material is hauled. The spreading shall be performed in such a manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping on the subgrade will exist. To insure proper mixing, the gravel shall be bladed across the entire roadbed before being spread. Care must be taken to prevent mixing of subgrade or shoulder material with the base course material in the blading and spreading operation.
- 3.6 Each course shall be compacted by any satisfactory method that will produce the density hereinafter specified. The gravel shall be substantially maintained at optimum moisture during the mixing, spreading, and compacting operations. Water shall be added or the material aerated, as necessary, to achieve optimum moisture during the mixing, spreading, and compacting operations. The specified grade and section shall be maintained by blading throughout the compaction operation. The material in each course shall be compacted to a density, as determined by AASHTO T- 191, of 100% of the maximum density obtained in the laboratory. The gravel shall be compacted across the entire width of application.

- 3.7 The laboratory density shall be obtained as follows:
- 3.7.1 The sample is prepared by removing the aggregate retained on the $\frac{3}{4}$ inch sieve and adding aggregate passing the $\frac{3}{8}$ inch sieve and retained on the No. 4 sieve in an amount equal to that removed.
 - 3.7.2 The prepared sample is compacted in five (5) equal layers in a cylindrical mold 6 inches in diameter and 7 inches high. Each layer is compacted by 55 blows with a 10 pound hammer 2 inches in diameter dropped a height of 18 inches.
 - 3.7.3 Trial sample specimens shall be molded at various water contents to determine the maximum density and optimum water content.
 - 3.7.4 The oven dry weight per cubic foot of the material at optimum moisture content is expressed as the maximum density by this procedure.
- 3.8 The Contractor shall arrange for the testing of the materials used under this item and a copy of the testing report shall be submitted to the Engineer for approval prior to installation of the material at the work site.
- 3.9 The compacted base course shall be tested for depth. Any deficiencies shall be corrected by scarifying, placing additional material, mixing, reshaping and recompacting to specified density as directed.
- 3.10 When neither prime coat, surfacing, nor pavement are provided in the same contract with the base course, the density requirement for the base course will be waived. No compaction will be required beyond that obtained by systematic maintenance under traffic.
- 3.11 The Contractor shall maintain the base course in a satisfactory condition until accepted.

4.0 METHOD OF MEASUREMENT

- 4.1 Work performed and material accepted under this item will be measured either by the cubic yard compacted in place or by the ton.

5.0 PAYMENT

- 5.1 Work performed under this item and measured as stated above, will be paid for at the contract unit price bid per ton or per cubic yard as stated in the Proposal for "Gravel Base Course" of the particular class stated and furnished. The price shall be full compensation for preparing the subgrade; for furnishing and loading material; hauling and delivering on the site; spreading, finishing, watering, manipulating, and compacting; and for all labor, equipment, tools, and incidentals necessary to complete the work.

DS

DETAILED SPECIFICATIONS

DETAILED SPECIFICATIONS
for
SWINGING BRIDGE WATER MAIN RELOCATION
to serve the users of
SARDIS LAKE WATER AUTHORITY
for the
PITTSBURG COUNTY DISTRICT #2
PITTSBURG COUNTY, OKLAHOMA

GENERAL INFORMATION

GENERAL

The work to be performed to complete this project shall include the furnishing of all materials, tools, equipment, supplies, labor and related items necessary for the satisfactory installation of water mains and associated items of work, all in accordance with the Plans, General and Supplementary Conditions, General Specifications and these Detailed Specifications.

QUALITY OF PLANS

The Construction Plans compiled for this project have been prepared with care. However, these plans cannot be expected to be correct in every detail. The Owner or Engineer may make minor changes in locations, lengths, grades, etc. To improve construction or preserve existing features and/or reduce construction costs.

GENERAL SPECIFICATIONS

The preceding General Specifications cover the various phases of work stated in these Detailed Specifications shall govern and control all work which, in the opinion of the Engineer, they may apply. Since the General Specifications are general in nature, they could refer to work and conditions not found in this project. In these cases such non-applicable stipulations will have no meaning. In case of conflict between the General and Detailed Specifications, the Detailed Specifications shall govern.

MEASUREMENT AND PAYMENT

Methods of measurement provided in the General Specifications are in cases superseded by the specific conditions stated in these Detailed Specifications. In such cases, the provisions stated in the Detailed Specifications shall apply.

Payment for each bid item shall be a the unit price bid or at the lump sum price each as identified in the Schedule of Bids and shall be compensation for all materials, tools, equipment, labor and incidentals necessary to complete the work.

SCHEDULE OF BIDS

A detailed description of each construction item, as stated in the Schedule of Bids is following.

SWINGING BRIDGE WATER MAIN RELOCATION

SCHEDULE OF BID ITEMS

GENERAL

- 1.0** The work to be performed shall consist of furnishing all materials, tools equipment and labor for constructing water mains and other appurtenances as described later in these Detailed Specifications and as shown on the plans and approved by the Engineer to fit special requirements for the conditions encountered. These specifications following will be applicable to the installation of water mains and appurtenances constructed under this contract.
- 2.0** These specifications are intended to include all work and materials necessary for completion of the work. Any incidental item of material, labor or detail required for the proper execution and completion of the work and omitted from the specifications, but obviously required by governing codes, local regulations, trade practices, operational functions and good workmanship shall be provided as a part of the Contract work without extra charge even though not specifically detailed or mentioned.
- 3.0** The Engineer will conduct meetings monthly to discuss the progress of construction and handle paperwork. The Contractor's Superintendent knowledgeable about the progress of construction and any problems encountered shall attend the meeting.
- 4.0** The Contractor shall attend the pre-construction meeting, progress meetings, final inspection and warranty inspection.

**SWINGING BRIDGE WATER MAIN RELOCATION
SCHEDULE OF BID ITEMS**

ITEM 1

**BONDING, MOBILIZATION and STORMWATER POLLUTION PREVENTION PLAN
IMPLEMENTATION**

1.0 GENERAL

- 1.1 This item shall cover the bonding, insurance and mobilization of the Contractor's personnel to the construction site. This item shall be payable a maximum of 30 days following the issuance of the Notice to Proceed.
- 1.2 This item shall also cover the cost of a lay-down yard, reception of materials, portable toilet, etc.

2.0 STORMWATER POLLUTION PREVENTION PLAN

- 2.1 The Contractor shall obtain a stormwater permit for this project from the Oklahoma Department of Environmental Quality (ODEQ), if required.
- 2.2 The permit requires that a Stormwater Pollution Prevention Plan (SWPPP) be developed and implemented for this water main relocation project. This plan shall be kept on-site and be available at all times for inspection. One copy shall be given to the construction observer.
- 2.3 Two (2) copies of the plan shall submitted to the Engineer for review. Final approval will come from ODEQ.
- 2.4 The Contractor will be required to follow the requirements of the Sate approved stormwater permit.

4.0 PAYMENT

- 4.1 Payment for the work under this item shall be by the lump sum amount stated in the Schedule of Bids under Item 1 for an accepted BONDING, MOBILIZATION and STORMWATER POLLUTION PREVENTION PLAN. Contractor shall break down these costs for submittal and approval by the Engineer. Bonding and Mobilization can be paid within 45 days of the Notice to Proceed, after approval by the Engineer. The remainder of the cost shall be spread over the project time to comply with the SWPPP implementation.
- 4.2 Payment shall also include the implementation of a SWPPP, all materials, labor, tools, equipment and incidentals necessary to follow the requirements of the plan and permit.
- 4.3 This item shall not exceed 10% of the overall cost of the entire contract. If a larger number is plugged into this item, the Engineer will lower this item to the 10% level at the expense of the Contractor.

ITEMS 2 THROUGH 4

3" and 2" WATER MAINS

1.0 SCOPE

- 1.1 Under these items the Contractor shall furnish all materials, labor, equipment and supplies necessary to install in a workmanlike and satisfactory manner the water mains shown on the plans and as directed by the Engineer. Pipe shall be laid in accordance with the applicable portions of the preceding General Specifications, "Pipe and Pipe Laying".
- 1.2 Under these items shall be included all excavation and trenching; the furnishing and installing of the water mains, backfilling, repairing settlement, maintaining trenches in good condition until final dressing, the smoothing and dressing of the trenches after final settlement; and disposal of debris and excess excavation.
- 1.3 Also, under these items the Contractor shall flush, sterilize, take water samples and place in service all water mains which are constructed under this contract. **The cost of all water used by the Contractor for flushing, testing and sterilization shall be the responsibility of the Contractor at \$3.00 per 1000 gallons** and no separate pay item shall be authorized.
- 1.4 Safety barricades, night lighting, warning lights or signs and all other items of work in connection with the installation of these water mains shall be included.
- 1.5 All water mains shall be laid to line and grade by the Contractor in accordance with the plans and as directed by the Engineer.

2.0 PIPE

- 2.1 High Density Polyethylene (HDPE) Water transmission and distribution pipe shall meet the specifications and requirements of AWWA C906 latest revision, in size 3 inch and be joined by means of a zero-leak rate, butt fusion and approved mechanical joints. The polyethylene pipe and fittings shall be made from prime virgin resins exhibiting a cell classification of PE 345434C as defined in ASTM D3350 with an established hydrostatic design basis of 1600 psi for water at 73° F. The resin shall be listed by the PPI in its pipe grade registry "TR-4". Pipe O.D. sizes shall be in the same as ductile iron pipe.
 - 2.1.1 **The net pressure capability shall be the working pressure rating as follows:**

DR 11 = Class 200/Class 250 DR 9 = Class 350
 - 2.1.2 The wall thickness shall follow the DR system prescribed in AWWA C906. The pipe is to be joined by heat fusion or mechanical joints systems proven for HDPE pipe. Both pipe and fittings must be NSF approved, be listed and marked. All pipe is to be welded using the manufacturer's recommended procedures.
 - 2.1.3 All pipe and fittings shall be marked as prescribed by AWWA C906 latest revision, which includes the nominal size, O.D. base, DR, pressure class, WPR, manufacturer's name, manufacturer's production code including month and year extruded. All pipe and fittings shall have a date stamp less than six (6) months old.

- 2.1.4 Trench depth shall be such to maintain a minimum of thirty-six (36) inches cover from the top of the pipe to finish grade. The bedding around the pipe shall have a maximum particle size of $\frac{3}{4}$ inch for manufactured and one inch for natural rock. Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of polyethylene pipe.
- 2.1.5 The contractor shall install the 3" water line under the creek by directional bore. The line shall be installed a minimum of three (3) feet below the solid creek bottom. The boring installed pipe shall extend a minimum of 100-feet beyond the top of bank on each side of the stream.
- 2.2 PVC Pipe shall conform to ASTM D1784, latest revision, Class 12454 resins and shall have a minimum Standard Dimension Ratio (SDR) of 17. The thickness class shall be either Class 250 (SDR 17) or Class 315 (SDR 13.5) as specified on the plans. All fittings two (2) inches and larger shall be ductile iron and shall conform to AWWA C153. Trench depth shall be such to maintain a minimum of thirty-six (36) inches cover from the top of the pipe to finish grade. The bedding around the pipe shall have a maximum particle size of $\frac{3}{4}$ inch for manufactured and one inch for natural rock. Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of PVC pipe.
- 2.3 In all cases the following construction procedures shall be strictly adhered to and enforced;
 - 2.3.1 At the end of each day's work and when for any reason the laying of pipe is discontinued for any period, open ends of pipe shall be closed with a watertight plug or cap firmly secured in place.
 - 2.3.2 All pipe and fittings shall be lowered carefully into the trench in such a manner as to prevent damage to pipe, fittings or linings. Neither pipe nor fittings shall be dropped or dumped into the trench.
 - 2.3.3 Pipe shall be laid with bell ends facing in the direction of laying.
- 2.4 Safety barricades, night lighting, warning lights or signs, and all other items of work in connection with the installation of these water mains which are not included for payments under any other item shall be included in the price per foot bid on these items.
- 2.5 The pipe shall be of the size, type and pressure rating shown on the plans or in the Schedule of Bids. All pipe shall comply with the appropriate sections of the General Specifications.
- 2.6 The Contractor's attention is called to the need for special bedding and embedment considerations when PVC pipe is used. The bedding detail on the Typical Detail Sheet of the plans shall be strictly complied with. If rock is excavated or uncovered, the Contractor shall install clean graded rock for bedding. Bedding shall be a minimum of six (6) inches between the pipe and rock protrusions.
- 2.7 The granular bedding six (6) inches deep under the pipe and the embedment from the bottom of the pipe to six (6) inches above the top of the pipe shall be hand placed. Material excavated from the trench and obtained along the route shall be used for bedding and embedment insofar as is practical. No separate pay item is authorized under these conditions.

- 2.8 When required by the Engineer, bedding or embedment material shall be hauled in and used. Under this condition, separate payment shall be made as specified under "Bedding Material".

3.0 TRACER WIRE

- 3.1 Tracer wire shall be installed with all water mains and service lines. The tracer wire shall extend into and to the top of all air release boxes, underground vaults, access boxes and any other water appurtenance where the tracer wire would be accessible to connecting an electronic locator device. The tracer wire shall extend along the outside and to the top of all valve boxes.
- 3.2 Tracer wire shall consist of a #12 AWG solid, single conductor, insulated copper wire or copper jacketed wire and shall parallel within six (6) inches of the side of all piping and service lines.
- 3.3 **No tracer wire connections will be allowed on this project unless connections are wire nutted together and sealed up in underground wire gel packs.** All tracer wire ends shall be located in the valve/line markers, if not located at another structure. The maximum distance of the locator markers shall not exceed 1000 feet. The valve/line markers shall be as those specified in the gate valves specifications.
- 3.4 All tracer wire shall be tested using an Ohm meter once a section of water main has been installed and end points developed. This test shall be done in the presence of the Engineer's Representative. Also, if a portion of the water main is uncovered (i.e. leak detection) the Contractor shall retest the tracer wire for continuity after all repairs are completed.
- 3.5 All tracer wire end connections shall be located in the locator markers, if not located at another structure. No additional compensation shall be given for these locator markers

4.0 STERILIZATION

- 4.1 Sterilization shall be in accordance with the latest addition of AWWA C-651, Section 5.2 "Disinfecting Water Mains, (Continuous Feed Method)". Adequate steps shall be taken by the Contractor to prevent erosion from the flush water during the sterilization procedure.

5.0 EASEMENTS

- 5.1 No additional compensation will be made to the Contractor in the event that the Contractor is required to skip a section of pipe laying and then come back to it at a later time due to easement problems or other problems beyond the control of the Owner or the Engineer.

6.0 INITIAL CLEAN-UP

- 6.1 Initial clean-up shall be made concurrently with the laying of the pipe and shall include the disposal of all trees, rocks, excess soil, and miscellaneous construction debris. Initial clean-up shall also include restoration of property and driveways. The only items remaining after initial clean-up is complete should be the repair of trench settlement and the permanent repair of fences and paved drives. Should the initial clean-up not progress orderly and with the laying of pipe, the Owner may reduce payment on subsequent pay estimates by the value of

the initial clean-up not completed. The value of the initial clean-up can be computed at **thirty (30) percent** of the unit price bid for this bid item.

- 6.2 This thirty (30) percent value shall be kept in a separate line item (1A, 2A, etc.) until such time that Contractor completes the clean-up of that line.

7.0 PAVED AND UNPAVED DRIVEWAYS AND SIDEWALKS

- 7.1 The Contractor shall restore and replace driveways, sidewalks and pavements disturbed or damaged by the process of the construction. The cost to remove and replace these items shall be considered incidental to the cost per foot of water main and no additional payment shall be made therefore. Replacement shall be in like kind, to the extent of which shall be as directed by the Engineer.

8.0 PAVED AND UNPAVED ROADS

- 8.1 All open-cut County Road crossings shall be fitted with Class 7 (SB-2) base rock above the required bedding for the pipe. The Class 7 (SB-2) base rock shall be compacted to 95% of modified proctor. All County Road crossings shall utilize a PVC encasement pipe that is a maximum of five (5) inches larger than the carrier pipe. The cost of this encasement pipe is incidental to the cost of the carrier pipe.
- 8.2 All paved County Road crossings shall utilize a steel encasement pipe and be bored under the roadway, unless otherwise specified. The cost of this encasement shall be paid for as bid under an Encased Paved County Road Crossing.

9.0 TESTING

- 9.1 Testing of the water mains shall be completed according to the information in the General Specifications. An accurate (**new**) water meter shall be provided for testing and shall be located in the downstream line of the testing pump. The Contractor shall also have an easy operating shut-off valve downstream of the pump. It is preferred that the Contractor have one individual responsible for pipe filling and testing. Chlorination of water mains will only be allowed after the testing section has passed the pressure and leakage test. Contractors testing taps and extra expended equipment shall be incidental to installation of the pipe. Refer to the General Specifications for more information.

10.0 MEASUREMENT AND PAYMENT

- 10.1 Measurement shall be from center to center of fittings or valves. No pipe length deduction will be made for fittings or valves. Payment for 3" and 2" Polyethylene Pipe and PVC pipe shall be made at the unit price bid in the Schedule of Bids under the appropriate bid item.
- 10.2 Payments for fittings larger than 2" shall be made under a separate item. Payments for valves and fire hydrants will be made under separate items. Separate payment for Bedding shall be made if required by the Engineer / Construction Observer.

ITEM 5

GATE VALVES - 2"

1.0 GATE VALVES

- 1.1 Under these items the Contractor shall furnish and install 2" gate valves and boxes at the locations shown on the plans or as directed by the Engineer.
- 1.2 All valves shall be AVK Series 25 valves with stainless steel stems and EPDM rubber encapsulated wedges as manufactured by American AVK Company, or the approved equivalent. Valves shall have a 2" square wrench nut. The design failure point shall not be the valve stem. The design failure point shall be the retainer gland on the top of the stuffing box.
- 1.3 Refer to General Specifications section "Water Pipe, Force Main, and Pipe Laying" for additional requirements.

2.0 VALVE BOX

- 2.1 All valves shall be equipped and installed with a three (3) piece, plus lid, screw type valve box as manufactured by Tyler/Union 6855 Series, or the approved equivalent.
- 2.2 A precast concrete protective collar is also required for valve box not in the street.

3.0 VALVE/LINE MARKERS

- 3.1 A valve/line marker shall be installed at each set of valves not located in the pavement. The marker shall be the Rhino TriView's highly visible triangular design ensures that excavators, mower operators and others will be able to see your warning message from any direction, protecting your pipeline as well as providing easy access to terminals by your technicians or contract locators. The Rhino TriView is durable and flexible reducing the likelihood of damage in the event that the marker is impacted by a vehicle.
- 3.2 The markers shall be installed during the installation of the water line so tracer wire can be installed. The standard marker colors shall be blue with a standard cap color of black. The size shall be 60" long and be a Tracer Wire Terminal Post with two Internal Terminals and two External Terminals. The 1/4" Brass Terminal includes a bolt, nut, washers and ring terminal.
- 3.3 The markers will also serve as pipeline markers that carry a warning message which may prevent an excavator from digging without calling for a locate. The standard color fast decals shall use sharply contrasting colors and incorporate the international No-Dig symbol and the 811 logo.
- 3.4 The water line markers shall be as manufactured by Rhino Marking and Protection Systems, A Division of REPNET, Inc., www.RhinoMarkers.com, Phone: 1-800-522-4343, Fax: 1-888-522-4343 or an approved equivalent.

4.0 PAYMENT

- 4.1 The Contractor shall be paid for each valve, valve box, concrete ring and valve/line marker actually installed at the unit price bid in the Schedule of Bids for the appropriate bid item and such payment shall include all work incidental to installation including the precast concrete collar and valve/line marker.

ITEM 6

2" BLOW-OFF VALVES

- 1.0** Under this item the Contractor shall furnish and install at the locations shown on the plans a blow-off hydrant in accordance with the detail shown on the Typical Details sheet in the plans. These hydrants shall be non-freezing, self-draining with a 3 foot bury. This hydrant will be furnished with a 2" inlet, a non-turning operating rod, and shall open counterclockwise. All working parts shall be bronze to bronze design and serviceable without digging and comply with the latest NSF requirements for brass. All piping shall be either cast or ductile-iron. The outlet shall also be bronze and be 2½" NST. Hydrants shall be lockable to prevent unauthorized use. Hydrant shall be a No. 77 Post Hydrant as manufactured by the Kupferle Foundry Co., St. Louis, Mo. or approved equivalent.
- 2.0** The blow-off valve shall utilize a two (2") inch MJ connection. The blow-off valve shall be restrained to the PVC through the use of a MIDCO gland. All blow-off hydrants shall use the minimum sized thrust blocking as stated in the "Ductile Iron Fittings" requirements.
- 3.0 PAYMENT**
- 3.1** The Contractor shall be paid for each blow-off actually installed at the unit price bid in the Schedule of Bids for "2" Blow-off Valve Assembly" and such payment shall include all work incidental to completing the installation.

ITEM 7

DUCTILE IRON FITTINGS

1.0 FITTINGS

- 1.1 Under this item the Contractor shall furnish and install Ductile Iron Fittings at locations as shown on the plans, or as directed by the Engineer. No plastic fittings will be allowed on the smaller lines.
- 1.2 These fittings shall be pressure rated for 250 (350 psi where Class 350/Class 315 pipe is shown on the plans) in accordance with AWWA C153 and shall utilize restrained joints.
- 1.3 The restraint joints shall be as manufactured by Smith-Blair, Inc., EBAA IRON, Inc., MIDCO or an approved equivalent. The two inch joints and HDPE pipe shall use MIDCO restraint glands.
- 1.4 The fittings shall be coated with 6 - 8 mils thickness of fusion bonded epoxy conforming to the requirements of AWWA Specification C-550 and C116/A21.116, latest revision. All fittings shall be furnished with gaskets.
- 1.5 Also included under this item shall be the providing of necessary and required blocking of fittings as shown on the plans. Plastic shall be wrapped around each fitting prior to placement of backing (see "Typical Details" sheet).
- 1.6 **The minimum size of blocking shall be a 24" x 18" x 12" cube of concrete. This concrete shall be placed. No bags of Quickcrete will be accepted unless mixed.**

2.0 PAYMENT

- 2.1 Payment for these fittings will include the concrete, bolts, restraining glands, and accessories of a properly installed Ductile Iron Fitting. Also included is the labor, tools, equipment and any incidental items necessary for a properly installed Ductile Iron Fitting.
- 2.2 Payment for these fittings will be by the pound (lb.) at the unit price bid in the Schedule of Bids, for this item. **The weight paid for each installed fitting (including accessories, concrete, equipment, labor and incidentals) will be derived from the minimum weight (excluding accessories) shown in the AWWA Standard C153 for compact fittings.**

ITEM 8

6"x 3" TAPPING SLEEVE, 3" GAVE VALVES, AND VALVE BOXES

1.0 GENERAL

- 1.1 Under this item, the Contractor shall furnish all labor, materials, and equipment required to connect the Tapping Sleeve and Valve to the existing mains at the locations shown on the plans.

2.0 SLEEVES

- 2.1 Sleeves shall be designed for a working pressure of at least 200 psi. A test plug shall be furnished through the body for hydrostatic pressure testing on all sleeves. Full body stainless steel, mechanical-type sleeves are required. The sleeve shall be covered with a bituminous coating upon completion of the installation for all non-stainless steel parts.
- 2.2 The outlet shall conform to a mechanical joint connection designed to accept a regular MJ valve. All bolts shall be corrosion resistant alloy.
- 2.3 The sleeve shall have been tested to a minimum of 300 psi on pipe to verify proper fit and be welded to a "Zero Leakage" standard.
- 2.4 These sleeves shall be Model 3490MJ as manufactured by PowerSeal Corporation (800-800-0932), Smith-Blair, or an approved equivalent.

3.0 VALVES

- 3.1 All tapping valves shall be AVK Series 25 valves with EPDM rubber encapsulated wedges as manufactured by American AVK Company, or an approved equivalent. Valves shall have a 2" square wrench nut. Refer to General Specifications section "Water Pipe, Force Main, and Pipe Laying" for additional requirements.

4.0 VALVE BOX

- 4.1 All valves shall be equipped and installed with a three piece, plus lid, screw type valve box as manufactured by Tyler/Union 6855 Series, or the approved equivalent. A valve marker shall be installed at each set of valves not located in the pavement, like the valve bid item.
- 4.2 A concrete protective collar is also required for valve box and a valve marker for the valve location.

5.0 PAYMENT

- 5.1 Payment for this item shall be at the unit price bid in the Schedule of Bids, based on each "Tapping Sleeve, Valve and Valve Box properly installed and shall include the cost of all equipment, labor, and materials necessary to complete the installation.

ITEM 9

ENCASED 3" COUNTY ROAD CROSSING

1.0 GENERAL

- 1.1 Under this item, the Contractor shall furnish all materials and labor to install encased county road crossing of water mains as shown on the plans in accordance with the Plans and Specifications.
- 1.2 The encasement shall be installed under the paved road pavement by dry-boring or tunneling. Traffic and safety controls shall be maintained with signs, flagmen, or otherwise as needed or directed by the Pittsburg County Road Departments.
- 1.3 Included in this item shall be a smooth steel encasement pipe with welded joints. The inside diameter of the encasement pipe shall not less than four inches (4") greater in diameter than the outside diameter of the bell or flange of the carrier pipe to be encased.
- 1.4 Also included under this item will be approved casing spacers to center the carrier pipe inside the encasement pipe. The spacers shall be spaced according to the manufacturers recommendations for a full pipe of the type of carrier pipe used.
- 1.5 The steel casing shall extend five (5') feet past the road ditches and be installed with 2-inch steel vent pipes on each end.

2.0 PERMIT

- 2.1 **The Contractor shall obtain the County's permit, if required, to insure satisfactory restoration of Pittsburg County Road Department property.** Contractor shall be responsible for the acceptance of the county road crossing by the Pittsburg County Road Department at which time permit shall be released.
- 2.2 **Proper alignment and grade must be maintained through the crossing.**

3.0 PAYMENT

- 3.1 Payment for "Encased County Road Crossing shall be by the linear foot installed for the size of the carrier. Payment shall be at the unit price bid in the Schedule of Bids, which shall include all compensation for extra labor involved including rock excavation or pavement replacement, if necessary, exclusive of the price per foot of pipe. Carrier pipe will be paid for separately.

ITEM 10

CONNECTION TO EXISTING MAINS

1.0 GENERAL

- 1.1 This item shall include locating existing piping and connecting new piping to existing piping and shall be installed at the locations shown on the plans.
- 1.2 This item shall also include all fittings and brass less than two (2) inches in size.

2.0 PAYMENT

- 2.1 Payment shall be made for each connection made to existing piping.
- 2.2 This shall not be paid in conjunction with Items 8, “6”x3” Tapping Sleeve and 3” Gate Valve”.

ITEM 11

2" CUT AND CAP EXISTING MAIN

1.0 GENERAL

- 1.1 This item shall include locating existing piping, cut and cap the existing line to abandon a section of the main as shown on the plans and according to the detail.
- 1.2 This item shall also include all fittings, caps and accessories.
- 1.3 This item shall also include the steel tubing installed between the two caps on the piping.
- 1.4 The concrete installed shall also be included.
- 1.5 This item cannot be completed until the new piping has obtained safe water samples and passed pressure testing.

2.0 PAYMENT

- 2.1 Payment shall be made for each cut and cap completed made to existing piping. This item shall include all concrete, steel tubing, caps and hardware, labor and incidentals necessary to complete the item.

ITEM 12

GRAVEL BEDDING AND BACKFILL MATERIAL

1.0 GENERAL

- 1.1 Under this item of work the Contractor shall place bedding and embedment material when so directed by the Engineer or his Representative. This bedding and embedment shall be placed in accordance with the details shown on the plans when the excavated material is not satisfactory and the availability of other suitable material is absent. Materials required due to over excavation will be at the expense of the Contractor.
- 1.2 Where required by the Engineer or his Representative, bedding material shall be hauled in and used. Obtaining bedding material along the ditch shall not be paid as bedding. Bedding shall cause the Contractor to go at least 400 feet to obtain suitable material.

2.0 BEDDING MATERIAL

- 2.1 This material shall consist of fine river sand, silt loam or a No. 6 gradation (ASTM C33, latest revision) of a quality approved by the Engineer or his Representative. The maximum particle size shall not exceed $\frac{3}{4}$ inch. At least 30% of the material shall pass the $\frac{1}{2}$ inch sieve.
- 2.2 Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of PVC pipe.

3.0 MEASUREMENT AND PAYMENT

- 3.1 The bedding shall be measured on the basis of the actual measurement of the lineal feet of pipe that bedding is used. The minimum required bedding used when required shall be as shown on the plans. Over excavation of the trench will be at the Contractor's expense.
- 3.2 The **exact** length of pipe bedding required shall be determined by the Engineer or his Representative. The **actual** length of the pipe bedding shall be so noted in the construction observer's diary, and initialed by the Contractor or his representative, which shall constitute full agreement by all parties to the quantity in question.
- 3.3 Payment shall be made at the unit price bid per linear feet in the Schedule of Bids for this item, "Bedding Material" and such price shall include all related items of work connected with furnishing and placing bedding or backfill material.

ITEM 13

ROCK EXCAVATION

1.0 GENERAL

- 1.1 Under this item the Contractor shall remove and dispose of solid rock encountered in the pipe trench as specified herein.

2.0 DEFINITION

- 2.1 Solid rock excavation shall be defined as any boulder or ledge rock requiring blasting or mechanical hammering prior to removal. Also included shall be any solidified material, which in the opinion of the Engineer or his Representative, **could not be excavated by a 325 Caterpillar trackhoe with a 24 inch bucket and being used under reasonable operating procedures shall be termed solid rock excavation.**
- 2.2 **Included in this item shall be the removal and disposal from the site of excess solid rock so excavated.**

3.0 ADDITIONAL REQUIREMENTS

- 3.1 It should be noted that no boulder exceeding eight (8) inches in any dimension shall be placed in the trench backfill above the bedding.
- 3.2 All Contractors or subcontractors performing blasting shall conform to all requirements for insurance, the protection of private property, the State of Arkansas Safety Requirements, and any other applicable standards.

4.0 MEASUREMENT AND PAYMENT

- 4.1 The rock shall be measured on the basis of the actual thickness in the trench at the required depth and a width equal to **eighteen (18) inches plus the diameter of the carrier pipe** being laid according to the detail on the plans. Over excavation of rock will be at the Contractor's expense.
- 4.2 Payment will be at the price bid per cubic yard in the Schedule of Bids for this item "Rock Excavation" in Trench, and such price shall include all related items of work connected with the removal and disposal of said solid rock material.

ITEM 14

2" TEMPORARY WATER LINE

1.0 GENERAL

- 1.1 Under this bid item, the Contractor shall furnish all material, equipment, and labor for a 2-inch temporary DR-11 polyethylene water line that will allow the construction to begin for the new bridge structure. The line shall be installed above ground across the existing walk bridge crossing the stream as shown on the plans and described herein. This installation shall include all piping, fittings, sterilization, above ground restraints, connections, existing pipe locating and related accessories.

2.0 PIPE

- 2.1 High Density Polyethylene (HDPE) Water transmission and distribution pipe shall meet the specifications and requirements of AWWA C906 latest revision, in size 3 inch and be joined by means of a zero-leak rate, butt fusion and approved mechanical joints. The polyethylene pipe and fittings shall be made from prime virgin resins exhibiting a cell classification of PE 345434C as defined in ASTM D3350 with an established hydrostatic design basis of 1600 psi for water at 73° F. The resin shall be listed by the PPI in its pipe grade registry "TR-4". Pipe O.D. sizes shall be in the same as ductile iron pipe.

- 2.1.1 **The net pressure capability shall be the working pressure rating as follows:**

DR 11 = Class 200/Class 250

- 2.1.2 The wall thickness shall follow the DR system prescribed in AWWA C906. The pipe is to be joined by heat fusion or mechanical joints systems proven for HDPE pipe. Both pipe and fittings must be NSF approved, be listed and marked. All pipe is to be welded using the manufacturer's recommended procedures.
- 2.1.3 All pipe and fittings shall be marked as prescribed by AWWA C906 latest revision, which includes the nominal size, O.D. base, DR, pressure class, WPR, manufacturer's name, manufacturer's production code including month and year extruded. All pipe and fittings shall have a date stamp less than six (6) months old.
- 2.2 Contractor shall sterilize water line before connection to the existing system. An alternative would be a pre-sterilized water line with capped ends.
- 2.3 500-foot water line shall be centered over creek and connected on both ends to the existing 2-inch PVC water line. Contractor shall install piles of soil over the above ground line at 50-foot intervals on both sides of the bridge to keep the water line in place.

3.0 SALVAGE

- 3.1 After the new water main is installed and safe samples have been obtained, the Contractor shall connect the south end of the existing line to the new water main. Then the temporary water line shall be given to the Sardis Lake Water Authority. The contractor shall roll up the water line on the original spool for delivery to the District. Contractor shall deliver

water line to the District's main office / water treatment plant on Highway 2 north of Clayton, Oklahoma.

4.0 PAYMENT

- 4.1 Payment shall be at the lump sum price bid for the "2" temporary water line" in the Schedule of Bids for acceptably furnished, installed and salvaged; and shall be full compensation for all materials, equipment, and labor necessary to complete the work and shall be full compensation including incidentals.

APPENDIX

Release of Claimants

RELEASE OF CLAIMANTS

Date: _____

Project: _____

Dear Sir:

I hereby acknowledge receipt of _____

Dollars (\$ _____) in full payment of my

contracted dated _____, for improvement

work which I did for you and which is described in my contract.

I, Certify that I have paid in full for all material's purchased and all labor employed in the performance of this contract and that there are no claims against me as an employer under this contract on account of injuries sustained by workmen employed by me thereunder.

I, hereby release you from any claims arising by virtue of this contract.

WARNING

The making of any false statement or misrepresentation herein may be a crime punishable under Title 18 U.S.C. Section 1001 which provides in part: "Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully.... makes false representation, or makes or uses any false writing or document knowing the same to contain any false fictitious or fraudulent statement or entry, shall be fined not more than \$10,000.00 or imprisoned not more than five years, or both."

Sincerely,

By: _____
(Signature)

Title: _____
(Print or Type)