

CONTRACT AND SPECIFICATIONS

FOR

***WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)***

TO SERVE

***MOUNT SHERMAN WATER ASSOCIATION
NEWTON COUNTY, ARKANSAS***

MARCH 2010



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(SHILOH ROAD & MURRAY ROAD)***

TO SERVE

***MOUNT SHERMAN WATER ASSOCIATION
NEWTON COUNTY, ARKANSAS***

MARCH 2010



ENGINEERING SERVICES, INC.

1207 SOUTH OLD MISSOURI ROAD • P. O. BOX 282 • SPRINGDALE, ARKANSAS 72765-0282
479-751-8733 • 479-751-8746 (FAX) • www.engineeringservices.com

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ITEM 1
Advertisement For Bids

Advertisement for Bids
Addenda
Information for Bidders

ADVERTISEMENT FOR BIDS

Sealed bids for the construction of the *Water Main Extension (Shiloh Road & Murray Road)* to serve portions of Central Newton County for the Mount Sherman Water Association will be received by the *Mount Sherman Water Association* until **2:00 p.m.** local time on **April 12, 2010**; and then at the *Mount Sherman Fire Station, Highway 74, Newton County, Arkansas*, publicly opened and read aloud.

The project consists of the following:

- Approximately 8,000 linear feet of 3" Water Main
- Approximately 2,000 linear feet of 2" Water Main
- All necessary fittings, valves, service connections, fire hydrants, bedding material, and other related accessories for a complete and operation system.

Information for Bidders, Bid Forms, Form of Contract, Plans and Specifications, Bid Bond Form, Performance and Payment Bond Forms, and other Contract Documents may be examined at the office of the Engineer.

Copies may be obtained at the office of Engineering Services, Inc., Consulting Engineers, 1207 South Old Missouri Road, P. O. Box 282, Springdale, Arkansas 72765, upon a ***non-refundable*** payment of One Hundred (\$100.00) dollars for each set.

Each bidder must deposit with his bid, security in the amount for and subject to the conditions provided in the Information for Bidders.

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

No Bidder may withdraw his bid within ninety (90) days after the actual date of the opening thereof.

Date: _____

Jim Bowen, Chairman
Mount Sherman Water Association

ADDENDUM NO. 1

DATE: April 5, 2010

PROJECT: *Water Main Extension (Shiloh Road & Murray Road)*
Mount Sherman Water Association

BIDS DUE: **MONDAY, APRIL 12, 2010**
Mount Sherman Fire Station, Highway 74, Newton County, Arkansas

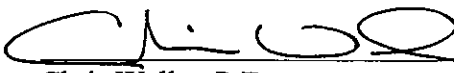
OWNER: Mount Sherman Water Association

ENGINEER: Engineering Services, Inc.
1207 South Old Missouri Road
Springdale, Arkansas 72764

MAKE THE FOLLOWING CHANGES IN THE PLANS & SPECIFICATIONS.

1. SPECIFICATIONS (Advertisement For Bids – Page 1-1) – The date that sealed bids for the construction of the project will be received has been revised from *September 1, 2009* to *April 12, 2010*. Attached please find a revised Page 1-1 of the Advertisement for Bids.
2. PLANS & SPECIFICATIONS (Schedule of Bids – Page 2-4 through Page 2-9) – The Shiloh Road Extension portion of this project, as labeled on Sheet 2 and detailed on Sheet 6 of the plans, has already been constructed in the recent past. This portion of the project is not part of this bid and contract. The item amounts in the Schedule of Bids have been revised to reflect this portion of the project being omitted. Attached please find revised Pages 2-4 through 2-9 of the Schedule of Bids.

END OF ADDENDUM NO. 1
(Refer to Attachments)


Chris Waller, P.E.,
Engineering Services, Inc.

Addendum No. 1 is a total of 8 sheets.

ADVERTISEMENT FOR BIDS

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Information for Bidders, Bid Forms, Form of Contract, Plans and Specifications, Bid Bond Form, Performance and Payment Bond Forms, and other Contract Documents may be examined at the office of the Engineer.

Copies may be obtained at the office of Engineering Services, Inc., Consulting Engineers, 1207 South Old Missouri Road, P. O. Box 282, Springdale, Arkansas 72765, upon a *non-refundable* payment of One Hundred (\$100.00) dollars for each set.

Each bidder must deposit with his bid, security in the amount for and subject to the conditions provided in the Information for Bidders.

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

No Bidder may withdraw his bid within ninety (90) days after the actual date of the opening thereof.

Date: _____

Jim Bowen, Chairman
Mount Sherman Water Association

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
1	1,180	L.F.	3" Diameter PVC Water Main (Class 315) Water Main furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
2	1,600	L.F.	3" Diameter PVC Water Main (Class 250) Water Main furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
3	5,000	L.F.	3" Diameter PVC Water Main (Class 200) Water Main furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
4	680	L.F.	2" Diameter PVC Water Main (Class 250) Water Main furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
5	1,340	L.F.	2" Diameter PVC Water Main (Class 200) Water Main furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
6	220	L.F.	1" HDPE Service Line furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
TOTAL AMOUNT BID THIS PAGE..... \$ _____					

NAME OF BIDDER: _____

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
7	40	L.F.	3" Encased Gravel Road Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
8	40	L.F.	2" Encased Gravel Road Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
9	120	L.F.	Gravel Driveway Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
10	5	EA.	3" Gate Valve with Box furnished and installed for _____ dollars and _____ cents each.	\$ _____	\$ _____
11	6	EA.	2" Gate Valve with Box furnished and installed for _____ dollars and _____ cents each.	\$ _____	\$ _____
12	3	EA.	2" Blow-Off Hydrant furnished and installed for _____ dollars and _____ cents each.	\$ _____	\$ _____

TOTAL AMOUNT BID THIS PAGE\$ _____

NAME OF BIDDER: _____

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
13	2	EA.	Air Release Valve furnished and installed for _____	_____ dollars and _____ cents each.	\$ _____ \$ _____
14	2	EA.	Pressure Reducing Valve furnished and installed for _____	_____ dollars and _____ cents each.	\$ _____ \$ _____
15	1	EA.	Connect to Existing Water Main furnished and installed for _____	_____ dollars and _____ cents each.	\$ _____ \$ _____
16	1	EA.	1" Service Line Connection furnished and installed for _____	_____ dollars and _____ cents each.	\$ _____ \$ _____
17	11	EA.	Meter Service furnished and installed for _____	_____ dollars and _____ cents each.	\$ _____ \$ _____
18	900	LBS.	Ductile Iron Fittings furnished and installed for _____	_____ dollars and _____ cents per pound.	\$ _____ \$ _____

TOTAL AMOUNT BID THIS PAGE..... \$ _____

NAME OF BIDDER: _____

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
19	550	C.Y.	Rock Excavation furnished and installed for _____ _____ dollars and _____ cents per cubic yard.	\$ _____	\$ _____
20	9,500	L.F.	Bedding Material furnished and installed for _____ _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
21	50	L.F.	Concrete Encasement furnished and installed for _____ _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
22	1,250	L.F.	Yard Restoration for _____ _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
23	6	EA.	Water Pipeline Signs furnished and installed for _____ _____ dollars and _____ cents each.	\$ _____	\$ _____
TOTAL AMOUNT BID THIS PAGE.....				\$ _____	

NAME OF BIDDER: _____

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
24	1	L.S.	Erosion Control and Mitigation furnished and installed for _____ _____ dollars and _____ cents lump sum.	\$ _____	\$ _____
25	1	L.S.	OSHA's Standard for Excavation and Trenches Safety System for ____ _____ dollars and _____ cents lump sum.	\$ _____	\$ _____
TOTAL AMOUNT BID THIS PAGE.....				\$ _____	

NAME OF BIDDER: _____

**SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION**
Note: BIDS shall include sales tax and all other applicable taxes and fees.

BID SUMMARY

TOTAL AMOUNT BID PAGE 2-4.....\$ _____

TOTAL AMOUNT BID PAGE 2-5.....\$ _____

TOTAL AMOUNT BID PAGE 2-6.....\$ _____

TOTAL AMOUNT BID PAGE 2-7.....\$ _____

TOTAL AMOUNT BID PAGE 2-8.....\$ _____

TOTAL AMOUNT BID.....\$ _____

NAME OF BIDDER: _____

ADDENDUM NO. 2

DATE: April 9, 2010

PROJECT: *Water Main Extension (Shiloh Road & Murray Road)*
Mount Sherman Water Association

BIDS DUE: **MONDAY, APRIL 12, 2010**
Mount Sherman Fire Station, Highway 74, Newton County, Arkansas

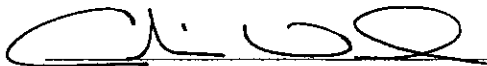
OWNER: Mount Sherman Water Association

ENGINEER: Engineering Services, Inc.
1207 South Old Missouri Road
Springdale, Arkansas 72764

MAKE THE FOLLOWING CHANGES IN THE PLANS & SPECIFICATIONS.

1. SPECIFICATIONS (Schedule of Bids – Page 2-5) – The quantities of Bid Item 10 (3" Gate Valve) and Bid Item 11 (2" Gate Valve) were incorrect. The specifications have been revised to match the quantities in the plans. Attached please find a revised Page 2-5 of the Schedule of Bids.
2. SPECIFICATIONS (Detailed Specifications "Pressure Reducing Valve" – Pages 6-15 through 6-16) – The plans and the specifications do not match. The plans show the correct detail. The specifications have been revised to match the details in the plans. Attached please find revised Pages 6-15 through 6-16 of the Detailed Specifications.

END OF ADDENDUM NO. 2
(Refer to Attachments)


Chris Waller, P.E.,
Engineering Services, Inc.

Addendum No. 2 is a total of 4 sheets.

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
7	40	L.F.	3" Encased Gravel Road Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
8	40	L.F.	2" Encased Gravel Road Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
9	120	L.F.	Gravel Driveway Crossing furnished and installed for _____ dollars and _____ cents per linear foot.	\$ _____	\$ _____
10	4	EA.	3" Gate Valve with Box furnished and installed for _____ dollars and _____ cents each.	\$ _____	\$ _____
11	7	EA.	2" Gate Valve with Box furnished and installed for _____ dollars and _____ cents each.	\$ _____	\$ _____
12	3	EA.	2" Blow-Off Hydrant furnished and installed for _____ _____ dollars and _____ cents each.	\$ _____	\$ _____

TOTAL AMOUNT BID THIS PAGE \$ _____

NAME OF BIDDER: _____

BID ITEM 14

PRESSURE REDUCING VALVE

Under this bid item, the Contractor shall furnish all material, equipment, and labor for the satisfactory installation of the pressure reducing stations shown on the plans and described herein. This installation shall include all ductile iron piping, fittings, valves, pressure reducing valves, pressure gauges, reinforced concrete vault, entrance hatch, drain line, and related accessories.

All materials for this bid item shall be submitted to the Engineer for approval prior to ordering, installing, or constructing.

Pressure Reducing Valves

The pressure reducing valves shall be a Cla-Val 90-01D-BY with CK2 Cock, X43 "Y" Strainer, and Check Valve, or approved equal. The pressure reducing valve shall be sized as shown on the plans.

Gate Valves

Gate valves shall be Mueller and Company No. A-2360-20, or approved equivalent, and shall have a two (2") square wrench nut, transition gaskets (depending on type of pipe used) with O-ring seals or approved equal. Valves shall open when the operating nut is turned left (counter clockwise). Valves shall be equipped and installed with a three piece, plus lid, screw type valve box No.562-S, as manufactured by Tyler Pipe, or the approved equal. A concrete protective collar is required for all valve boxes. Concrete for protective collars shall be redi-mixed concrete. A minimum of 3" granular base shall be provided under the collar. Pre-cast valve collars may be accepted if they are provided with the gravel base, leveled, and have non-shrink epoxy installed between the precast concrete collar and the top of the valve box. Approval of pre-cast valve collars shall be at the discretion of the Engineer.

Each valve shall be operated (via a valve wrench) prior to placing the concrete collar around the valve box. If the valve wrench cannot fit on the 2" square operating nut, or if the 2" operating nut is significantly off-center, the valve box shall be excavated, re-centered, and carefully backfilled to insure the 2" square nut remains centered.

Piping

Piping shall be as shown on the plans. All piping shall be schedule 40 steel pipe or Class 350 Ductile Iron conforming to AWWA C110 and shall have a cement mortar lining and seal coat conforming to AWWA C104. Fittings shall be ductile iron fittings conforming to AWWA C110 with flanged connections. Flanges shall conform to AWWA C110 and must be adequate for water service of 250 psi. All flange bolts and nuts must be stainless steel. Ductile iron pipe shall have flanged ends on the portion installed within the vault. All flange bolts and nuts must be

stainless steel. **Ductile-Iron piping shall extend a minimum of five (5') outside the vault as shown on the Typical Details sheet of the plans. This piping and all pipe and fittings within the vault shall be included in the lump sum price bid.** The inlet and outlet pipe shall be cast-in-place and shall have a retainer gland cast in the wall of the vault. **All piping shall be painted with approved paints and methods BEFORE the introduction of water into the piping.** The piping shall be painted as follows: (1) Surface Prep: SSPC-SP6 commercial Blast Cleaning; (2) 66-Color Hi-Build Epoxoline, minimum of 4.0 mils and maximum of 5.0 mils; (3) 66-Color Hi-Build Epoxoline, minimum of 5.0 mils and maximum of 6.0 mils. Color shall be AWWA blue.

Pressure Gauges

Two (2) pressure gauges reading from 0-300 psi upstream and 0-200 psi downstream in two (2) pound increments shall be installed on the piping shown. Gauges shall be glycerin filled, stainless steel case, bronze internals with a 6" face. Brass fittings and valves shall be supplied with each gauge so that each gauge can be isolated from main line pressure.

Vault

The concrete vault shall be constructed as shown on the detail sheet of the plans. Concrete shall be Class A(AE) conforming to the requirements of the General Specifications for Concrete. Reinforcing steel shall be of the size and spacing shown on the plans and conforming to the General Specifications for Reinforcing Steel. The access door shall be hinged with retractable handles and shall be lockable as shown on the plans. Access doors shall be Halliday Products model S1R33030 access door with lockable hasp, or approved equal. The access door shall be installed with a gasket to seal the seam to prevent water from entering the vault.

The concrete vault shall be either cast-in-place or precast. A submittal for use of precast vault will be required. The vault will be set on a minimum of 6" Class 7 base material. The sump pit shall be cast-in-place in the vault when the floor is poured. The drainline shall be bedded and shall drain to daylight. A headwall and flap valve shall be placed on the end of the drainline. The location of the sump pit and drain line location will be determined in the field by the Engineer and Contractor. It is important that the clearances specified be maintained between the piping and vault walls and floor to facilitate maintenance of the various units. The floor shall be reinforced concrete construction sloped to drain to the floor sump at 1" per 12".

Payment

Payment shall be made for each completed and accepted installation at the unit price bid in the *Schedule of Bids* and shall be full compensation for all equipment, materials, and labor necessary to complete the work.

INFORMATION FOR BIDDERS

BIDS will be received by the *Mount Sherman Water Association*, (herein called the "OWNER") at the time and place set forth in the Advertisement for Bids attached hereto.

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

**Mount Sherman Water Association
P.O. Box 323
Jasper, Arkansas 72641**

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

***Water Main Extension
(Shiloh Road & Murray Road)***

and the envelope should bear on the outside the BIDDER'S name, address, and 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:

**Mount Sherman Water Association
P.O. Box 323
Jasper, Arkansas 72641**

All BIDS must be made 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 90 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 BIDDER.

BIDDERS must 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 assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the 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 percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNERS will return the BONDS of all except the three 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 PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or PAYMENT BONDS and PERFORMANCE BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the PERFORMANCE BOND and PAYMENT 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.

Successful BIDDER must comply with the requirements of Arkansas Code Ann. §17-25-401-409 (1995) in accordance with the procedures established by the Contractors Licensing Board (Reference Clause 19.2 of the General Conditions).

Successful BIDDER must comply with the requirements of Act 291 of 1993 concerning trenches or other excavations 5 feet deep or more in accordance with OSHA standards.

The OWNER, within ten (10) days of receipt of acceptable PERFORMANCE BOND, PAYMENT 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.

The BIDDER must present satisfactory evidence that he has been regularly engaged in the type of work BID upon, giving the length of time so engaged, and that he is fully prepared with the necessary capital, material, machinery, and expert workmen to perform the contract.

The attention of the prospective BIDDERS is directed to Act 150 of the 1965 Acts of Arkansas, being an "Act Regulating the Practice of Contracting in the State of Arkansas". When the project presented for BID is financed in whole or in part with State funds and is estimated to cost

\$20,000.00 or more, the prospective BIDDER must show evidence of license with the "Contractor's Licensing Board" for the State of Arkansas before a proposal form will be furnished.

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 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.

A conditional 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 to the contract throughout.

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 in respect to its BID.

Further, the BIDDER agrees to abide by the requirements set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when required to do so by the OWNER.

The ENGINEER is *Engineering Services, Inc.* The ENGINEER'S address is *1207 South Old Missouri Road, Springdale, Arkansas 72764.*

ITEM 2
Bidder's Proposal

Bidder's Proposal
Schedule of Bids
Bid Bond

BIDDER'S PROPOSAL

PLACE: Mt. Sherman Water Association

DATE: April 12, 2010

1. In compliance with your invitations for bids dated April 12, 2010, and subject to all the conditions thereof, the undersigned Red Rock Construction Co., LLC
a corporation incorporated in the State of Arkansas
OR
a _____ consisting of _____
OR
an individual trading as _____
of the City of _____, State of _____
hereby proposes to furnish and do everything required by the contracts to which this refers for the construction of all structures listed at the unit prices shown for each bid item on the following Schedule of Bids. (The attached Schedule of Bids 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. In case of a conflict between the numeric unit price shown and the written price, the written price will govern in determining the total bid.)
2. The undersigned bidder does hereby declare and stipulate 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 is made in the pursuance of and subject to all the terms and conditions of the Information for Bidders, the Construction Agreement, General Specifications, Detailed Specifications, and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.
3. Accompanying this proposal is a certified check or standard bid bond in the sum of Five Thousand Five Hundred Fifty Nine and No/100 Dollars¹ (\$5,559.50) in accordance with the Information for Bidders.

¹ 5% of the amount bid

4. 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 ten (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 name and address of the corporate surety with which the Bidder proposes to furnish the specified performance bond and payment bond is as follows:

United Fire & Casualty Company

P.O. Box 73909

Cedar Rapids, IA 52407

5. 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.
6. All the various phases of work enumerated in the Detailed Specifications with their individual jobs and overhead, whether specifically mentioned, 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 it is named in said list.
7. Payment for work performed will be in accordance with the Schedule of Bids subject to changes as provided for in the Construction Agreement.
8. The Contractor acknowledges the following addenda to the plans and specifications:
- No. 1, dated April 5, 2010
- No. 2, dated April 12, 2010
- No. , dated , 2010
- No. , dated , 2010
9. Award may be made to the lowest responsive responsible BIDDER.
10. Unbalanced bidding to increase early construction payments on the basis of percent completion of large cost items will not be acceptable.
11. The Contractor agrees to complete all work within 90 days of the NOTICE TO PROCEED. 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 \$500.00 for each calendar day that the Contractor shall be in default after the time stipulated in the contract documents.

12. The Contractor agrees that not less than the prevailing hourly rate of wages shall be paid to all workers performing work under the contract. The Contractor is responsible for completing and submitting the "Statement of Intent to Pay Prevailing Wages" within thirty (30) days of the NOTICE TO PROCEED.

Contractor: RED ROCK CONSTRUCTION CO. LLC

Signature: Kent B. [Signature]

Title: MBR

Business Address: P.O. BOX 268
JASPER AR. 72641

AR Contractor's License No.: 0074700410

Or Date of Application for AR
Contractor's License No.: _____

Contractor's Phone: 870-434-5316

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
1	1,180	L.F.	3" Diameter PVC Water Main (Class 315) Water Main furnished and installed for <u>Seven</u> dollars and <u>Seventy Five</u> cents per linear foot.	\$ <u>7.75</u>	\$ <u>9,145.00</u>
2	1,600	L.F.	3" Diameter PVC Water Main (Class 250) Water Main furnished and installed for <u>Seven</u> dollars and <u>Fifty</u> cents per linear foot.	\$ <u>7.50</u>	\$ <u>12,000.00</u>
3	5,000	L.F.	3" Diameter PVC Water Main (Class 200) Water Main furnished and installed for <u>Seven</u> dollars and <u>Twenty Five</u> cents per linear foot.	\$ <u>7.25</u>	\$ <u>36,250.00</u>
4	680	L.F.	2" Diameter PVC Water Main (Class 250) Water Main furnished and installed for <u>Six</u> dollars and <u>Seventy Five</u> cents per linear foot.	\$ <u>6.75</u>	\$ <u>4,590.00</u>
5	1,340	L.F.	2" Diameter PVC Water Main (Class 200) Water Main furnished and installed for <u>Six</u> dollars and <u>Twenty Five</u> cents per linear foot.	\$ <u>6.25</u>	\$ <u>8,375.00</u>
6	220	L.F.	1" HDPE Service Line furnished and installed for <u>Three</u> dollars and <u>Fifty</u> cents per linear foot.	\$ <u>3.50</u>	\$ <u>770.00</u>
TOTAL AMOUNT BID THIS PAGE				\$	<u>71,130.00</u>

NAME OF BIDDER: Red Rock Construction Co., LLC

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
7	40	L.F.	3" Encased Gravel Road Crossing furnished and installed for <u>Twenty</u> dollars and <u>Zero</u> cents per linear foot.	\$ <u>20.00</u>	\$ <u>800.00</u>
8	40	L.F.	2" Encased Gravel Road Crossing furnished and installed for <u>Fifteen</u> dollars and <u>Zero</u> cents per linear foot.	\$ <u>15.00</u>	\$ <u>600.00</u>
9	120	L.F.	Gravel Driveway Crossing furnished and installed for <u>Twenty</u> dollars and <u>Zero</u> cents per linear foot.	\$ <u>20.00</u>	\$ <u>2,400.00</u>
10	4	EA.	3" Gate Valve with Box furnished and installed for <u>Five Hundred Fifty</u> dollars and <u>Zero</u> cents each.	\$ <u>550.00</u>	\$ <u>2,200.00</u>
11	7	EA.	2" Gate Valve with Box furnished and installed for <u>Four Hundred Fifty</u> dollars and <u>Zero</u> cents each.	\$ <u>450.00</u>	\$ <u>3,150.00</u>
12	3	EA.	2" Blow-Off Hydrant furnished and installed for <u>Six Hundred</u> dollars and <u>Zero</u> cents each.	\$ <u>600.00</u>	\$ <u>1,800.00</u>
TOTAL AMOUNT BID THIS PAGE				\$	<u>10,950.00</u>

NAME OF BIDDER: Red Rock Construction Co., LLC

SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION
 Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
13	2	EA.	Air Release Valve furnished and installed for <u>Eight Hundred</u> dollars and <u>Zero</u> cents each.	\$ <u>800.00</u>	\$ <u>1,600.00</u>
14	2	EA.	Pressure Reducing Valve furnished and installed for <u>Nine Thousand</u> dollars and <u>Zero</u> cents each.	\$ <u>9,000.00</u>	\$ <u>18,000.00</u>
15	1	EA.	Connect to Existing Water Main furnished and installed for <u>Six Hundred</u> dollars and <u>Zero</u> cents each.	\$ <u>600.00</u>	\$ <u>600.00</u>
16	1	EA.	1" Service Line Connection furnished and installed for <u>Two Hundred</u> dollars and <u>Zero</u> cents each.	\$ <u>200.00</u>	\$ <u>200.00</u>
17	11	EA.	Meter Service furnished and installed for <u>Three Hundred Fifty</u> dollars and <u>Zero</u> cents each.	\$ <u>350.00</u>	\$ <u>3,850.00</u>
18	900	LBS.	Ductile Iron Fittings furnished and installed for <u>Zero</u> dollars and <u>Zero</u> cents per pound.	\$ <u>0.00</u>	\$ <u>0.00</u>
TOTAL AMOUNT BID THIS PAGE.....				\$	<u>24,250.00</u>

NAME OF BIDDER: Red Rock Construction Co., LLC

**SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION**

Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
19	550	C.Y.	Rock Excavation furnished and installed for <u>Zero</u> dollars and <u>Zero</u> cents per cubic yard.	\$ 0.00	\$ 0.00
20	9,500	L.F.	Bedding Material furnished and installed for <u>Zero</u> dollars and <u>Zero</u> cents per linear foot.	\$ 0.00	\$ 0.00
21	50	L.F.	Concrete Encasement furnished and installed for <u>Fifty</u> dollars and <u>Zero</u> cents per linear foot.	\$ 50.00	\$ 2,500.00
22	1,250	L.F.	Yard Restoration for <u>Zero</u> dollars and <u>Zero</u> cents per linear foot.	\$ 0.00	\$ 0.00
23	6	EA.	Water Pipeline Signs furnished and installed for <u>Sixty</u> dollars and <u>Zero</u> cents each.	\$ 60.00	\$ 360.00
TOTAL AMOUNT BID THIS PAGE.....				\$	2,860.00

NAME OF BIDDER: Red Rock Construction Co., LLC

**SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION**
Note: BIDS shall include sales tax and all other applicable taxes and fees.

ITEM NO.	APPROX. QUANTITY	PAY UNIT	DESCRIPTION AND PRICE IN WORDS	UNIT PRICE	TOTAL BID
24	1	L.S.	Erosion Control and Mitigation furnished and installed for <u>One Thousand</u> dollars and <u>Zero</u> cents lump sum.	\$ <u>1,000.00</u>	\$ <u>1,000.00</u>
25	1	L.S.	OSHA's Standard for Excavation and Trenches Safety System for <u>One Thousand</u> dollars and <u>Zero</u> cents lump sum.	\$ <u>1,000.00</u>	\$ <u>1,000.00</u>
TOTAL AMOUNT BID THIS PAGE.....				\$	<u>2,000.00</u>

NAME OF BIDDER: Red Rock Construction Co., LLC

**SCHEDULE OF BIDS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION**
Note: BIDS shall include sales tax and all other applicable taxes and fees.

BID SUMMARY

TOTAL AMOUNT BID PAGE 2-4.....	\$ <u>71,130.00</u>
TOTAL AMOUNT BID PAGE 2-5.....	\$ <u>10,950.00</u>
TOTAL AMOUNT BID PAGE 2-6.....	\$ <u>24,250.00</u>
TOTAL AMOUNT BID PAGE 2-7.....	\$ <u>2,860.00</u>
TOTAL AMOUNT BID PAGE 2-8.....	\$ <u>2,000.00</u>

TOTAL AMOUNT BID.....	\$ <u>111,190.00</u>
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NAME OF BIDDER: Red Rock Construction Co., LLC

THE AMERICAN INSTITUTE OF ARCHITECTS

AIA Document A310

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we

Red Rock Construction Co., LLC
P.O. Box 268, Jasper, Arkansas 72641

(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and
United Fire & Casualty Company
P.O. Box 73909, Cedar Rapids, Iowa 52407

(Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of Iowa
as Surety, hereinafter called the Surety, are held and firmly bound unto

Mount Sherman Water Association
HC 70 Box 250, Jasper, Arkansas 72641

(Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called the Obligee, in the sum of

Five Percent of Bid Amount Dollars (5%),
for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind
ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by
these presents.

WHEREAS, the Principal has submitted a bid for
Shiloh Road/Murray Road Water Main Extensions
Jasper, Arkansas

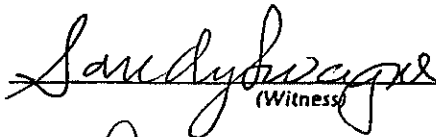
(Here insert full name, address and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract
with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding
or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt
payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter
such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty
hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract
with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain
in full force and effect.

Signed and sealed this

12th

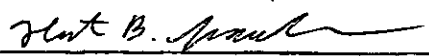
day of April, 2010

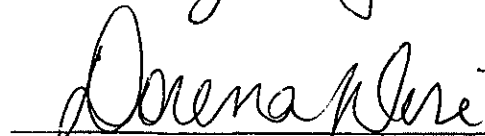

(Witness)

Red Rock Construction Co., LLC

(Principal)

(Seal)

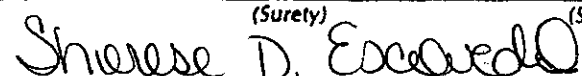

(Title) MBR


(Witness)

United Fire & Casualty Company

(Surety)

(Seal)


Sherese D. Escovedo (Title) Attorney-In-Fact

UNITED FIRE & CASUALTY COMPANY
HOME OFFICE - CEDAR RAPIDS, IOWA
CERTIFIED COPY OF POWER OF ATTORNEY

(Original on file at Home Office of Company - See Certification)

KNOW ALL MEN BY THESE PRESENTS, That the UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa, and having its principal office in Cedar Rapids, State of Iowa, does make, constitute and appoint MICHAEL D HALTER, OR KEVIN M BRUICK, OR RICHARD R IRVIN, OR SHERRY L JAGGERS, OR CHARLES ALLEN, OR BOB SMITH, OR DALE TEMPLE, OR SYLVIA A YOUNG, OR SHERESE D. ESCOVEDO, OR ROLFE KENNEDY, OR CAROLYN HUNTER, OR DORENA WISE ALL INDIVIDUALLY OF LITTLE ROCK AR

its true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature as follows: All bonds not to exceed \$10,000,000.00 and to bind UNITED FIRE & CASUALTY COMPANY thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of UNITED FIRE & CASUALTY COMPANY and all the acts of said Attorney, pursuant to the authority hereby given are hereby ratified and confirmed.

The Authority hereby granted shall expire 6th day of January, 2011 unless sooner revoked.

This power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by Board of Directors of the Company on April 18, 1973.

"Article V-- Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Company may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Company in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed. Such attorneys-in fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Company by their signature and execution of any such instruments and to attach the seal of the Company thereto. The President or any Vice President, the Board of Directors or any other officer of the Company may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the UNITED FIRE & CASUALTY COMPANY has caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 6th day of January, 2009



UNITED FIRE & CASUALTY COMPANY

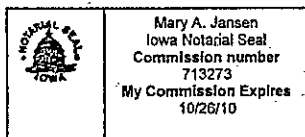
By *Dennis J. Richmann*

Vice President

State of Iowa, County of Linn, ss:

On 6th day of January, 2009, before me personally came Dennis J. Richmann

to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of the UNITED FIRE & CASUALTY COMPANY, the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation, and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.



Mary A. Jansen

Notary Public

I, the undersigned officer of the UNITED FIRE & CASUALTY COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the by-laws of said Company as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID COMPANY, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.



In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Company this 12th day of April 20 10.

David A. Jantz

Secretary

GENERAL CONDITIONS

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1. DEFINITIONS

- 1.1 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:
- 1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications, or corrections.
- 1.3 BID - 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 - Any person, firm or corporation submitting a BID for the WORK.
- 1.5 BONDS - 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 - 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 - 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, SPECIFICATIONS, and ADDENDA.
- 1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.
- 1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.
- 1.10 CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the Agreement.
- 1.11 DRAWINGS - The parts of the CONTRACT DOCUMENTS, which show the characteristics, and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.
- 1.12 ENGINEER - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

- 1.13 FIELD ORDER - 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.
- 1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.
- 1.15 NOTICE TO PROCEED - 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 - 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 - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.
- 1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.
- 1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrates how specific portions of the WORK shall be fabricated or installed.
- 1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.
- 1.21 SUBCONTRACTOR - An individual, firm, or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.
- 1.22 SUBSTANTIAL COMPLETION - That date certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.
- 1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.
- 1.24 SUPPLIER - 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.

- 1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.
- 1.26 WRITTEN NOTICE - 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. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

- 2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.
- 2.2 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 detailed drawings and instructions.

3. SCHEDULES, REPORTS, AND RECORDS

- 3.1 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.
- 3.2 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:
 - 3.2.1 The dates at which special detailed drawings will be required; and
 - 3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies, and equipment.
- 3.3 The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

- 4.1 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.
- 4.2 In case of conflict between the DRAWINGS AND SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over general DRAWINGS.
- 4.3 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.

5. SHOP DRAWINGS

- 5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWINGS shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWINGS, which substantially deviates from the requirement of the CONTRACT DOCUMENTS, shall be evidenced by a CHANGE ORDER.
- 5.2 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.
- 5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission have 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.

6. MATERIALS, SERVICES AND FACILITIES

- 6.1 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, lights, 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.
- 6.2 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.
- 6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
- 6.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.
- 6.5 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.

7. INSPECTION AND TESTING

- 7.1 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.
- 7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.
- 7.3 The CONTRACTOR shall provide at the CONTRACTOR'S expense the testing and inspection services required by the CONTRACT DOCUMENTS.
- 7.4 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.
- 7.5 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.

- 7.6 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.
- 7.7 If any WORK is covered contrary to the written 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.
- 7.8 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.

8. SUBSTITUTIONS .

- 8.1 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. 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 CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, 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.

9. PATENTS

- 9.1 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 harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer or manufacturers is specified, however, 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.

10. SURVEYS, PERMITS, REGULATIONS

- 10.1 The OWNER, through the ENGINEER, shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the ENGINEER 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.
- 10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.
- 10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for 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 drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, the CONTRACTOR shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY, AND PERSONS

- 11.1 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.
- 11.2 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 for 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.
- 11.3 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.

12. SUPERVISION BY CONTRACTOR

- 12.1 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.

13. CHANGES IN THE WORK

- 13.1 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.
- 13.2 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.

14. CHANGES IN CONTRACT PRICE

- 14.1 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:
- a. Unit prices previously approved.
 - b. An agreed lump sum.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- 15.1 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.
- 15.2 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.

15.3 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 as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 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.

15.4.1 To any preference, priority, or allocation order duly issued by the OWNER.

15.4.2 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

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. CORRECTION OF WORK

16.1 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, and 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.

16.2 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.

17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 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.

- 17.2 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.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

- 18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety 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 date so fixed. 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.
- 18.2 If the CONTRACTOR is adjudged to be bankrupt or insolvent, or makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of its property, or if the CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials, or equipment or disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of 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.

- 18.3 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.
- 18.4 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.
- 18.5 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 the 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.
- 18.6 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.

19. PAYMENT TO CONTRACTOR

- 19.1 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 (excluding Section 19.2 below). 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.

19.2 In compliance with Arkansas Code Ann. §17-25-404 (1995), ten percent (10%) may be withheld from the ENGINEER'S estimate until a proper statement or certificate is received from the Contractors Licensing Board stating that the required bond has been filed and that the contractor is otherwise in compliance with Arkansas Code Ann. §17-25-404 (1995).

- (1) That no compensating tax is due the State under the contract.
- (2) That the tax due under the contract has been paid.
- (3) That a suitable surety bond has been provided by the CONTRACTOR and approved by the Contractors Licensing Board as prescribed in the Act.

19.3 The request for payment may also include an allowance for the cost of such major materials and equipment that are suitably stored either at or near the site.

19.4 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.

19.5 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.

- 19.6 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.
- 19.7 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, materialmen, 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.
- 19.8 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.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- 20.1 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.

21. INSURANCE

21.1 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:

21.1.1 Claims under worker's compensation, disability benefit, and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than employees;

21.1.4 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

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 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 cancelled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, liability insurance as hereinafter specified:

21.3.1 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 \$500,000 for all property damage 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 damage sustained by two or more persons in any one accident. *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. The OWNER and ENGINEER shall be named as additional insured in the CONTRACTOR's Certificate of Insurance.*

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon 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

21.4 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.

21.5 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, the OWNER, and the ENGINEER.

22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the 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 upon the prompt payment by

the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the 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 at any time a surety on any such BOND 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 do so, substitute an acceptable BOND (or BONDS) 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. For contracts in excess of \$100,000.00, the BONDS shall be issued by a Bonding Company by the A.M. BEST Rating Book as follows:

- (1) Contracts in excess of \$100,000.00, but less than \$1,000,000.00 - "B+" rating or higher and contract amount may not exceed 2.0% of the policyholder's surplus.
- (2) Contracts in excess of \$1,000,000.00 - "A" rating or higher and contracts may not exceed 2.0% of the policyholder's surplus.

In addition, the BONDS shall be executed by an Arkansas Agent; not countersigned. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the State of Arkansas or is removed from the above list of Surety Companies, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) 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.

23. ASSIGNMENTS

- 23.1 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.

24. INDEMNIFICATION

- 24.1 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 or 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.

24.2 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 benefits acts or other employee benefits acts.

24.3 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.

25. SEPARATE CONTRACTS

25.1 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.

25.2 The OWNER may perform additional WORK related to the PROJECT or the OWNER may let other contracts containing 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.

25.3 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 14 and 15.

26. SUBCONTRACTING

- 26.1 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.
- 26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty percent (50%) of the CONTRACT PRICE, without prior written approval of the OWNER.
- 26.3 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 the CONTRACTOR.
- 26.4 The CONTRACTOR shall cause appropriate provisions to be inserted 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 to 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.
- 26.5 Nothing contained in this CONTRACT shall create any contractual relationship between any SUBCONTRACTOR and the OWNER.

27. ENGINEER'S AUTHORITY

- 27.1 The ENGINEER shall act as the OWNER'S representative during the construction period, 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.
- 27.2 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 made at the factory or fabrication plant of the source of material supply.
- 27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.
- 27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY

- 28.1 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.
- 28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.
- 28.3 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.

29. GUARANTEE

- 29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of five (5) years from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of five (5) years 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 any damage to 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.

30. ARBITRATION BY MUTUAL AGREEMENT

- 30.1 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 making an acceptance of final payment as provided by Section 20, may be decided by arbitration 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.
- 30.2 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.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

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

ITEM 4
Construction Agreement

Agreement
Performance Bond
Payment Bond
Certificate of Insurance
Notice of Award
Notice to Proceed
Certificate of Owner's Attorney
Approval of Contract

AGREEMENT

THIS AGREEMENT, made this 30 day of **April, 2010**, by and between the **Mount Sherman Water Association**, hereinafter called "OWNER" and **Red Rock Construction Co., LLC**, doing business as a corporation, hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned:

1. The CONTRACTOR will commence and complete the construction of the:

Water Main Extension (Shiloh Road & Murray Road)

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 will commence the work required by the CONTRACT DOCUMENTS within *10* calendar days after the date of the NOTICE TO PROCEED and will complete the same within *90* calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of **One Hundred Eleven Thousand One Hundred Nineteen and No/100 Dollars (\$111,119.00)**, or as shown in the Bid Schedule for the Base Bid.
5. 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. Bid Bond,
 - F. General Conditions,

G. Supplemental General Conditions,

H. Agreement,

I. Performance Bond,

J. Payment Bond,

K. Certificate of Insurance,

L. Notice of Award,

M. Notice to Proceed,

N. DRAWINGS prepared by **Engineering Services, Inc.** numbered **1** through **6**, and dated **March, 2010.**

O. SPECIFICATIONS prepared or issued by **Engineering Services, Inc.**, dated **March, 2010.**

P. ADDENDA:

No. 1, dated **April 5, 2010,**

No. 2, dated **April 9, 2010.**

6. 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.
7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.
8. This contract shall not be effective unless and until approved by the Director of the Arkansas Natural Resources Commission.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in five (5) copies each of which shall be deemed an original on the date first above written.

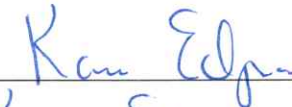
OWNER: Mount Sherman Water Association

BY: 

Name: James Bowen

Title: Chairman

Address: P.O. Box 323
Jasper, AR 72641

(SEAL)
ATTEST: 

Name: Karen Edgmon

Title: Bookkeeper

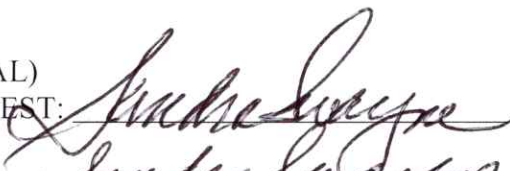
CONTRACTOR: Red Rock Construction Co., LLC

BY: 

Name: Horst Graalmann

Address: P.O. Box 268
Jasper, AR 72641

Employer
Identification Number: _____

(SEAL)
ATTEST: 

Name: Sandra Lureyne

Title: UBR

THE AMERICAN INSTITUTE OF ARCHITECTS

Bond # 54181905

AIA Document A311

Performance Bond

KNOW ALL MEN BY THESE PRESENTS: that Red Rock Construction Co., LLC
P.O. Box 268
Jasper, AR 72641
(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called Contractor, and, United Fire & Casualty Company
P.O. Box 73909
Cedar Rapids, IA 52407
(Here insert full name and address or legal title of Surety)

as Surety, hereinafter called Surety, are held and firmly bound unto Mount Sherman Water Association
HC 70 Box 250
Jasper, AR 72641
(Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called Owner, in the amount of
ONE HUNDRED ELEVEN THOUSAND ONE HUNDRED NINETEEN AND NO/100THS
Dollars (\$111,119.00),

for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Contractor has by written agreement dated 4/30/2010 , entered into a contract with Owner for
(Here insert full name, address and description of project)
Water Main Extension (Shiloh Road & Murray Road)

in accordance with Drawings and Specifications prepared by Engineering Services, Inc. (ESI)
P.O. Box 282
Springdale, AR 72765-0282
(Here insert full name and address or legal title of Architect)

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

PERFORMANCE BOND

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall be, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

1) Complete the Contract in accordance with its terms and conditions, or

2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, or, if the Owner elects, upon determination by the Owner and the Surety jointly of the lowest responsible bidder, arrange for a contract between such bidder and Owner, and make available as Work progresses (even though there should be a default or a succession of

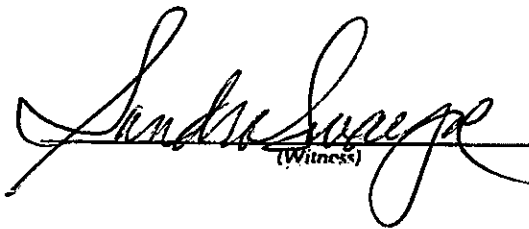
defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of the Owner.

Signed and sealed this 20th

day of May, 2010.


(Witness)

Red Rock Construction Co., LLC

(Principal)

(Seal)

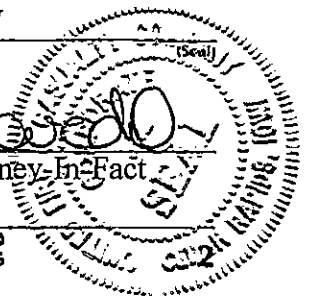

MBR (Title)


(Witness)

United Fire & Casualty Company

(Surety)


Sherese D. Escovedo (Title) Attorney-In-Fact



THE AMERICAN INSTITUTE OF ARCHITECTS

Bond # 54181905

AIA Document A311

Labor and Material Payment Bond

THIS BOND IS ISSUED SIMULTANEOUSLY WITH PERFORMANCE BOND IN FAVOR OF THE OWNER CONDITIONED ON THE FULL AND FAITHFUL PERFORMANCE OF THE CONTRACT

KNOW ALL MEN BY THESE PRESENTS: that Red Rock Construction Co., LLC
(Here insert full name and address or legal title of Contractor)

P.O. Box 268

Jasper, AR 72641

as Principal, hereinafter called Principal, and, United Fire & Casualty Company
(Here insert full name and address or legal title of Surety)

P.O. Box 73909

Cedar Rapids, IA 52407

as Surety, hereinafter called Surety, are held and firmly bound unto Mount Sherman Water Association
(Here insert full name and address or legal title of Owner)

HC 70 Box 250

Jasper, AR 72641

as Oblige, hereinafter called Owner, for the use and benefit of claimants as hereinbelow defined, in the

amount of ONE HUNDRED ELEVEN THOUSAND ONE HUNDRED NINETEEN AND NO/100THS

(Here insert a sum equal to at least one-half of the contract price)

Dollars (\$111,119.00),

for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has by written agreement dated 4/30/2010, entered into a contract with Owner for
(Here insert full name, address and description of project)

Water Main Extension (Shiloh Road & Murray Road)

in accordance with Drawings and Specifications prepared by Engineering Services, Inc. (ESI)
(Here insert full name and address or legal title of Architect)

P.O. Box 282

Springdale, AR 72765-0282

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

LABOR AND MATERIAL PAYMENT BOND

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant:

a) Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial

accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

b) After the expiration of one (1) year following the date on which Principal ceased Work on said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.

4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

Signed and sealed this 20th

day of May, 2010.

Red Rock Construction Co., LLC

(Principal)

(Seal)

(Witness)

(Title)

United Fire & Casualty Company

(Surety)

(Seal)

Sybil A. Young
(Witness)

Sherese D. Escovedo
Sherese D. Escovedo (Title) Attorney-in-Fact

UNITED FIRE & CASUALTY COMPANY
HOME OFFICE - CEDAR RAPIDS, IOWA
CERTIFIED COPY OF POWER OF ATTORNEY

(Original on file at Home Office of Company - See Certification)

KNOW ALL MEN BY THESE PRESENTS, That the UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa, and having its principal office in Cedar Rapids, State of Iowa, does make, constitute and appoint MICHAEL D HALTER, OR KEVIN M BRUICK, OR RICHARD R IRVIN, OR SHERRY L JAGGERS, OR CHARLES ALLEN, OR BOB SMITH, OR DALE TEMPLE, OR SYLVIA A YOUNG, OR SHERESE D. ESCOVEDO, OR ROLFE KENNEDY, OR CAROLYN HUNTER, OR DORENA WISE ALL INDIVIDUALLY OF LITTLE ROCK AR

its true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature as follows: All bonds not to exceed \$10,000,000.00 and to bind UNITED FIRE & CASUALTY COMPANY thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of UNITED FIRE & CASUALTY COMPANY and all the acts of said Attorney, pursuant to the authority hereby given are hereby ratified and confirmed.

The Authority hereby granted shall expire 6th day of January, 2011 unless sooner revoked.

This power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by Board of Directors of the Company on April 18, 1973.

"Article V - Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Company may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Company in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed. Such attorneys-in fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Company by their signature and execution of any such instruments and to attach the seal of the Company thereto. The President or any Vice President, the Board of Directors or any other officer of the Company may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the UNITED FIRE & CASUALTY COMPANY has caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 6th day of January, 2009



UNITED FIRE & CASUALTY COMPANY

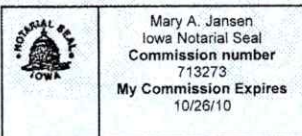
By Dennis J. Richmann

Vice President

State of Iowa, County of Linn, ss:

On 6th day of January, 2009, before me personally came Dennis J. Richmann

to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of the UNITED FIRE & CASUALTY COMPANY, the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.



Mary A. Jansen

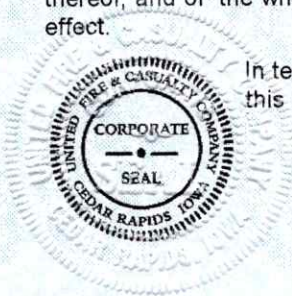
Notary Public

I, the undersigned officer of the UNITED FIRE & CASUALTY COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the by-laws of said Company as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID COMPANY, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Company this 20th day of May 20 10.

David A. Jansen

Secretary



DATE (MM/DD/YYYY)
07/15/2010

PRODUCER (870) 741-5423
Campbell Insurance Agency, Inc.
PO Box 1695
209 N Walnut
Harrison AR 72602-

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
Red Rock Construction
PO Box 268

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A: Peerless Insurance Co	24198
INSURER B: America First Insurance	12696
INSURER C: The Netherlands Insurance	24171
INSURER D:	
INSURER E:	

Jasper AR 72641-

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR/ADD'L LTR INSRD		TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS		
A		GENERAL LIABILITY	CBP1590048	09/04/2009	09/04/2010	EACH OCCURRENCE	\$ 1,000,000	
	☒	COMMERCIAL GENERAL LIABILITY				DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 100,000	
	☐	CLAIMS MADE ☒ OCCUR				MED EXP (Any one person)	\$ 5,000	
						PERSONAL & ADV INJURY	\$ 1,000,000	
						GENERAL AGGREGATE	\$ 2,000,000	
						PRODUCTS - COM/OP AGG	\$ 2,000,000	
GENTL AGGREGATE LIMIT APPLIES PER:								
☒	POLICY	☐ PRO- JECT	☐ LOC	/ /	/ /			
B		AUTOMOBILE LIABILITY	BA1590229	09/04/2009	09/04/2010	COMBINED SINGLE LIMIT (Ea accident)	\$ 1,000,000	
	☒	ANY AUTO				BODILY INJURY (Per person)	\$	
	☐	ALL OWNED AUTOS				BODILY INJURY (Per accident)	\$	
	☐	SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident)	\$	
	☐	HIRED AUTOS						
	☐	NON-OWNED AUTOS						
		GARAGE LIABILITY		/ /	/ /	AUTO ONLY - EA ACCIDENT	\$	
☐	ANY AUTO					OTHER THAN EA ACC	\$	
☐						AUTO ONLY: AGG	\$	
A		EXCESS/UMBRELLA LIABILITY	UB4001425931	09/04/2009	09/04/2010	EACH OCCURRENCE	\$ 1,000,000	
	☒	OCCUR ☐ CLAIMS MADE				AGGREGATE	\$ 1,000,000	
							\$	
	☐	DEDUCTIBLE				/ /	/ /	\$
	☐	RETENTION \$						\$
C		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	WC8711376	09/04/2009	09/04/2010	☒ WC STATU- TORY LIMITS ☐ OTH- ER		
		ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED?				E.L. EACH ACCIDENT	\$ 1,000,000	
		If yes, describe under SPECIAL PROVISIONS below				E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000	
						E.L. DISEASE - POLICY LIMIT	\$ 1,000,000	
		OTHER				/ /	/ /	
			/ /	/ /				
			/ /	/ /				

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

CERTIFICATE HOLDER

() - () -

Mt Sherman Water Association, ESI
and ANRC
P O Box 232
Jasper AR 72641-

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL SEND BY MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BY FIRST CLASS MAIL REGISTERED MAIL RETURN RECEIPT GUARANTEED.

AUTHORIZED REPRESENTATIVE _____

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

DISCLAIMER

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

NOTICE OF AWARD

TO: **Red Rock Construction Co., LLC**
P.O. Box 268
Jasper, Arkansas 72641

PROJECT DESCRIPTION:

Water Main Extension (Shiloh Road & Murray Road)

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated March 11, 2010, and Information for Bidders.

You are hereby notified that your BID has been accepted in the amount of **\$111,119.00**.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, 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 OWNER.

Dated this 30 day of April, 2010,

OWNER: **Mount Sherman Water Association**

By: _____

James Bowen, Chairman

ACCEPTANCE OF NOTICE

Receipt of the NOTICE OF AWARD is hereby acknowledged by RED ROCK CONSTRUCTION
this _____ day of April, 2010,

By: Mark B. Smith

Title: MOR

NOTICE TO PROCEED

TO: **Red Rock Construction Co., LLC**
P.O. Box 268
Jasper, Arkansas 72641

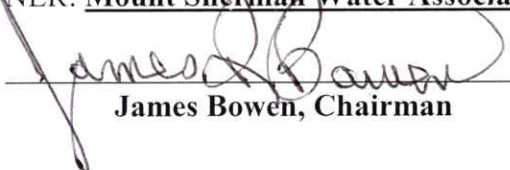
DATE: 10/11/10

PROJECT DESCRIPTION:

Water Main Extension (Shiloh Road & Murray Road)

You are hereby notified to commence WORK in accordance with the Agreement dated April 30, 2010, on or before NOVEMBER 1ST, 2010, and you are to complete the WORK within **90** consecutive calendar days thereafter. The date of completion of all WORK is therefore JANUARY 30TH, 2010.

OWNER: **Mount Sherman Water Association**

By: 
James Bowen, Chairman

ACCEPTANCE OF NOTICE

Receipt of the NOTICE TO PROCEED is hereby acknowledged by RED ROCK CONSTRUCTION LLC, this 11 day of OCTOBER, 2010,

By: 

Title: MBR

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, Thomas A. Morby, the duly authorized and acting legal representative of the **Mount Sherman Water Association**, do hereby certify as follows:

I have examined the attached contracts(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements have been duly executed by the proper parties thereto acting through their duly authorized representatives; and that said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provision thereof.

Date: 4.30.10

Thomas A. Morby

APPROVAL OF CONTRACT

Approved as to form and content and without liability for any payments thereunder, the Arkansas Natural Resources Commission hereby concurs in the award of this contract to:

Red Rock Construction Co., LLC

ARKANSAS NATURAL RESOURCES COMMISSION

By: _____
J. Randy Young, P.E., Executive Director

ITEM 5

General Specifications

General Provisions
Crushed Stone Base Course
Gravel Base Course
Reinforcing Steel
Concrete
Seeding
Water Pipe, Force Main, and Pipe Laying

GENERAL PROVISIONS

1. GENERAL

It shall be the responsibility of the Contractor(s) to avail themselves a complete set of drawings and specifications and be familiar with all parts thereof. Failure to do so shall not relieve any responsibility in the fulfillment of the Contract in any respect.

2. INTENT

The intent of the Plans and Specifications is that the Contractors shall furnish all labor and materials, equipment and transportation necessary for the proper execution of the work. The work required as related to other trades is shown in its majority on the Plans, but thoroughly examine the Plans and Specifications relating to other trades in order to include all necessary work. No additional compensation shall be considered for failure to properly interpret the responsibilities to other trades. The Contractor shall do all the work shown on the Plans and described in the Specifications and all incidental documents. The Engineer reserves the right to make any reasonable change in the locations indicated without additional compensation to the Contractor.

In certain areas, the Plans are diagrammatic, therefore, offsets, fittings, valves, and accessories may not be shown. Work should be planned around building details and other crafts.

3. CONFLICT

If there is conflicting variance between the Drawings and Specifications, the provisions of the most stringent shall control. In case of conflict 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 be complementary, any work required by one, but not by the other, shall be performed as though required by both.

In case of interferences between trades, the Engineer will decide which work is to take precedence regardless of work that might be installed.

4. SCOPE

The work contemplated and included under this section of the Specifications consists of the furnishing of all labor, materials, and supervision necessary for the installation of complete systems, as specified herein or shown on the Plans, together with all necessary auxiliaries and appurtenances for same.

The Contractor shall furnish and install all systems complete in every respect and ready to operate. The Contractor shall furnish all miscellaneous items and accessories required

for such installations, whether or not each such item or accessory is shown on the Plans or mentioned in these Specifications.

5. INSPECTION OF SITE

The Contractor before submitting his proposal shall inspect the site of the proposed construction and become fully informed as to the facilities, difficulties, and restrictions attending the execution of the work. No additional compensation will be granted for work or items omitted from his proposal due to his failure to inform himself of the conditions affecting the performance of the work included in the Contract, or necessary to carry on and satisfactorily complete the work included herein.

Make determination of soil conditions before bidding. These specifications and accompanying Plans in no way imply as to condition of soil to be encountered.

6. CODES, STANDARDS AND REGULATIONS

All workmanship and materials herein specified shall meet in every respect the codes, standards and regulations having jurisdiction of the work. In case of difference between the various codes, specifications, local ordinances, industry standards and other regulations, the matter will be brought to the attention of the Engineer and either the most stringent shall govern or the regulation or standard as selected by the Engineer shall govern.

The Contractor shall arrange for inspection and testing of systems by constituted authorities as required by local codes and ordinances. The Contractor shall obtain and deliver to the Engineer final certificates of acceptance from authorities.

Should the Contractor perform any work that does not comply with the requirements of the applicable codes, standards and regulations, he shall bear all costs arising from the deficiencies.

Unless otherwise stated in a specific general specification section, the following codes, standards and regulations in effect on the date of bid invitation shall be considered a part of these specifications:

- State Public Health Department Regulations
- State Plumbing Code
- National Fire Protection Association
- American Society of Mechanical Engineers
- American Society for Testing Materials
- Air Conditioning and Refrigeration Institute
- National Electrical Code
- National Electrical Safety Code
- Local, City, State and Federal Codes and Standards
- National Electrical Manufacturers Association

OSHA-Occupational Safety and Health Standards
Arkansas Fire Prevention Code
Manual of Accident Prevention in Construction-Associated General Contractors
American Water Works Association Standards
American Association of State Highway & Transportation Officials Specifications

7. UTILITIES LOCATIONS AND CONNECTIONS

Locations and elevations of utilities given on plans are from utility maps or other reliable sources but are offered as a general guide only with no guarantee as to accuracy. The Contractor shall verify the locations and elevation of all utilities affecting work.

The Contractor shall arrange with proper authorities and utility companies for service connections, verifying locations and arrangements.

The Contractor shall furnish meters as indicated on plans when not furnished by the utility company. This shall include meter loops and bypasses.

Voltage that appears on the Plans and elsewhere in these Specifications has been obtained from the serving utility company. Before ordering equipment and starting the job, the Contractor shall verify the voltage with the utility company. If voltage differs from that noted on the Plans and in the Specifications, the Engineer shall be notified at once. If the Engineer is not notified before equipment is ordered or construction is started, the Contractor shall provide an acceptable and operable system at no additional cost to the Owner.

8. PERMITS AND FEES

Unless otherwise noted for a particular item in the Specifications, the Contractor shall provide all necessary notices, obtain all permits, pay all taxes, file all necessary plans, and obtain all necessary approvals in connection with the work required for the project.

Work is to be executed and inspected in accordance with local and state codes, laws, ordinances, rules and regulations applicable to particular class of work, and any fees in connection therewith are to be paid by the Contractor.

He shall also arrange with City, County, or State in accordance with ordinances covering work, for complete inspection, paying all charges pertaining thereto.

9. CONTRACTOR DEFINITION

Where the word "Contractor" is used in connection with the work included under the various sections of these Specifications, reference is thereby made to the Contractor who is engaged to execute the work included under that Section of the Specifications only, notwithstanding the fact that this Contractor may be either the Prime Contractor, General Contractor or his Subcontractor.

10. PLANS

The accompanying Plans in general indicate approximately the locations of pipes, pumps, fans, duct work, feeders, circuits, outlets, switches, etc., except in those cases where specific notes appear. Exact locations of appurtenances shall be determined by references to the general plans and to detail shop drawings, by measurements at the building, and in cooperation with other Contractors and the Engineer.

Exact locations are subject to the Engineer's approval and may differ a reasonable amount from the approximate locations shown on the Plans without additional compensation to the Contractor.

Major changes resulting in a savings in labor or material shall be made only in accordance with a Contract Change Order. Major deviations shall be made only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted to and approved by the Engineer.

11. MATERIALS

The Contractor shall provide materials and equipment which are new and in perfect condition. 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 shall have a nameplate giving the name and address of the manufacturer, catalog number and designation.

Where the words "or approved equal" are used in the Specifications or on the Plans, it shall be understood that the Engineer will be the sole judge in the matter. In all 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 of the same manufacturer. It is not the intention to discriminate against an "equal" product of others manufacturers, but rather to definitely set a standard of quality and shall not be construed to limiting competition. Any proposed substitution must be submitted for comparison and no substitution will be assumed to be acceptable without specific authorization from the Engineer. Should a substitution be accepted and should the substitution prove defective or otherwise unsatisfactory for the intended service, within the warranty period, the Contractor shall replace the substitution with the equipment or material originally specified, and on which the Specifications required him to base his proposal at no additional compensation.

Final decision as to whether or not a specific piece of equipment meets specifications shall rest with the Engineer.

Where substituted equipment furnished requires use of larger, more or differently arranged connections, such connections shall be installed to complete satisfaction of the Engineer without additional cost to the Owner.

12. TEMPORARY CONSTRUCTION POWER

The Contractor shall furnish and install temporary power, water, heating, and lighting as the needs require for construction and safety purposes. It shall be the responsibility of the General or Prime Contractor to obtain and be responsible for all utility charges.

13. WORKMANSHIP

All work shall be installed in a neat, careful, safe and workmanlike manner by craftsmen skilled in the trade.

14. SUPERINTENDENT

The Contractor shall provide the services of an experienced competent superintendent who shall be in charge of all work and shall be at the job site at all times installations are being made.

15. STANDARDS

The Contractor shall perform all work in such a manner that the many components will function as a complete workable system including any accessories required to accomplish such installations. The Contractor shall perform all work in accordance with acceptable industry standards except where other standard or procedures are herein specified.

The Contractor shall arrange and install any exposed portions of work specified under this division such as devices, fixtures, panels, safety switches, etc., to fit in and harmonize with work specified in other sections to the satisfaction of the Engineer.

16. COORDINATION AND COOPERATION

The Contractor shall coordinate all work with architectural, structural, and other trades to insure proper execution of the work and general progress for the entire project and to avoid delaying any other Contractor. The Contractor shall cooperate with all other trades so that the entire project will not be handicapped, hindered or delayed. The Contractor shall assist other trades in working out space conditions to permit all work to be installed satisfactorily. No extra compensation will be allowed for the Contractor for any remedial work required to eliminate interferences due to lack of coordination and cooperation.

17. STORAGE OF MATERIALS

The Contractor shall protect all materials and apparatus to prevent any damage to them. Unless approved by the Engineer, no material or apparatus shall be stored outside or exposed to the elements. Apparatus shall be covered with tarpaulins or other protective coverings, pallets shall be provided or other methods to raise materials above the floor, and where directed barriers provided or guard rails to protect the materials. Failure on the part of the Contractor to comply with the above to the complete satisfaction of the

Engineer or his representative will be sufficient cause for the rejections of the piece of apparatus in question.

The Contractor shall keep ends of 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.

18. DAMAGED AND DEFECTIVE WORK

The Contractor shall remove and replace damaged and defective work of materials as directed by the Engineer with no extra compensation. All repairs to the work shall be made with new materials or a complete new piece of equipment shall be provided as directed by the Engineer.

19. SAFETY

The Contractor shall provide necessary precautions for the safety of life and property. All construction work shall conform to the standards of the Occupational Safety and Health Act. The Contractor shall provide approved ground fault interrupter devices on all electrical construction devices consuming power and including temporary lighting systems.

20. CLEAN UP

The Contractor shall keep his work area clean at all times. Upon completion of work in any area, the Contractor shall remove all equipment, excess materials and debris from area and leave area clean. The Contractor shall protect all equipment during operations of painting, plastering, cutting or drilling and any like operation which might damage the equipment. Upon completion of project, the Contractor shall remove all equipment, excess material, scrap and debris from the job site. The job site shall be left clean and finished.

21. SUBMITTAL OF CATALOG DATA AND SHOP DRAWINGS

The Contractor shall submit to the Engineer shop drawings for all equipment and materials to be installed on the project. No equipment or materials shall be installed until the Shop Drawings have been approved, even if the material submitted is identical to that originally specified. Consideration for substitution of materials will not be allowed if the Shop Drawings are not received within 30 days after the award of the Construction Contract.

The Contractor shall assume any additional charges, including engineering charges and any charges for changes in the work, resulting from substitutions.

Rough-in materials including pipe, wire, conduits, connectors, and boxes may be submitted in a list form including the names of manufacturers and catalog type or

number. All other equipment and material shall be submitted with detailed prints or drawings. Prints or drawings shall be permanent reproductions and no Thermo-fax copies. The total number of Shop Drawings and lists shall not be less than five.

Should the Contractor propose to submit items other than those specified, he shall include cuts of both the specified item and the proposed "equal item" and the "proposed substitution" shall be clearly marked.

Where the Specifications or Plans call for the work to be installed in accordance with the manufacturer's specifications, recommendations or directions, copies of the same shall be submitted to the Engineer for review and surveillance.

22. MANUALS

The Contractor shall provide to the Engineer three (3) copies of bound materials for the project 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 include a typewritten schedule of each motor, giving nameplate data, switch and fuse or breaker sizes and voltage and phase at motor terminals.

23. TESTS AND ADJUSTMENTS

The Contractor shall test and demonstrate each and every system in the presence of and to the complete satisfaction of a representative of the Engineer. Prior to demonstration, the Contractor shall start all equipment and make necessary tests and adjustments to place the systems in first class operating condition.

The Contractor shall furnish all services, instruments, equipment and personnel required for the tests; in addition, the Contractor shall submit a typewritten test report, where applicable and recorded data is taken or required, to the Engineer for approval prior to final acceptance.

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 completely installed, tested as required by this section and the State Ordinances and State Safety Orders, and shall be repeated upon request to the complete satisfaction of those making the inspection.

Upon completion of the installation of equipment, the Contractor shall work with other trades to start all equipment and make necessary tests and adjustments to place all systems in first-class operating condition.

Tests are to be applied for a minimum period of four hours or until tests are complete.

All failure and defects shall be corrected in a manner satisfactory to the Engineer or his representative.

24. AS BUILT DRAWINGS

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

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.

25. GUARANTEE

The Contractor shall furnish to the Engineer a typewritten guarantee, counter-signed by the General Contractor, to the effect that all work or equipment installed by him under this Contract shall be free from any or all defects for a period of one (1) year from the date of final acceptance. Should any defect develop in any of the systems or equipment within this period, due to faulty equipment, poor installation or workmanship, the Contractor shall agree to repair or replace same with new and like material without additional compensation.

GENERAL SPECIFICATIONS

CRUSHED STONE BASE COURSE

1. DESCRIPTION

This item shall consist of a foundation course for surface 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 thickness and typical cross-section shown on the plans.

2. MATERIALS

This material shall consist of crushed run stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified, with the further provision that a mixture of crushed stone and natural fines shall contain not less than 90 percent crusher produced material. The stone shall be hard and durable with a percent of wear by the Los Angeles Test (AASHTO T96) not greater than 45. For the purpose of this specification, shale and slate are not considered to be stone. The material furnished shall not contain more than 5% by weight of shale, slate and other deleterious matter.

The class or classes of crushed stone base course material that may be used on any particular job will be those called for in the proposal schedule.

GRADING REQUIREMENTS

<u>Sieve</u>	<u>Percent Passing</u> <u>Class 7</u>
1-1/2"	100
3/4"	50-90
No. 4	25-55
No. 40	10-30
No. 200	3-10
Max. Plasticity Index (Minus 0.425 Matl)	6
Min. Percent Crusher-Run Matl	90

The fraction passing the No. 200 sieve shall not be greater than two-thirds 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.

When it is necessary to blend two or more materials, each material shall be proportioned separately through mechanical feeders to insure uniform production. Premixing or blending in the pit to avoid separate feeding will not be permitted.

The blending of materials on the roadway in order to obtain a mixture that will comply

with the above requirements will not be permitted.

3. CONSTRUCTION METHODS

The base course material shall be placed on a completed and approved subgrade or existing base that has been bladed to substantially conform to the grade and cross section shown on the plans.

The subgrade shall be prepared in accordance with the 1993 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.

Base course material shall not be placed on a frozen subgrade or subbase.

The crushed stone shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width and cross section shown on the plans.

If the required compacted depth of the base course exceeds six (6") inches, the base shall be constructed in two or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed six (6") inches. When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base course may be increased to eight (8") inches upon approval.

The spreading shall be done the same day that the material is hauled, and it shall be performed in such manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping the crushed stone on the subgrade will exist. To insure proper mixing, the crushed stone shall be bladed across the 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.

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 being added or the material aerated as may be 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-2922, of not less than 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.

The laboratory density shall be obtained as follows: the sample is prepared by removing the aggregate retained on the 3/4 inch sieve and adding aggregate passing the 3/4 inch

sieve and retained on the No. 4 sieve in an amount equal to that removed. The sample so prepared is compacted in five equal layers in a cylindrical mold six (6") inches in diameter and seven (7") inches high. Each layer is compacted by 55 blows with a 10 pound hammer two (2") inches in diameter dropped a height of eighteen (18") inches. Trial sample specimens are molded at various water contents to determine the maximum density and optimum water content. The oven dry weight per cubic foot of the material at optimum moisture content is termed maximum density by the above procedure.

The contractor shall arrange for the testing of the materials to be used under this bid item and a copy of the testing report shall be submitted to the Engineer for approval prior to installation of the material at the project site.

The compacted base course shall be tested for depth and any deficiencies shall be corrected by scarifying, placing additional material, mixing, reshaping and recompacting to the specified density, as directed.

Where 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 and no compaction will be required beyond that obtained by systematic maintenance under traffic.

The Contractor shall maintain the base course in a satisfactory condition until accepted.

4. MEASUREMENT

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

5. PAYMENT

Work performed under this item and measured as provided above, will be paid for at the contract unit price bid per ton or per cubic yard, as may be provided in the Proposal Schedule, for Crushed Stone Base Course, of the particular class called for and furnished, which 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. DESCRIPTION

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 thickness, and typical cross section shown on the plans.

2. MATERIALS

This material shall consist of a natural or artificial mixture of gravel and soil mortar uniformly well graded from coarse to fine and so proportioned as 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 having a percent of wear loss by Los Angeles Test (AASHTO T-96) not greater than 45, or a objectionable, deleterious or other injurious matter.

The class or classes of gravel base course material that may be used on any particular job will be those called for in the proposal schedule.

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, at the election of the Contractor, be furnished in lieu of any class of Gravel Base Course.

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	--	--
1½"	0-15	--	--
1"	--	--	0-5
¾"	0-40	0-40	0-30
⅜"	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

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 Passing</u>	<u>Retained by Weight</u>
3/4"	3/8"	5 min.
3/8"	No. 4	5 min.
No. 4	No. 10	5 min.
No. 10	No. 40	4 min.

The fraction passing the No. 200 sieve shall not be greater than the two-thirds the fraction passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6.

When the source of gravel contains aggregate larger than that specified above for the class called for in the proposal schedule, 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.

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 in order to obtain a mixture that will comply with the above requirements will not be permitted except for minor corrections by written permission of the Engineer.

That portion of Class GB-3 retained on the No. 4 sieve shall contain a minimum of 15 percent crushed particles.

3. CONSTRUCTION METHODS

The base course material shall be placed on a completed and approved subgrade or existing base that has been bladed to conform to the grade and cross section shown on the plans.

The subgrade shall be prepared as specified in Section 212 of the Arkansas State Highway Commission Standard Specifications for Highway Construction, 1978, and 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 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.

Base course material shall not be placed on a frozen subgrade or subbase.

The gravel shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width and cross section as shown on the plans.

If the required compacted depth of the base course exceeds 6 inches, the base shall be constructed in two or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches. When vibrations or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base course may be increased to 8 inches upon approval of the Engineer.

The spreading shall be done the same day that the material is hauled and it shall be performed in such a manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping the gravel on the subgrade will exist. To insure proper mixing, the gravel shall be bladed entirely across the 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.

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 being added or the material at optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be 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 AASHTO T- 191, of not less than 100 percent of the maximum density obtained in the laboratory. The gravel shall be compacted across the entire width of application.

The laboratory density shall be obtained as follows: The sample is prepared by removing the aggregate retained on the 3/4 inch sieve and adding aggregate passing the 3/4 in sieve and retained on the No. 4 sieve in an amount equal to that removed. The sample so prepared is compacted in five 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 by a height of 18 inches. Trial sample specimens are molded at various water contents to determine the maximum density and optimum water content. The oven dry weight per cubic foot of the material at optimum moisture content is termed maximum density by the above procedure.

The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and recompacting to specified density, as directed.

Where 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 and no compaction will be required beyond that obtained by systematic maintenance under traffic.

The Contractor shall maintain the base course in a satisfactory condition until accepted.

4. METHOD OF MEASUREMENT

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

GENERAL SPECIFICATIONS

REINFORCING STEEL

1. DESCRIPTION

Under this item, reinforcing steel and miscellaneous metallic material of the quality, type, size, and quantity designated shall be furnished and placed in concrete structures in accordance with these Specifications and in conformity with the details shown on the Plans.

2. MATERIALS

2.1. Bar Reinforcement: Bar reinforcing for concrete shall conform to the requirements of the current specifications for Billet Steel Bars, AASHTO M-31, or to the current specifications for Rail Steel Bars, Designation M-42 of the AASHTO Specifications for Highway Materials.

- (a) All bars shall be of the deformed type conforming to current specifications of the AASHTO Designation M-137 unless otherwise specified.
- (b) The use of cold twisted bars shall not be permitted.
- (c) Steel for all bars shall be made by the open-hearth process, unless otherwise called for in the Detailed Specifications, or on the Plans.
- (d) Structural grade billet steel bars may be permitted only when the Plans are prepared upon 18,000 psi design strength for reinforcing steel, or when at the expense of the Contractor, an additional amount of steel in the proportion of the design stress to 18,000 psi is provided.
- (e) Unless otherwise specified on the plans all re-bar shall be grade 60.

2.2. Wire and Wire Mesh: Wire shall conform to the current Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement of the AASHTO Specifications for highway materials, Designation M-32. Wire mesh, when used as reinforcement in concrete shall conform to the Specifications for Welded Steel Wire Fabric for Concrete Reinforcement of the AASHTO Specifications for Highway Materials, Designation M-55.

2.3. Bar Mat Reinforcement: Bar mat reinforcement for concrete shall conform to the Specifications for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement of the AASHTO Specifications for Highway Materials, Designation M-54.

2.4. Structural Shapes: Structural shapes used as reinforcement in concrete shall

conform to the requirements for structural steel, ASTM standards.

- 2.5. Wrought Iron Plates, Shapes and Bars: Wrought iron shall conform to the requirements of the ASTM Standards, A-42 for Wrought Iron Plates, A-207 for Rolled Wrought Iron Shapes and Bars, or A-72 for Welded Wrought Iron Pipe.
- 2.6. Carbon Steel Castings: Carbon steel castings shall conform to the Specifications for Mild to Medium Strength Carbon Steel Castings for General Application of the ASTM, Designation A-27. Grade 65-30 shall be furnished unless otherwise specified.
- 2.7. Grey Iron Castings: Iron castings shall conform to the requirements of the ASTM Standards A-48 Grey Iron Castings. Class No. 30 shall be furnished unless otherwise specified. The castings shall be boldly flatted at angles and the rises shall be sharp and perfect. Iron castings shall be true to pattern in form and dimensions, free from pouring faults, cracks, sponginess, blow holes and other defects in positions affecting their strength and value for the service intended. All castings shall be sandblasted or otherwise effectively cleaned of scale and sand so as to present a smooth, clean and uniform surface.
- 2.8. Water Stops and Flashing: Copper water stops and flashing shall conform to the Specifications for Copper Sheet, Strip and Plate of the AASHTO Designation M-138. Type ETP shall be used unless otherwise specified. Sheets shall be 16 ounces per square foot unless otherwise specified. The sheet copper in each joint shall be continuous, separate pieces being connected by thoroughly workmanlike soldered joints to form a complete watertight unit.
- 2.9. Rubber Water Stops: Rubber water stops shall conform to the details shown on the Plans and to the following Specifications.

Rubber water stops shall be formed from synthetic rubber made exclusively from neoprene, reinforcing carbon black, zinc oxide, polymerization agents and softeners. This compound shall contain not less than 70 percent by volume of neoprene. The tensile strength shall not be less than 2,750 psi with an elongation at breaking of 600 percent. The Shore Durometer indication (hardness) shall be between 50 and 60. After seven days in air at 158 degrees (+ 2 degrees) F. and 300 pounds psi pressure, the tensile strength shall be not less than 65 percent of the original. The water stops shall be formed with an integral cross section in suitable molds, so as to produce a uniform section with a permissible variation in dimension of 1/32 inch, plus or minus. No splices will be permitted in straight strips. Strips and special connection pieces shall be well cured in a manner such that any cross section shall be dense, homogenous and free from all porosity. All injunctions in the special connection pieces shall be full molded. During the vulcanizing period, the joints shall be securely held by suitable clamps. The material at the splices shall be dense and homogeneous throughout the cross section. All water stops shall be installed and held in proper position during

construction in accordance with the details shown on the Plans.

3. ORDER LISTS

Before ordering material, all order lists and bending diagrams shall be furnished by the Contractor for approval of the Engineer, and no materials shall be ordered until such lists and bending diagrams have been approved. The approval of order lists and bending diagrams by the Engineer shall in no way relieve the Contractor of responsibility for the correctness of such lists and diagrams. Any expense incident to the revision of material furnished in accordance with such lists and diagrams to make it comply with the design drawings shall be borne by the Contractor. Unless otherwise noted, all dimensions relating to reinforcing steel are to center of bars.

4. PROTECTION OF MATERIAL

Steel reinforcement shall be protected at all times from injury. When placed in the work, it shall be free from dirt, detrimental seals, paint, oil or other foreign substances. However, when steel has, on its surface, detrimental rust, loose scale and dust which is easily removable, it may be cleaned by a satisfactory method, if approved by the Engineer.

5. FABRICATION

Bent bar reinforcement shall be cold bent to the shapes shown on the Plans, and unless otherwise provided on the Plans or by authorization, bends shall be made in accordance with the following requirements.

Stirrups and tie bars shall be bent around a pin having a diameter not less than six times the minimum thickness except for bars larger than one inch (1"), in which case the bends shall be made around a pin of eight bar diameters.

Bar reinforcement shall be shipped in standard bundles, tagged and marked in accordance with the Code of Standard Practice of the Concrete Reinforcement Steel Institute.

6. PLACING AND FASTENING

All steel reinforcements shall be accurately placed in the positions shown on the Plans and firmly held during the placing and setting of concrete. When placed in the work, it shall be free from dirt, detrimental rust, loose scale, paint, oil and other foreign matter. Bars shall be tied at all intersections except where spacing is less than one foot (1') in each direction when alternate intersections shall be tied.

Distances from the forms shall be maintained by means of stays, block ties, hangers, or other approved supports, except that reinforcing in superstructure shall be supported by approved metal chairs and bar supports. Blocks for holding reinforcement from contact with the form shall be precast mortar blocks of approved shape and dimensions or

approved metal chairs. Metal chairs which are in contact with the exterior surface of the concrete shall be galvanized. Layers of bars shall be separated by metal bar supports or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks shall not be permitted. Reinforcement in any member shall be placed and then inspected and approved by the Engineer before the placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal required. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before placing. Water stops shall be furnished and placed as shown on the Plans. Where splicing is necessary, joints shall be welded or soldered to form continuous watertight joints.

7. SPLICING

All reinforcement shall be furnished in the full lengths indicated on the Plans. Splicing of bars, except where shown on the Plans, will not be permitted without the written consent of the Engineer. Splices shall be staggered as far as possible. Unless otherwise shown on the Plans, bars shall be lapped 40 diameters to make the splice. In lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain the minimum distance to the surface on the concrete shown on the Plans. Welding of reinforcing steel shall be done only if detailed on the Plans or if authorization is made by the Engineer in writing. Welding shall conform to the current specifications for Welded Highway and Railway Bridges of the American Welding Society.

8. LAPPING

Sheets of mesh or bar mat reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges. The end lap shall not be less than one mesh in width.

9. SUBSTITUTIONS

Substitution of bars which differ in size from that shown on the Plans will be permitted only with specific authorization by the Engineer. If steel is substituted, it shall have an area equivalent to the design area or larger.

10. MEASUREMENT

Reinforcing steel, placed and accepted in concrete for structures will be measured in pounds based on the total computed weight for the sizes and lengths of bars, mesh or mats as shown on the Plans or authorized. The weight of mesh will be computed from the theoretical weight of plain wire. If the weight per square foot is given on the Plans, that weight shall be used.

The weight of plain or deformed bars or bar mat will be computed from the theoretical weight of plain round or square bars of the same nominal size as shown in the following table:

<u>Bar Size Number</u>	<u>Size Round Bars</u>	<u>Size Square Bars</u>	<u>Weight Lb/ft.</u>
2	1/4"	-	0.167
3	3/8"	-	0.376
4	1/2"	-	0.668
5	5/8"	-	1.403
6	3/4"	-	1.502
7	7/8"	-	2.044
8	1"	-	2.670
9	-	1"	3.400
10	-	1-1/8"	4.303
11	-	1-1/4"	5.313

The weight of all reinforcement used in railings, when they are paid for on a linear foot basis, shall not be included. The weight of reinforcement in precast piles and other items where reinforcement is included in the contract price for the item shall not be included.

No allowance will be made for clips, wire, separators, wire supports and other material used in fastening the reinforcing in place. If bars are substituted upon the Contractor's request and as a result more steel is used than specified, only the amount specified shall be included. When laps are made for splices, other than those shown on the Plans, for the convenience of the Contractor, the extra steel shall not be included.

11. PAYMENT

Reinforcing steel placed and accepted in concrete for structures and measured as proved above shall be paid at the contract unit price per pound for "Reinforcing Steel," which price shall be full compensation for the furnishing, blending, fabricating and placing the reinforcement placed in concrete and for all tools, labor, equipment and incidentals necessary for the work. Clips, metal spaces, bar supports, ties, wire or other material used for fastening reinforcements in place, will not be paid for directly but will be considered subsidiary to the item of Reinforcing Steel.

GENERAL SPECIFICATIONS

CONCRETE

1. GENERAL

This item shall consist of concrete in structures, tanks, bridges, culverts and miscellaneous work, including the concrete portions of steel, timber, stone masonry and composite structures, prepared and constructed in accordance with these specifications, and conforming to the lines, grades, dimensions and designs shown on the plans. Concrete shall consist of an approved Portland cement, a fine aggregate, a coarse aggregate and water, mixed in the proportions specified for the various classes of concrete hereinafter designated. Air entrainment, when specified, shall be accomplished by the addition of an air-entraining agent to the mixing water. The various materials entering into the composition of the concrete shall be such as will satisfy the requirements specified in this section.

2. CLASSES OF CONCRETE

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

Non-air-entrained Concrete

Class AA
Class A
Class A (F)
Class B

Air-entrained Concrete

Class AA (AE)
Class A (AE)
Class A (F) (AE)

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:

Class AA - Slabs and girders without wearing surface, concrete piles, handrails, and all bridge floors.

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.

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.

Class A(F)-Will be used for thin sections, or in areas where heavy reinforcement makes

it impractical to use Class A size aggregate. The air-entrained classes will be used when specifically set out in the Detailed Specifications or shown on the Plans.

3. CLASSIFICATION AND PROPORTIONING

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. Should a new source of material be proposed for use, the Engineer shall conduct the testing and trial mixing and the Contractor shall bear the costs of trial mixing and testing involved.

<u>Class of Concrete</u>	<u>Designated Size of Coarse Aggregate Square Openings</u>	<u>Minimum Bags of Cement Per Cu. Yd.</u>	<u>Net Water per Bag of Cement in Gallons</u>	<u>Consistency Range in Slump Inches</u>	<u>Air Content (Range) Percent</u>
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	1-1/4" to No. 4	5	6-1/2	2-4	

The concrete material shall be proportioned using the Absolute Volumes 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)	3,500 psi
A (F) or A (F)(AE)	3,000 psi
B	2,100 psi

The compressive strength will be determined by the Engineer from testing cylinders which have been sampled from concrete used in the structure, cured under the same conditions as the structure, made and compressor tested in accordance with the current American Association of State Highway Officials Specifications, Designation T-23, covering the testing of molded cylinders. Testing will be conducted by the Engineer at the Engineers discretion and shall be paid for by the Owner. If the strength required for the class of concrete being produced is not secured with the minimum cement content specified, additional cement shall be used at the Contractor's expense.

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.

Where the Detailed Specifications require that the Contractor provide approved laboratory design mixes, the Contractor shall furnish adequate material samples to the laboratory under the supervision of the Engineer.

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. The Engineer shall determine by means of trial batches on the project the amount of admixture required to produce an air content within the range specified. The mixer shall be equipped with a suitable automatic dispenser for adding to the mixing water the desired amount of air-entraining agent. The dispenser shall be constructed and connected so that the inspector can make ready determination of the amount of air-entraining admixture entering the mixing water.

4. CONSISTENCY

Concrete shall have a consistency such that it will be workable in the required position. It shall be of such a consistency that it will flow around reinforcing steel but individual particles of the coarse aggregate when isolated shall show a coating of mortar containing its proportionate amount of sand. The consistency of concrete shall be gauged by the ability of the equipment to properly place it and not by the difficulty in mixing or transporting. The quantity of mixing water shall be determined by the Engineer in accordance with Section 3 and shall not be varied without his consent.

In general, the slump for concrete, placed by the usual methods or by the vibration method, shall comply with the requirements of Section 3, unless otherwise authorized by the Engineer. Testing shall be conducted by the Engineer as the Engineer deems necessary and paid for by the Owner.

5. SAMPLING AND TESTING

Compliance with the requirements shown in Section 3 shall be determined in accordance with the current methods of the American Association of State Highway Officials.

During the progress of the work, concrete test cylinders or beams will be made and tested by the Engineer at the Engineer's discretion for compressive strength or modulus of rupture for the purpose of checking the field control of the quality of the concrete. Three such specimens shall be made from each run of concrete representing a unit of the finished structure or for each 100 cubic yards of concrete placed, whichever is the lesser. The foregoing shall be modified for complete piling or other specialty work, where it shall be required that at least one set of cylinders be cast for each pour, or for each 50 cubic yards of concrete placed, whichever is the lesser. Should the test cylinders fail, the Contractor shall reconstruct the concrete structure at no additional cost to the Owner. The Contractor shall then be responsible for the expenses involved in re-testing the concrete.

6. MATERIALS

The materials used shall conform to the requirements as set out herein. No materials shall be used containing foreign matter, frost, or lumps or crust of hardened substances. The gradation of the aggregate shall be determined by laboratory methods with sieves having square openings. The Contractor or producer shall use the size, length and character of screen and method of crushing and screening that is best suited to produce the different sizes of aggregate required.

- 6.1. Water: All water used in mixing or curing shall be clean and free from injurious amounts of oil, salt, or other deleterious substances. Where the source of water is relatively shallow, it shall be obtained at such a depth and the intake so enclosed as to exclude silt, mud, grass or other foreign materials.
- 6.2. Cement and Air-Entraining Agent: Portland cement shall conform to the requirements of the current AASHTO Specifications, Designation M-85, for Portland cement. Unless otherwise provided, Type I shall be furnished. Only one brand of any one type of cement shall be used on the contract except by written permission of the Engineer. The Contractor may use, subject to the approval of the Engineer, Type III, a high-early strength Portland cement.

The air-entraining agent shall comply with the requirements of Standard Specifications for Air-entraining Admixtures of Concrete, AASHTO Designation M-154, and shall be added to the mixing water in solution. The Contractor shall submit evidence based on tests made in a recognized laboratory to show that the air-entraining admixture conforms to the requirements of the latest revision of AASHTO M-154 (ASTM C-206) for 7 and 28 day compressive and flexural strengths and resistance to freezing and thawings, except as provided in the following paragraph. Tests for bleeding, bond strength and volume change will not be required. A recognized laboratory is any State Highway, Bureau of Public Roads or cement concrete laboratory regularly inspected by the Cement Reference Laboratory of the National Bureau of Standards. Tests may be made upon samples taken from a quantity submitted by the manufacturer as representative of the admixture to be supplied.

An exception to the requirements in the preceding paragraph is the case of admixtures which are manufactured by neutralizing Vinsol resin with caustic soda (Sodium hydroxide). When the Contractor proposes to use such an admixture he shall submit a certification concerning the admixture in the following form:

"This is to certify that the product (trade name) as manufactured and sold by the (company) is an aqueous solution of Vinsol resin that has been neutralized with sodium hydroxide. The ratio of sodium hydroxide to Vinsol resin is one part sodium hydroxide to (number) parts of Vinsol resin. The percentage of solids based on the residue dried at 105 degrees C. is (number). No other additive or chemical agent is present in this solution."

When the Contractor proposed to use an air-entraining admixture which has been previously approved, he shall submit a certification stating that the admixture is the same as that previously approved. If an admixture offered for use is essentially the same (with minor differences in concentration) as another previously approved material, a certification will be required stating that the product is essentially the same as the approved admixture and that no other admixture or chemical agent is present.

Either prior to or at any time during construction the Engineer may require that the admixture selected by the Contractor be further tested to determine its effect upon the strength of the concrete. When so tested, 7 day compressive strength of concrete made with the cement and aggregates in the proportions to be used in the work and containing the admixture under test in an amount sufficient to produce from 3 to 5 percent entrained air in the plastic concrete shall not be less than 88 percent of the strength of concrete made with the same materials and with the same cement content and consistency but without the admixture. The percentage reduction in strength shall be calculated from the average strength of at least five (5) 6" x 12" cylinders of each type of concrete.

Specimens shall be made and cured in the laboratory in accordance with the requirements of the latest revision of the AASHTO T-152 (ASTM C231). Cement furnished in sacks shall weigh not less than 94 pounds per sack net. The use of cement salvaged from used or discarded sacks will not be allowed, nor will the mixing or alternate use of different brands of cement be permitted. Cement placed in storage shall be suitably protected. Any retrogression in quality occurring during the storage period will be cause for rejection. If the cement furnished shows erratic behavior of the concrete, or in regard to the strength of the finished product, or in the time of the initial or final set, the Contractor will at once, without notice from the Engineer, cease the use of that brand of cement and furnish cement of such properties as to ensure work of a quality satisfactory to the Engineer. When a type of cement is not specified on the plans or in the specifications is permitted by the Engineer, any additional cost shall be assumed by the Contractor.

- 6.3. Coarse Aggregate: The coarse aggregate shall consist of crushed stone or gravel. A coarse aggregate consisting of a combination of crushed stone and gravel shall be used only when specifically approved by the Engineer. The Contractor shall submit an aggregate test report to the Engineer for approval. The tests shall be in accordance with the requirements in Sections 6.3 and 6.4 of this specification.

Crushed stone shall consist of clean, tough, durable fragments of rock of uniform quality. The stone shall have a percent of wear of not more than 40 (Los Angeles Test) and when subjected to five cycles of the soundness test (Sodium Sulphate) shall have a loss not to exceed twelve percent. Gravel shall consist of clean, hard durable uncoated pebbles, crushed or uncrushed, having a percent of wear of not more than 40 (Los Angeles Test), AASHTO Designation T-96.

When tested by laboratory methods, the amount of deleterious substances will not exceed the following limits:

<u>Substance</u>	<u>Maximum Permissible Percentage of Weight</u>
Removed by decantation	1.00%
Coal and lignite	0.25%
Clay lumps	0.25%
Soft fragments	5.00%
Total deleterious	5.00%

Coarse aggregate size shall be reasonably well graded from coarse to fine and shall conform to the following grading requirements:

Class AA, AA(AE), A(F) (AE) and A(F) Concrete

<u>Sieve Size</u>	<u>Percent Passing</u>
Retained on 3/4" sieve	0%
Retained on 3/8" sieve	30-70%
Retained on No. 4 sieve	95-100%

Class A and A (AE) Concrete

<u>Sieve Size</u>	<u>Percent Passing</u>
Retained on 1-1/4" sieve	0%
Retained on 3/4" sieve	20-65%
Retained on 3/8" sieve	70-90%
Retained on No. 4 sieve	95-100%

Class B Concrete

<u>Sieve Size</u>	<u>Percent Passing</u>
Retained on 1-1/2" sieve	0%
Retained on 3/4" sieve	20-65%
Retained on 3/8" sieve	70-90%
Retained on No. 4 sieve	95-100%

Coarse aggregate from any one source shall not vary as to maximum size and shall be uniform to a reasonable degree in gradation with the representative sample submitted by the Contractor with the further provision the aggregate furnished from any one source having a variation in fineness modulus of the representative sample submitted by the Contractor will not be accepted under the specifications.

- 6.4. Fine Aggregate: The fine aggregate shall consist of clean, hard, durable particles of natural sand or other approved inert material with similar characteristics.

The amount of deleterious substances shall not exceed the following limits:

<u>Substance</u>	<u>Maximum Permissible Percentage of Weight</u>
Removed by decantation	2.00%
Clay lumps	0.50%
Coal and lignite	0.25%
Soft and flaky particles	2.00%

The fine aggregate shall be free from injurious amounts of organic impurities and shall pass the mortar strength test as specified in the following: When the fine aggregate is mixed with Portland cement in the proportion of one part of cement to three parts of fine aggregate, the tensile strength compared to standard Ottawa sand mortar specimens made with the same cement of the same proportions and consistency shall not be less than one hundred percent at seven (7) and twenty-eight (28) days.

Fine aggregate shall be reasonably well graded from coarse to fine, and shall conform to the following grading requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
Retained on 3/8" sieve	0%
Retained on No. 4 sieve	0-5%
Retained on No. 8 sieve	5-30%
Retained on No. 16 sieve	20-55%
Retained on No. 30 sieve	40-80%
Retained on No. 50 sieve	70-95%
Retained on No. 100 sieve	95-100%

Mortar sand, when specified, shall meet the following gradations:

<u>Sieve Size</u>	<u>Percent Passing</u>
Passing No. 8 sieve	100%
Passing No. 50 sieve	15-40%
Passing No. 100 sieve	0-10%

Fine aggregate from any one source shall be uniform to a reasonable degree in gradation with the representative sample submitted by the Contractor, with the further provision that aggregate supplied from any one source having a variation in fineness modulus greater than 20 points either way from the fineness modulus of the representative sample submitted by the Contractor will not be accepted.

6.5. Joint Fillers: The material for filling and sealing joints shall comply with the specifications for one or more of the following types:

- (a) Preformed Joint Fillers: Preformed joint filler, bituminous type, shall meet the requirements of the current ASTM Specifications, Designation D-994 (AASHTO Designation M-33)

Preformed expansion joint filler, non-extruding and resilient types, shall meet the requirements of the current AASHTO Specifications, Designation M-53, except that all materials shall require a load of at least 100 pounds per square inch for compression to 50 percent of original thickness. Unless otherwise designated on the Plans on in the Detailed Specifications, Type III filler shall be used.

- (b) Poured Joint Filler: Poured joint filler shall consist of a prepared mixture of asphalt and mineral 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:

<u>Property</u>	<u>Requirement</u>
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 Ratio	1.02 Max.
Ductility at 77°F	5 Min.
Flow at 140°F	0.5 cm. Max.

- 6.6. Roofing Felt: Roofing felt used for joint material and bearing pads shall consist of a roofing felt saturated and coated on both sides with asphalt, and coated on one side with powdered mineral matter such as talc or mica, and shall conform to the current specifications for Asphalt and Roll Roofing of the ASTM Specifications, Designation D-224.

- 6.7. Water Stops: Synthetic rubber and metal water stops shall conform to the requirements of the General Specifications covering Reinforcing Steel.

7. HANDLING AND STORAGE OF MATERIALS

The handling and storage of concrete aggregates shall be such as to prevent segregation and the admixture of foreign materials. The Engineer may require that the aggregates be stored on suitable platforms. Coarse and fine aggregates shall be stored in separate stock piles sufficiently removed from each other to prevent the material at the edges of the piles from becoming intermixed. The location of stock piles shall be satisfactory to the Engineer.

All cement shall be stored in suitable weatherproof buildings which will protect the cement from dampness. Provisions for storage shall be ample and the shipments of cement as received shall be separately stored in such a manner as to provide easy access

for the identification and inspection of each shipment. Stored cement shall meet the test requirements at any time after storage when a retest is ordered by the Engineer.

On small jobs, storage in the open may be permitted by written authorization from the Engineer, in which case a raised platform and ample waterproof covering shall be provided.

Copies of cement records shall be furnished to the Engineer, showing in such detail as he may reasonably require, the quantity used during the day or run at each part of the work. Cement held in storage for a period of over three months, or cement which, for any reason, the Engineer may suspect of being damaged, shall be subject to a retest before being used on the work.

8. MEASUREMENT OF MATERIALS

Materials shall be measured by weighing, except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one (1%) percent of the desired amount. Cement in standard packages (sack) need not be weighed, but bulk cement shall be weighed. The mixing water shall be measured by volume or by weight. The water measuring device shall be susceptible of control accuracy to plus or minus 1/2 percent of the capacity of the tank. All measuring devices shall be subject to approval.

Where volumetric measurements are authorized by the Engineer for projects where the amount of concrete is small, the weight proportions shall be converted to equivalent volumetric proportions. In such cases, suitable allowance shall be made for variations in the moisture condition of the aggregate, including the bulking effect in the fine aggregate.

When the aggregates contain more water than the quantity necessary to produce a saturated surface-dry condition as contemplated in Section 3, representative samples shall be taken and the moisture content determined for each kind of aggregate.

When sack cement is used, the quantities of aggregates for each batch shall be exactly sufficient for one or more full sacks of cement and no batch requiring fractional sacks of cement will be permitted.

9. MIXING CONCRETE

9.1. General: Unless otherwise authorized by the Engineer in writing, and except as provided herein, concrete shall be machine mixed at the site.

9.2. Mixing at Site: Concrete shall be thoroughly mixed in a batch mixer of an approved size and type which will ensure a uniform distribution of the materials

throughout the mass.

The mixer shall be equipped with adequate water storage and a device for accurately measuring and automatically controlling the amount of water used in each batch. Mechanical means shall be provided for automatically preventing the discharge of the mixer until the materials have been mixed the specified minimum time.

The entire contents of mixer shall be removed from the drum before materials for a succeeding batch are placed therein. The materials composing a batch shall be deposited simultaneously in the mixer. No mixer having a rated capacity of less than 1-bag batch shall be used nor shall a mixer be charged in excess of its rated capacity plus ten percent.

All concrete shall be mixed for a period of not less than 1-1/2 minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at the speed for which it has been designed, but this speed shall not be less than 14 nor more than 20 revolutions per minute. Upon cessation of the mixing for a considerable period, the mixer shall be thoroughly cleaned.

- 9.3. Ready-Mixed Concrete: The use of ready-mixed concrete will be permitted only when specifically approved by the Engineer. If the use of ready-mixed concrete is permitted, all provisions set out heretofore for sit-mixed concrete shall be observed except as herein modified.

When the specified slump is 3 inches or less, the tolerance shall be plus or minus 1/2 inch. When the specified slump is greater than 3 inches, the tolerance shall be plus or minus 1 inch.

Ready-mixed concrete shall be understood to mean any concrete which is proportioned and mixed in a central plant and hauled to the work in agitator trucks of approved type, or in non-agitating equipment when approved by the Engineer, or concrete which is proportioned in a central plant and mixed in approved transit mix trucks enroute to the site of the work, or mixed completely in a truck mixer at the point of delivery following the addition of mixing water.

Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators. Each mixer and agitator shall have attached thereto, in a prominent place, a metal plate on which is plainly marked for the various uses for which the equipment is designed, the capacity of the drum container in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades. The truck mixer, when loaded to manufacturer's rated capacity, which shall not exceed 57-1/2 percent of the volume of the drum of the mixer, shall be capable of combining the ingredients of the concrete within the specified time into a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

The agitator, when loaded to manufacturer's rated capacity, which shall not exceed 80 percent of the volume of the drum and of the agitator, shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

Mixers and agitators shall be operated within the limits of capacity and speed of rotation designed by the manufacturer of the equipment. Units designated as agitators shall not be used in connection with truck mixing. When a stationary mixer is used for the complete mixing of the concrete, the mixing time shall be the same and the mixer and mixing operation shall comply substantially with the provision set out herein for site mixed concrete.

When a truck mixer is used for transporting concrete which has been completely mixed in a stationary mixer, mixing during transportation shall be at the speed designated by the manufacturer of the equipment as agitation speed, and the volume of the batch shall not exceed 80 percent of the gross drum volume.

Concrete shall be delivered to the site of the work and discharged from the truck mixer or agitator into the forms complete within 1-1/2 hours after the introduction of the mixing water to the cement and aggregates except that in hot weather, or under other conditions contributing to quick stiffening of the concrete, the maximum allowable time may be reduced by the Engineer. Each batch shall be accompanied by a time slip issued at the batching plant bearing the time of departure.

Slump tests shall be made from time to time of individual samples taken at the beginning, midpoint and end of the load by the Engineer at the Engineer's discretion. If these samples vary by more than the tolerances specified above, the mixer or agitator shall not be used unless the condition is corrected. Retesting expenses shall be borne by the Contractor.

Mixers and agitators shall be examined daily for changes in condition due to the accumulation of hard concrete or mortar or wear of blades. The pickup and throw-over blades shall be replaced when any part or section is worn one (1") inch or more below the original height of the Manufacturer's design. A copy of the manufacturer's design, showing dimensions and arrangements of blades shall be available at all times.

The concrete when discharged shall be of the consistency and workability required for the job without the use of additional mixing water. The rate of discharge shall be controlled by the speed of the rotation of drums in the discharge direction with the discharge gate fully open. When approved in writing by the Engineer, central-mixed concrete which is designed for the purpose, may be transported in approved non-agitating equipment. Bodies of this equipment shall be smooth, watertight, metal containers, equipped with gates that will permit

control of the discharge of the concrete. Covers shall be provided for protection against the weather. The concrete shall be delivered to the site of the work in a thoroughly mixed and uniform mass and discharged with a satisfactory degree of uniformity. Placement in forms shall be completed within 30 minutes after introduction of the mixing water to the cement and aggregates.

If the concrete furnished shows erratic behavior under the field conditions, or in regard to strength of the finished product as shown by beams or cylinder tests or in the time of initial or final set, the Contractor will, at once, without notice to the Engineer, cease the use of ready-mixed concrete until such corrections in procedure are made as to ensure work of a quality satisfactory to the Engineer.

The organization supplying concrete shall have sufficient plant capacity and transporting apparatus to ensure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing and finishing of the concrete. The rate shall be such that the interval between batches shall not exceed 20 minutes. The methods of delivering and handling the concrete shall be such as will facilitate placing with the minimum of rehandling and without damage to the structure or the concrete.

- 9.4. Hand Mixing: When hand mixing is authorized it shall be done on a watertight platform and in such a manner as to ensure a uniform distribution of the materials throughout the mass. Mixing shall be continued until a homogeneous mixture of the required consistency is obtained.
- 9.5. Retempering: 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.

10. HANDLING AND PLACING CONCRETE

In preparation for the placing of concrete, all sawdust, chips, and other construction debris and extraneous matter shall be removed for the interior of the forms. Struts, stays and braces, serving temporarily to hold the forms in correct shape and alignment pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary, and these temporary members shall be entirely removed from the forms and not buried in the concrete. All concrete shall be placed before it has reached its initial set.

Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. The use of long troughs, chutes and pipes for conveying the concrete from the mixer to the forms shall be permitted only on written authorization from the Engineer. In case an inferior quality of concrete is produced by the use of such conveyors, the Engineer may order discontinuance of their use and the substitution of a satisfactory method of placing concrete. Open troughs and chutes shall be of metal or metal lined. Where steep slopes are required, the chutes shall be equipped with baffles or

be in short lengths that reverse the direction of movement. All chutes, troughs and pipe shall be kept clean and free from coatings or hardened concrete by thoroughly flushing with water after each run. Water used for flushing shall be discharged clear of the structure.

When placing operations would involve dropping the concrete more than five feet, it shall be deposited through sheet metal or other approved pipes. As far as practical, the pipes shall be kept full of concrete during the placing and their lower ends shall be kept buried in the newly placed concrete. After initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of reinforcing bars which protrude.

All concrete, during and immediately after depositing, shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions:

- (a) The vibrations shall be internal unless special authorization of other methods is given by the Engineer or as provided for herein.
- (b) Vibrators shall be of a type and design approved by the Engineer. They shall be capable of transmitting vibration to the concrete at frequencies of not less than 4,500 impulses per minute.
- (c) The intensity of vibration shall be such as to visibly affect a mass of concrete of one (1") inch slump over a radius of at least 18 inches.
- (d) The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms.
- (e) Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures and into the corners and angles of the forms.
- (f) Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective.
- (g) Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation, and vibration shall not be used to transport concrete in the forms.

- (h) Vibration shall be supplemented by such spading as is necessary to ensure smooth surfaces and dense concrete, along form surfaces and in corners and locations impossible to reach with the vibrator.
- (i) The provisions of this article shall apply to precast piling, concrete cribbing and other precast members except, that if approved by the Engineer; the manufacturer's methods of vibration may be used.

Concrete shall be placed in horizontal layers not more than 12 inches thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead. Each layer shall be placed and compacted before the preceding batch has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the batches. Each layer shall be compacted so as to avoid the formation of a construction joint with a preceding layer which has not taken initial set.

When placing concrete is temporarily discontinued, the concrete, after becoming firm enough to retain its form, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete. To avoid visible joints as far as possible upon exposed faces, the top surface of the concrete adjacent to the forms shall be smoothed with a trowel. Where a "feather edge" might be produced at a construction joint, as in the sloped top surface of a wingwall, an insert form work shall be used to produce a blocked-out portion in the preceding layer which shall produce an edge thickness of not less than 6 inches in the succeeding layer. Work shall not be discontinued within 18 inches of the top of any face, unless provisions have been made for a coping less than 18 inches thick, in which case, if permitted by the Engineer, the construction joint may be made at the underside of the coping.

Immediately following the discontinuance of placing concrete all accumulations of mortar splashed upon the reinforcing steel and the surfaces of forms shall be removed. Dried mortar chips and dust shall not be puddled into the unset concrete. If the accumulations are not removed prior to the concrete becoming set, care shall be exercised not to injure or break the concrete-steel bond at and near the surface of the concrete, while cleaning reinforcing steel.

11. DEPOSITING CONCRETE UNDER WATER

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.

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.

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.

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.

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.

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.

12. CONSTRUCTION JOINTS

Construction joints shall be made only where located on the Plans or shown in the pouring schedule, unless otherwise approved by the Engineer. If not detailed on the plans, or in the case of an emergency, construction joints shall be placed as directed by the Engineer. Shear keys or inclined reinforcement construction joints shall be used where necessary to transmit shear or bond the two sections together. Before depositing new concrete on or against concrete which has hardened, the forms shall be retightened. The surface of the hardened concrete shall be roughened as required by the Engineer, in a manner that will not leave loosened particles or aggregates or damaged concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. To ensure an excess of mortar at the junction of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces, shall first be thoroughly covered with a coating of mortar or neat cement grout

against which the new concrete shall be placed before the grout has attained its initial set.

The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation.

13. FALSEWORK AND CENTERING

Unless otherwise provided, detailed plans for falsework or centering shall be supplied to the Engineer on request, but, in no case shall the Contractor be relieved of responsibility for results obtained by the use of these plans.

For designing falsework and centering, a weight of 150 pounds per cubic foot shall be assumed for green concrete. All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads without appreciable settlement or deformation. The Engineer may require the Contractor to employ screw jacks or hardwood wedges to take up an settlement in the form work either before or during the placing of concrete.

Falsework which cannot be founded on a satisfactory footing shall be supported on piling which shall be spaced, driven and removed in a manner approved by the Engineer. Falsework shall be set to give the finished structure the camber specified or indicated on the plans.

Arch centering shall be constructed according to centering plans approved by the Engineer. Provision shall be made by means of suitable wedges, sand boxes or other devices for the gradual lowering of centers, and rendering the arch self-supporting. When directed, centering shall be placed upon approved centers, and rendering the arch self-supporting. When directed, centering shall be placed upon approved jacks in order to take up and correct any slight settlement which may occur after the placing has begun.

14. FOUNDATION PITS AND FORMS

All foundation pits and forms shall be inspected and approved by the Engineer prior to placing any part of the structure and the methods employed in performing the work and all equipment, tools and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer. All equipment, tools and machinery used must be maintained in a satisfactory working condition.

Forms shall conform to the shape, lines and dimensions of the concrete as called for on the plans. All plane form surfaces shall be constructed so that the finished concrete surfaces will be true planes, free from waves and irregularities. Lumber used in forms for exposed surfaces shall be straight, dressed to uniform width and thickness and shall be free from loose knots or other defects. Lumber once used in forms shall have nails withdrawn and surfaces to be in contact with the concrete thoroughly cleaned before being used again.

Forms shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together in such a manner that they will maintain their original position and shape under the superimposed loads and the fluid pressure of the concrete. If adequate foundations for shores cannot be secured, trussed supports shall be provided.

Where required by the Detailed Specifications, concrete shall be poured against waterproofed Douglas Fir Plywood, or waterproofed tempered hardpressed fiberboard, of a make and quality approved by the Engineer, and installed in strict conformity to the manufacturer's specifications. Form used for backing up or otherwise supporting form lining shall have a flat surface but need not be tight.

At the top of all walls or other surfaces which are to be finished to a true line, the top of the form shall be brought to a true line and grade so that the surface may be finished by means of a float or template resting on the top edge of the form. Forms, on one side of the wall at least, shall not extend over horizontal construction joints.

Flat steel bars, belts or rods, unless otherwise authorized, shall be used for internal form ties. They shall be provided with lugs, nuts, cones or other approved devices, which will serve as spreaders or forms in proper position, spacing and alignment. The ties shall be of such design that the body of the tie will remain embedded in the concrete, with the ends of the ties not closer than one-half inch (1/2") from the outer concrete surfaces.

The ends of the embedded portion of the tie shall be provided with holes, corrugations, hooks or other approved type of mortar cinch, and these ends shall be protected from the concrete by means of cone shaped shields of sufficient depth to provide adequate anchorage for the cement mortar plugs which shall be placed in the holes left by these shields. Wire form ties will be permitted only on light and unimportant work and with the approval of the Engineer. They shall not be used through surfaces where discoloration would be objectionable. Wire ties, where used, must not be tightened by twisting, but shall be tightened by means of wedges placed outside the forms. No more initial stress is to be placed in the wire tie than is necessary to remove all slack.

Shores supporting successive stories shall be placed directly over those below or so designed that the load will be transmitted directly to them. Forms shall be set to line and grade and so constructed and fastened as to provide and maintain true lines. The forms for all walls should be such as to allow continuous pouring from the bottom to the top of the wall.

Unless otherwise specified, suitable moulding materials or bevel strips shall be placed in the angles of forms to round or bevel the edges of the concrete. Bevel strips on the exposed corners of beams and girders shall be carried to within one foot of the face of the beam support. Bevel strips on the exposed corners of columns shall be carried to within one foot of their intersection with the edge of a beam or girder of the same width as the column. If the column is from two to six inches wider than the largest beam or girder it supports, the bevel strips shall continue to within one foot of the bottom of the slab above

the beam. Bevel strips on columns shall stop at a point sixteen inches (16") above the floor. The ends of all triangle bevel strips which do not extend the full length of the corners they occupy shall be cut off on a angle of forty-five degrees (45°).

Unless otherwise authorized by the Engineer, the inside of forms shall be coated with non-staining paraffin oil, or other approved material, applied before the reinforcement is placed and all surplus oil removed from the surface of the forms by thorough wiping with soft absorbent cloths. Temporary openings shall be placed at the bottom of the column and wall forms, and at other points where necessary to facilitate cleaning and inspection immediately before depositing concrete.

Forms shall not be disturbed until the concrete has adequately hardened. Shoring shall not be removed until the member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to support both the member and construction loads in such a manner as will protect the member from damage by the loads. This shoring shall not be removed until the member has acquired sufficient strength to support safely its weight and the load upon it. The following table gives the minimum time which shall elapse between the time of placing the concrete and the removal of forms at various average temperatures.

<u>Class of Work</u>	<u>Above 60°</u>	<u>54 to 60°</u>	<u>40 to 50°</u>	<u>Below 40°</u>
Walls in Mass work	1 Day	2 Days	2 Days	Not until tests have been made indicating the concrete is set
Thin Walls (12" or less in thickness)	2 Days	4 Days	7 Days	
Columns (if girders are shored)	3 Days	5 Days	10 Days	
Bottom forms of slabs (5' or less span)	4 Days	8 Days	14 Days	
Bottom forms of beams and girders (Less than 14" span)	14 Days	20 Days	28 Days	

If high early strength cement is used, these periods may be reduced as directed by the Engineer.

When field operations are controlled by beam or cylinder tests, the removal of forms, supports and housing, and the discontinuance of heating and curing may be begun when the concrete is found to have a modulus of rupture of not less than 600 psi or a compressive strength of 3,000 psi, provided further that in no case shall supports be removed in less than seven days after pouring the concrete. The beams or cylinders shall be cured under conditions which are not more favorable than the most unfavorable conditions for the portions of the concrete which they represent.

Form work in buildings should be so designed that the column forms may be removed without in any way disturbing the supports of the beams or girders, in order that any defect in the column may be detected and remedied before any load is placed on the column.

Dimensions of all forms shall be carefully checked by the Contractor and the Engineer after they are erected and before the concrete is placed. The Contractor will be held responsible for the accuracy of all construction.

15. FINISHING CONCRETE

Face forms shall be removed as soon as possible in order to facilitate finishing the concrete surfaces. Care shall be taken to avoid roughening or injuring the corners and to keep all edges sharp. Immediately after the forms are removed, any fins or other projections shall be carefully removed, rough spots, in the faces of the walls and any broken corners or edges shall be repaired and all bolt holes shall be plugged and entirely filled with mortar containing one part by volume of cement and two parts by volume of sand screened over a No. 8 screen. Pointing shall be brought smooth with the surface by means of a wooden float. A steel trowel shall not be used to finish the surface. Plastering will not be permitted.

All concrete which, upon removal of the forms, is found to be porous or "honey-combed" shall not be approved. At the Engineer's discretion the entire structure shall be reconstructed or the "honey-combed" portion shall be immediately cut out and removed entirely from the body of the concrete. The parts removed shall extend not less than one inch (1") back of the reinforcing steel where such steel is present in the concrete face which is being repaired, removing sound concrete, if necessary, to obtain this depth. If reinforcement steel is not present, the parts removed shall extend into the concrete not less than three inches (3") and the opening dovetailed in such a manner that the new concrete filling will be securely anchored. In replacing concrete so removed, forms shall be built with a spout or hopper outside the concrete surface which shall be filled with fresh concrete to a point not less than twelve inches (12") above the top of the hole caused by removing the porous concrete.

The fresh concrete shall be properly bonded to the old concrete surfaces as hereinbefore specified, and shall be well puddled. The hopper shall be removed after the concrete has hardened and within twenty-four hours after the concrete is placed, the excess concrete carefully cut away and the surface pointed and rubbed smooth. Concrete used in replacing porous concrete shall be protected from premature drying as hereinafter specified.

After the pointing has set sufficiently to permit it, all exposed surfaces shall be thoroughly wetted and rubbed with a medium carborundum stone followed by a second rubbing with a fine carborundum stone to obtain an entire surface of a smooth texture and uniformity in color. A cement wash or plaster coat shall not be used. Specific exceptions to rubbing of exposed concrete may be made in the Detailed Specifications or on the Plans. Particular attention is called to the fact that the tops of all walls shall be finished true to line and grade and shall be troweled smooth.

Floors, sidewalks and other exposed wearing surfaces which require finishing shall be poured against carefully set screeds and troweled smooth with power operated trowels.

Excess water shall be drained away or otherwise removed. The final finish with a steel trowel shall not be made until the cement has acquired its initial set. No more troweling shall be done than is necessary to obtain a smooth surface. At the option of the Engineer, the top surfaces of walks may be finished with a light broom or brush and an edging tool, instead of a trowel. Sidewalks shall be laid out in blocks with an approved grooving tool as shown on the Plans or as directed by the Engineer.

Care must be taken to avoid drawing an excess of cement to the surface of floors or walks. Dry cement or a dry mixture of cement and sand shall not be sprinkled directly on the surface. Floors shall be marked at the direction of the Engineer. Care shall be taken that all floor surfaces drain properly and that the grooving tool does not raise the surface of the floor and form pockets which do not drain. Floors requiring a mortar surface or coat will be so indicated on the Plans and shall be finished as specified. The surface shall not vary more than 1/8 inch under a 10-foot straightedge. The surface shall have a granular or matte texture which will not be slick when wet.

16. CONCRETING IN COLD WEATHER

No concrete shall be placed when the air temperature is below 35°F, unless provision is made for heating the ingredients and for enclosing the concrete and heating the enclosures. No concrete shall be placed when the weather reports indicate air temperatures below 35°F during the succeeding five days unless provision is made for enclosing the concrete and heating the enclosures.

When concrete is placed at air temperatures below 35°F, the ingredients shall be heated so that the temperature of the concrete when placed shall be not less than 60°F. The concrete shall be enclosed immediately after placing and the concrete and air in the enclosure kept above 50°F. for a period of 5 days. When dry heat is used, means of maintaining atmospheric moisture shall be provided. If wet steam is used for heating, the time may be reduced to a minimum of 48 hours provided that the temperature of the concrete and the air in the enclosure is held above 78°F. If protected in this manner the concrete shall be covered with cotton mats or three thickness of nine ounce burlap after the enclosure is removed and the covering shall remain in place for a period of 5 days after placing the concrete. Heating equipment or methods which alter or prevent the entrainment of the required amount of air in the concrete shall not be used. The equipment shall be capable of heating the materials uniformly. Aggregate and water used for mixing shall not be heated to a temperature exceeding 150°F. Materials containing frost or lumps of frozen material shall not be used.

17. CONCRETING IN HOT WEATHER

When the ambient temperature is above 90°F, the forms, reinforcing steel, steel beam flanges, and other surfaces which will come in contact with the mix shall be cooled to below 90°F. by means of a water spray or other approved methods.

18. CURING CONCRETE FOR STRUCTURES

White pigmented membrane curing solution may be used for curing concrete in all minor drainage structures and the substructures of major structures whose surfaces do not require a rubbed finish, except for precast piling and substructures of grade separation structures including railroad underpasses. All of the concrete in substructures for grade separation structures, superstructures of major structures and precast piling shall be cured with wet cotton or wet burlap blankets.

The membrane curing solution shall comply with the requirements of AASHTO Designation M-148. The cotton mats shall comply with the requirements of AASHTO Designation M-73. The burlap blankets shall be made of jute and manila fibers and shall weigh not less than 9 ounces per square yard of single thickness.

When membrane curing is used, the exposed concrete shall be thoroughly sealed immediately after the free water has left the surface. The concrete inside the forms shall be sealed immediately after the forms are removed and necessary finishing has been done. The solution shall be applied in one or two separate applications. If the solution is applied in two increments, the second application shall follow the first application in 30 minutes.

The Contractor shall provide satisfactory equipment and means to properly control and assure the direct application of the curing solution on the concrete surfaces so as to result in a uniform coverage at the rate of one gallon for each 200 square feet of area.

If rain falls on the newly coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged in any other manner, a new coat of the solution shall be applied to the affected areas equal in curing value to that above specified.

When curing with cotton mats or burlap blankets is required, the exposed concrete immediately after finishing shall be covered with wet cotton mats or two thicknesses of wet burlap blankets. The cotton mats or burlap blankets shall be kept continuously and thoroughly wet for a period of not less than five days after the concrete was placed.

19. EXPANSION AND FIXED JOINTS

All joints shall be constructed according to the details shown on the Plans.

19.1. Open Joints: Open joints shall be placed in the locations shown on the Plans and shall be constructed by the insertion and subsequent removal of a wood strip, metal plate or other approved material. The insertion and removal of the template shall be accomplished without chipping or breaking the corners of the concrete.

Reinforcement shall not extend across an open joint unless so specified on the Plans.

19.2. Filled Joints: Poured expansion joints shall be constructed similar to open joints. When premolded types are specified, the filler shall be placed and held in correct position as the concrete on one side of the joint is placed. When the form is removed, the concrete on the other side shall be placed. Remolded material shall be anchored to the concrete on one side of the joint by means of copper wire not lighter than 11 gauge, so as to retain the filler in proper position. Water stops shall be exercised in the construction of filled joints to ensure that the concrete sections are completely separated by the joint material.

19.3. Steel Joints: The plates, angles or other structural shapes shall be accurately shaped at the shop to conform to the sections of the concrete floor. The fabrication and painting shall conform to the requirements of these specifications covering those items. When called for on the Plans, or in the Detailed Specifications, the material shall be galvanized in lieu of painting.

Care shall be taken to ensure that the surface of the finished plane is true and free from water warping. Positive methods shall be employed in placing the joints to keep them in correct position during the placing of the concrete. The opening at expansion joints shall be that designated on the Plans at normal temperature, and care shall be taken to avoid impairment of the clearance in any manner.

19.4. Water Stops and Flashing: Water stops and flashing shall be furnished and placed as provided on the plans. They shall be spliced, welded, soldered, or otherwise joined to form continuous watertight joints and shall conform to the following requirements.

- (a) Copper water stops and flashing shall conform to AASHTO M-138, No. 110, unless otherwise specified on the plans.
- (b) Rubber water stops shall be formed from synthetic rubber made exclusively from neoprene, reinforcing carbon black, zinc oxide, polymerization agents, and softeners. This compound shall contain not less than 70 percent by volume of neoprene. The tensile strength shall not be less than 2,750 pounds per square inch with an elongation at breaking of 600 percent. The Shore Durometer indication (hardness) shall be between 50 and 60. After 7 days in air at 158° ($\pm 2^\circ$) F. and 300 pounds per square inch pressure, the tensile strength shall be not less than 65 percent of the original.
- (c) The water stops shall be formed with an integral cross section in suitable molds, so as to produce a uniform section with a permissible variation in dimension of 1/32 inch plus or minus. No splices will be permitted in straight strips. Strips and special connection pieces shall be well cured in a manner such that any cross section shall be dense, homogeneous, and free from all porosity. Junctions in the special connection pieces shall be full molded. During the vulcanizing period the joints shall be securely held by

suitable clamps. The material at the splices shall be dense and homogeneous throughout the cross section.

- (d) Polyvinylchloride water stops shall be manufactured by the extrusion process from an elastomeric plastic compound, the basic resin of which shall be polyvinylchloride (PVC). The compound shall contain any additional resins, plasticizers, stabilizers or other materials needed to insure that, when the material is compounded, it will meet the performance requirements given in this specification. No reclaimed PVC or other material shall be used.
- (e) The water stops shall be dense, homogeneous, and without holes or other defects.
- (f) The material shall comply with the following physical requirements when tested under the indicated ASTM test method:

<u>Property</u>	<u>ASTM Test</u>	<u>Requirements</u>
Specific Gravity	ASTM D 792	1.35 Max.
Durometer Hardness	ASTM D 2240	75±5
Tensile Strength	ASTM D 412	1800 psi Min.
Elongation	ASTM D 412	350%
Cold Brittleness	ASTM D 746	-35°F
Stiffness in Flexure	ASTM D 747	350 psi Min.

- (g) The manufacturer shall be responsible for the testing either in his own or a recognized commercial laboratory, and shall submit three certified copies of test results.

20. ALUMINUM EMBEDMENT

All portions of aluminum items which are to be embedded in concrete shall be given two coats of Koppers Bitumastic Black Solution or Inertol Standard for protection. Each coat shall be 2-3 mils thick. All coatings shall be applied in accordance with the manufacturer's recommendations.

21. MEASUREMENT

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.

22. PAYMENT

The various classes of concrete measured as provided for above will be paid for at the contract 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 methods.

GENERAL SPECIFICATIONS

SEEDING

1. DESCRIPTION

This item shall consist of furnishing and applying lime, fertilizer, seed, mulch cover, asphalt and water in accordance with these specifications at locations shown on the plans, or as directed.

The work under this item shall be accomplished as soon as practical after the grading in an area has been completed in order to deter erosion and siltation of streams.

2. MATERIALS

2.1. Lime: Lime shall be agricultural grade ground limestone or equivalent as approved by the Engineer.

2.2. Fertilizer: Fertilizer shall be a commercial grade, uniform in composition, free flowing and suitable for application with mechanical equipment, delivered to the site in labeled containers, conforming to current Arkansas fertilizer laws and bearing the name, trademark and warranty of the producer.

2.3. Seed: The seed shall be labeled in accordance with current rules and regulations of the Arkansas State Plant Board and shall have a minimum of 98% pure seed and 85% germination by weight, and shall contain no more than 1% weed seeds. A combined total of 50 noxious weed seeds shall be the maximum amount allowed per pound of seed with the following exceptions: Johnson grass seed, wild onion seed, wild garlic seed, field bindweed seed or nut grass seed will not be allowed in any amount whatsoever. Seed shall be furnished in sealed, standard containers. Seed which have become wet, moldy or otherwise damaged in transit or in storage will not be acceptable.

Legumes shall be inoculated with an approved culture as recommended by the manufacturer, just prior to seeding.

Seed shall be composed of the varieties and amount by weight as shown below.

GROUP I

March 1 – April 15

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Tall Fescue (Ky. 31)	35
Red Top (Common)	5
Weeping Love Grass (Eragrostis Curvula)	5
Lespedeza (Korean)	30

April 16 – June 30

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Weeping Love Grass (Eragrostis Curvula)	5
Bermuda Seed (Common) hulled	10
Lespedeza (Korean)	30

July 1 – August 31

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Weeping Love Grass (Eragrostis Curvula)	5
Bermuda Seed (Common) hulled	5
Bermuda Seed (Common) unhulled	10
Brown Top Millet	15

September 1 – October 15

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Tall Fescue (Ky. 31)	35
Red Top (Common)	5
Crimson Clover (Dixie)	20

GROUP II

March 1 – March 31

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Tall Fescue (Ky. 31)	35
Weeping Love Grass (Eragrostis Curvula)	5
Lespedeza (Kobe)	35

April 1 – June 15

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Bermuda Seed (Common) hulled	10
Weeping Love Grass (Eragrostis Curvula)	5
Bahia Grass (Pensacola)	20
Lespedeza (Kobe)	35

June 16 – August 31

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Weeping Love Grass (Eragrostis Curvula)	5
Bermuda Seed (Common) hulled	5
Bermuda Seed (Common) unhulled	10
Bahia Grass (Pensacola)	20
Brown Top Millet	5

September 1 – October 31

<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Tall Fescue (Ky. 31)	35
Rye Grass (Annual)	10
Crimson Clover (Dixie)	20

Seed planted between July 1 and August 31 may require more water than that specified in subsection 3.6 in order to survive. Therefore, watering will continue after germination until growth is established.

- 2.4. Mulch Cover: Mulch cover shall consist of straw from threshed rice, oats, wheat, barley or rye; of wood excelsior; or from hay obtained from various legumes or grasses, or a combination thereof. Mulch shall be dry and reasonably free from Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advance state of decomposition. All material will be inspected and approved prior to use.
- 2.5. Asphalt: Asphalt in mulch cover shall be of such quality that the mulch cover will be bound together to form a cover mat which will stay intact under normal climatic conditions. The quality and performance of the asphalt will be determined and certified by the Engineer.
- 2.6. Water: Water shall be of irrigation quality and free of impurities that would be detrimental to plant growth.

3. CONSTRUCTION METHODS

- 3.1. Seedbed Preparation: Areas to be seeded shall be dressed to the shape and section shown on the plans. If the plans call for replacing topsoil, this shall be done prior to any preparations for seeding. Before beginning the seedbed preparation, soil samples shall be obtained from each major soil area (such as cut back slope or fill fore slope) as directed by the Engineer for lime requirement analysis. Each major soil area should have approximately three samples per acre. The samples should be taken to a depth of approximately five inches, combined and thoroughly mixed and approximately a five pound sample removed for the lime requirement analysis for that major soil area.

Lime, at the rate determined by the lime requirement test, shall be uniformly spread on areas to be seeded prior to their being roughened or scarified. The seedbed shall be thoroughly pulverized by means of disk harrows or other approved methods, thoroughly mixing lime and soil to depth of not less than 4 inches (2 inches for slopes 4:1 or steeper) below finish slope elevation. Regardless of the pulverizing method used, the soil shall be broken with the contour of the slope. Objectionable foreign matter shall be removed and the soil left in a suitable horticultural condition to receive the fertilizer and seed. Water, as a pay item, may be applied before, during and after seedbed preparation, as directed by the Engineer, in order to maintain the desired moisture content in the soil.

When no lime is required, seedbed preparation shall be accomplished as specified above regardless of the method used in the distribution of fertilizer, seed and mulch cover.

- 3.2. Fertilization: Fertilizer shall be applied at the rate of 800 pounds per acre of 10-20-10, or the equivalent amount of plant food. Fertilizer shall be uniformly incorporated into the soil to a depth of at least two (2") inches. It may be worked into the soil alone or in conjunction with the required lime. If the Contractor so elects, the fertilizer may be drilled into the soil or combined with the seed in the hydro-seeding operation. If the fertilizer is incorporated into the hydro-seeding operation, the depth requirement will be waived.
- 3.3. Seeding:
- (a) Broadcasting: Broadcast sowing may be accomplished by hand seeders or by approved power equipment. Either method shall result in uniform distribution and no work shall be performed during high winds. The area seeded shall be lightly firmed with a cultipacker immediately after broadcasting.
 - (b) Drilled in Rows: When seed is drilled in rows, the rows shall be parallel to the toe of the slope. Fertilizer and seed shall not be mixed.
 - (c) Hydro-seeding: If a hydro-seeder is used for seeding, fertilizer and seed may be incorporated into one operation but a maximum of 800 pounds of fertilizer shall be permitted per each 1500 gallons of water, or if the Contractor so elects, the fertilizer may be applied during preparation of the seedbed. Water used in hydro-seeding will not be paid for directly but shall be subsidiary to the item of seeding. The area shall be lightly firmed with a cultipacker immediately prior to hydro-seeding.
- 3.4. Mulch Cover: Mulch cover shall be applied at the rate of 4000 pounds per acre immediately after seeding and shall be spread uniformly over the entire area by approved power mulching equipment. If the Contractor so elects, an approved mulching machine may be used whereby the application of mulch cover and asphalt may be combined into one operation. If this method is used, no change in application rates will be allowed.
- 3.5. Asphalt: Immediately following or during the application of the mulch cover on seeded areas, asphalt may be applied at the rate of 0.05 gallon per square yard. Application shall be made from a pressure distributor, so equipped to insure constant and uniform distribution
- 3.6. Water: After application of the mulch cover, water shall be applied in sufficient quantity to thoroughly moisten the soil to a depth of pulverization and then as necessary to germinate the seed and maintain growth at the direction of the Engineer for a period of at least 3 weeks. The time required for application of water will not be included in the computations of contract time for completion of the project provided all other work under the contract has been completed.

- 3.7. Restoration: The Contractor shall maintain seeded areas from the time of completion until final acceptance of the project. Additional work and materials required because of loss through erosion will be paid for under the pertinent contract items. Additional work and materials required due to the Contractor's negligence in maintaining completed work shall be accomplished at the Contractor's expense.

4. BASIS OF PAYMENT

Seeding, liming, mulching and watering completed and accepted as provided above will be paid for at the contract unit price bid per acre for Seeding, which price shall be full compensation for seedbed preparation; for furnishing and applying fertilizer, seed, lime, mulch material, asphalt and water; and for all equipment, tools, labor and incidentals.

GENERAL SPECIFICATIONS

WATER PIPE, FORCE MAIN, AND PIPE LAYING

1. GENERAL

All pipe shall be of the type, weight, class and/or designed working pressures shown on the plans, set out in the detailed specifications or as set out 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, haul and distribute the pipe, castings, fittings, valves, hydrants and excavate the trenches and pits to the required dimensions, excavate all bell holes, construct and maintain all bridges for traffic, sheet, 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 the pipe and castings, fittings, valves, hydrants and accessories, backfill and consolidate the trenches and pits, restore the roadway surface unless otherwise stipulated, remove surplus excavated material, clean the site of the work, and maintain the street or other surface over the trenches as specified.

The Contractor shall also furnish all equipment, tools, labor and materials required to rearrange branch connections to main sewers, or to rearrange sewers, conduits, ducts, pipes or other structures in accordance with the contract drawings and stipulations included therein.

2. DUCTILE IRON PIPE

Ductile iron pipe, if used on this contract, shall conform to the following specifications:

- 2.1. Pipe: Unless otherwise shown on the plans or specified in the detailed specifications, ductile iron pipe shall be of the class shown on the plans or stipulated in the proposal.

Ductile iron pipe shall meet the requirements of AWWA C151, "Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids," and AWWA C150, "Thickness Design of Ductile-Iron Pipe."

All flanged ductile iron pipe shall conform to AWWA C115, "Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges."

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

- 2.3. Jointing: Joints for cast iron pipe shall be in accordance with AWWA

Specification C111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."

- 2.4. Laying: Ductile iron pipe shall be laid in accordance with AWWA C600, "Installation of Ductile-Iron Water Mains and Appurtenances."
- 2.5. Lining: Ductile iron pipe shall be lined in accordance with AWWA C104, "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water."
- 2.6. HYDROSTATIC TESTING OF DUCTILE-IRON WATER MAINS

- 2.6.1. PRESSURE AND LEAKAGE TEST

2.6.1.1. Test Restrictions: After the pipe has been installed, each valved section shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. Test pressure shall not be less than 100 psi. Test Pressure shall not exceed pipe or thrust-restraint design pressures.

The hydrostatic test shall be of at least 2-h duration.

Test pressure shall not vary by more than ± 5 psi (35 MPa or 0.35bar) for the duration of the test. The pressure shall be returned to the initial pressure at the conclusion of the test.

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.

Individual pressure tests shall be conducted from valve to valve. Testing of multiple valved sections will not be permitted. 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.

2.6.1.2. Pressurization: After the pipe has been installed, each valved section shall be subjected to a hydrostatic pressure of at least 1.5 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 the 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 the opening or closing direction at differential pressures above the rated pressure. It is good practice to allow the system to stabilize at the test pressure before conducting the leakage test.

2.6.1.3. Air Removal: 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 cocks 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 cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the owner.

2.6.1.4. Examination: 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 sound material, and the test shall be repeated until it is satisfactory to the owner.

2.6.1.5. Leakage Defined: Leakage shall be defined as the quantity of water that must be supplied into each valved section of the newly laid pipe to return the pressure to the initial pressure and to maintain pressure within 5 psi of the specified test pressure (for the duration of the 2 hr test) 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. If the test pressure drops below 5 psi of the initial starting pressure at any time during the test, the test fails.

2.6.1.6. Allowable Leakage: No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

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

Where:

L = allowable leakage, in gallons per two-hour test period

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)

This formula is based on an allowable leakage of 10.5 gpd/mi/in of nominal diameter at a pressure of 150 psi.

2.6.1.6.1. Allowable leakage at various pressures is shown in Table 1.

2.6.1.6.2. 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.

2.6.1.6.3. When hydrants are in the test section, the test shall be made against closed hydrant valves; however, hydrant watch valves shall be open.

2.6.1.7. Acceptance of Installation: Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in Sec. 2.6.1.6, the contractor shall, at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.

2.6.1.7.1. All visible leaks are to be repaired, regardless of the amount of leakage.

Table 1. Allowable Leakage per 1,000 ft (305 m) of DI Pipeline (gallons per 2 hr test)†

Nominal Pipe Diameter--in.																	
Average Test Pressure <i>psi</i> <i>kPa</i>		3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	50
450	3100	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	2760	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	2410	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	2070	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	1900	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	1720	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	1550	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	1380	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	1210	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	1030	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	860	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	690	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

† To obtain leakage in liters/2 hour period, multiply the values in the table by 3.785.

3. PVC PIPE

PVC, if used on this contract, shall conform to the following specifications.

3.1. Four-inch and Smaller Diameter PVC Pipe:

- (a) All PVC pipe shall be PVC 1120 pressure pipe made from class 12454-A or 12454-B material as defined by ASTM D-1784 with outside diameter dimensions of steel or ductile-iron pipe. The PVC compounds shall be treated and certified as suitable for potable water products by the National Sanitation Foundation (NSF) Testing Laboratory (NSF Standard No. 61).
- (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 with a Standard Dimension Ratio SDR-21, SDR-17, SDR-13.5 or AWWA C900, whichever is specified in the detailed specifications or plans. If no specification is referenced in the plans or detailed specifications for PVC water main, use ASTM D2241. All 3" and 2" diameter PVC water main shall conform to the requirements of ASTM D2241. Pipe shall qualify for a hydrostatic design basis of 4000 psi at 73.4°F per the requirements of PPI TR-3.
- (c) Provision shall be made for expansion and contraction at each joint by use of a gasket type joint and integral bell or equal.
- (d) The pipe manufacturer shall be a member of the Plastic Pipe Institute or American Water Works Association.
- (e) All fittings and specials used in connection with the pipe shall conform to recommendations by the pipe manufacturer or be of proven equal. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and Engineer.

3.2. Six-inch and Larger PVC Pipe:

- (a) All PVC pipe shall be PVC 1120 pressure pipe made from class 12454-A or 12454-B material as defined by ASTM D-1784 with outside diameter dimensions of steel or ductile-iron pipe. The PVC compounds shall be treated and certified as suitable for potable water products by the National Sanitation Foundation (NSF) Testing Laboratory (NSF Standard No. 61).
- (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 with a Standard Dimension Ratio SDR-21, SDR-17, SDR-13.5 or AWWA C900, whichever is specified in the detailed specifications or plans. If no specification is referenced in the plans or

detailed specifications for PVC water main, use ASTM D2241. Pipe shall qualify for a hydrostatic design basis of 4000 psi at 73.4°F per the requirements of PPI TR-3.

- (c) Provision shall be made for expansion and contraction at each joint by use of a gasket type joint.
- (d) The pipe manufacturer shall be a member of the Plastic Pipe Institute or American Water Works Association, and shall have manufactured the pipe and joint proposed for use for not less than five (5) years.
- (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. The fittings shall be cement-lined in accordance with AWWA Specification C-104. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and consulting engineer or his representative. The use of a torque type wrench shall be mandatory to tighten up the glands as required.
- (f) 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. If AWWA C900 PVC is specified, marking shall be as described in section 6.1 of the AWWA C900 specifications.
- (g) 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, "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

- 3.3. Pipe Bedding: 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, bedding material shall be hauled in and used. This material shall consist of fine river sand or silt loam of a quality approved by the Engineer. Embedment shall be hand placed. Special care shall be exercised in the bedding and backfilling of polyvinyl chloride pipe.

- 3.4. Installation: PVC pipe shall be laid in accordance with AWWA C605, "Underground Installation of Polyvinyl chloride (PVC) Pressure Pipe and Fittings for Water."
- 3.5. Hydrostatic Testing of PVC Water Mains:
- 3.5.1. General: **All the provisions of Section 2.6 shall apply.** 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 pipeline.
- 3.5.2. Cross-connection control: When existing water mains are used to supply test water, they should be protected from back-flow 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 back-flow protection should be removed and the main under test isolated from the supply main.
- 3.5.3. Procedure: Pressure and leakage tests will be performed at the same time. 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 pipe in a manner satisfactory to the engineer. The pressure gauge shall be capable of being read to the nearest 1 psi. Maximum increments of 2 psi shall be provided with the test gauge. 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 repaired. All defective elements shall be repaired or removed and replaced and the test repeated until the allowable leakage requirements have been met.
- 3.5.4. Test Method: Tests shall be witnessed by the engineer and the equipment used for the test shall be subject to the approval of the engineer.

Table 2. System Test Methods

Procedure	Pressure	Duration of Test
Simultaneous Pressure and leakage Tests	150% of Working pressure* (minimum of 100 psi) at the point of the test, but not less than 125% of normal working pressure at highest elevation.	2 hr
Separate Pressure Test	150 % of working pressure* (minimum of 100 psi) at the point of the test, but not less than 125% of normal working pressure at highest elevation.	1 hr
Separate Leakage Test	150% of working pressure* (minimum of 100 psi) of the segment tested.	2 hr

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

- 3.5.5. 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 test gauge shall be graduated to maximum of 2 psi. The duration of each leakage test shall be 2 hr, 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 return the pressure to the initial 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 formula:

$$L = \left(SD \frac{\sqrt{P}}{74,000} \right) \times 0.5$$

Where:

L = allowable leakage, in gallons per two-hour test period

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)

This formula is based on an allowable leakage of 10.5 gpd/mi/in of nominal diameter at a pressure of 150 psi.

3.5.5.1. Leakage values determined by the above formulas are presented in Table 3.

3.5.5.2. 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.

3.5.5.3. When hydrants are in the test section, the test shall be made against closed hydrant valves.

3.5.5.4. All visible leaks shall be repaired, regardless of the amount of leakage.

Table 3. Allowable Leakage per 1,000 ft (305 m) of PVC Pipeline (gallons per 2 hr test)†

Nominal Pipe Diameter-- <i>in.</i>													
Average Test Pressure <i>psi</i> <i>kPa</i>		2	3	4	6	8	10	12	16	18	20	24	30
300	2070	0.23	0.35	0.47	0.70	0.94	1.17	1.40	1.87	2.11	2.34	2.81	3.51
275	1900	0.22	0.33	0.45	0.67	0.90	1.12	1.34	1.79	2.02	2.24	2.69	3.36
250	1720	0.21	0.32	0.43	0.64	0.85	1.07	1.28	1.71	1.92	2.14	2.56	3.21
225	1550	0.20	0.30	0.41	0.61	0.81	1.01	1.22	1.62	1.82	2.03	2.43	3.04
200	1380	0.19	0.28	0.38	0.57	0.76	0.96	1.15	1.53	1.72	1.91	2.29	2.87
175	1210	0.18	0.26	0.36	0.54	0.72	0.89	1.07	1.43	1.61	1.79	2.15	2.68
150	1030	0.16	0.24	0.33	0.50	0.66	0.83	0.99	1.32	1.49	1.66	1.99	2.48
125	860	0.15	0.22	0.30	0.45	0.60	0.76	0.91	1.21	1.36	1.51	1.81	2.27
100	690	0.13	0.20	0.27	0.41	0.54	0.68	0.81	1.08	1.22	1.35	1.62	2.03

† To obtain leakage in liters/ 2 hour period, multiply the values in the table by 3.785.

4. STEEL PIPE

Steel pipe, if used under this contract, shall conform to the following specifications:

- 4.1. Pipe: Pipe diameter and wall thickness shall be as specified in the detailed specifications. The diameter shall refer to the outside diameter of the pipe. Pipe shall be made and tested in accordance with AWWA Standard Specification for Steel Water Pipe, Designation C200.

All pipe shall be made up in the shop in sections 40 to 50 feet in length with not more than one (1) circumferential joint in any length. Short lengths will be allowed for specials. Pipe may be made by welding one (1) longitudinal joint or may be made by the spiral welding process. No riveted pipe will be considered.

Steel plate shall conform to the Standard Specifications of the ASTM Serial Designation A283, Grade B, Specification for Low and Intermediate Tensile Strength Carbon-Steel Plates of Structural Quality. Coupons may be required to be cut from as many as one in each 20 lengths of pipe furnished to check the

strength of welds. The strength of the welds must be at least 100 per cent of the strength of the pipe.

The manufacture of these pipes and the testing of them in the shop shall be inspected by a representative of a previously approved established laboratory or firm of national reputation for testing of this nature, and the report shall be made to the Engineer of this inspection. The costs of these tests and inspection shall be borne by the Contractor. After each joint of the pipe is completed, it shall be tested under hydrostatic pressure as prescribed by AWWA Standard Specification C200. General sweating of the welds will not be acceptable under this test.

Changes in line and grade may be made by beveling the ends of the pipe if field welding is allowed, or they may be made by steel specials, or in the couplings if couplings are used. Steel specials must be used whenever the angle exceeds 10°. Specials may be made up of straight pipe fabricated into the required shape or may be made of special rolled sections. Any specials or fittings shall be of the same character and thickness of material as the main pipe line. Openings for air valves, main connections and blow-off connections must be provided with suitable reinforcement around the openings, welded to the body of the pipe. Openings of the sizes shown on the plans shall be furnished with blank flanges or plugs of proper strength to withstand the working pressure of the line where no other provision is made for the closing of the openings.

- 4.2. Lining and Coating: All steel pipe shall be lined and coated in accordance with the AWWA Standard Specifications for Coal-Tar Protection Coatings and Linings for Steel Water Pipelines-Enamel and Tape Hot-applied, Designation C203. The interior and exterior surfaces of all pipe shall be cleaned, primed and coated with coal-tar primer and enamel shall be equal to that manufactured by the Barrett Company or by the Koppers Company, Inc.

If field welding is to be allowed, the pipe joints are to be furnished with the inside and outside coating held back twelve inches (12") on each end for field welding. If couplings are used, they shall be coated as specified for water pipe after installation. All bolts, nuts and spots where enamel is broken shall be touched up with enamel as specified for pipe.

- 4.3. Jointing: The plans show the plan and grade for the pipeline. The Contractor shall submit detailed drawings to the Engineer for approval, showing his proposed method of laying the pipe to these grades. All pipelines to be crossed shall be located before these drawings are prepared.

The Engineer will either set the grade for each pipe or will set the lines and grade for the pipe on offset stakes. The Contractor shall maintain a constant and accurate check on the grade and alignment from these stakes. Uniform bedding shall be prepared for the pipe immediately before laying.

The detailed specifications state whether the pipe is to be welded or coupled, or whether the Contractor may choose either method at his option. If welding is to be used, the Contractor must first file with the Engineer a description of the method which he proposes to use, the name of the individual or company who will do the welding with a statement as to the previous experience of such individual or company in this particular line of work. When requested, the Contractor shall cut coupons across the field welds and send them to an approved laboratory for testing. These welds must develop the full strength of the pipe. The Contractor, when permitted, may weld the line continuously, or he may weld sections together and lower them into the ditch and connect the sections with a positive weld. If the line is welded continuously, provisions must be made for slack in the line. If couplings are used throughout for joining the pipe, as much as 240 feet may be jointed together on top of the ditch and the sections carefully lowered into the ditch and connected. Any coating or lining damage during shipment or laying of the pipe shall be repaired to the satisfaction of the Engineer, as specified above under Lining and Coating.

- 4.4. Field Joints: After the field joints have been welded, if welding is allowed, the uncoated portions of the pipe and the welds both inside and outside shall be thoroughly cleaned and dried and free from loose mill scale, grease, paint, dirt, moisture and other foreign matter. They shall then receive one coat of Bitumastic or Barrett enamel, applied hot. On the inside of the pipe the enamel is to be applied as smoothly as possible. Both the priming solution and the enamel shall be of the same grade and manufacture as used on the remainder of the pipe.

If couplings are used to join the pipe together, the ends of the pipe shall be primed and enameled before the pipe is laid. All of the lining and coating of the steel pipe, including the field touch-up work, is to be done under the direction of the manufacturer of the lining and coating to the satisfaction of the Engineer.

- * The pipe couplings shall be of a gasketed, sleeve-type, with diameter to properly fit the pipe. Each coupling shall consist of one steel middle ring of thickness and length specified, two steel followers, two rubber-compounded wedge section gaskets and sufficient trackhead steel bolts to properly compress the gaskets. Field joints shall be made with this type coupling. The couplings shall be assembled on the job in a manner to insure permanently tight joints under all reasonable conditions of expansion, contraction, shifting and settlement, unavoidable variations in trench gradient, etc. The coupling shall be Dresser Style 38, as manufactured by Dresser Manufacturing Division, Bradford, Pennsylvania, or couplings of equal quality and the necessary quantity shall be furnished.

5. VALVES AND VALVE BOXES

All valves shall conform to the AWWA C500 Specification for materials, construction and workmanship and shall be of the double disc gate type, non-rising stem and unless

otherwise shown on the plans that lines 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 spigot end cast iron pipe. Unless otherwise shown on the plans, all underground valves shall include a valve box and the cost of such valve box shall be included in the unit price bid for valves of the various sizes, complete in place. Unless otherwise specified in the Detailed Specifications the valve box shall be of a cast iron box of the extension type, consisting of three pieces, suitable for the depth of covering over the pipe lines as shown on the plans. They shall be provided with a diameter of not less than five inches (5"), and the minimum thickness of metal at any point shall not be less than three-sixteenth inches (3/16"). They shall be painted inside and out with a good asphaltum paint.

6. FIRE HYDRANTS

Unless otherwise specified on the plans or in the detailed specifications, fire hydrants shall be classified according to the diameter of the opening of the main valve seat, 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.

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.

Where specified on the plans or set out in the proposal, the hydrant shall be equipped with a breakable coupling above ground line. The hydrant shall be so designed as to make repairs to broken upper hydrant sections without digging out the hydrant. The upper section of the barrel shall contain hose and pumper nozzles as specified.

The inlet to the hydrant shall be an elbow or hydrant shoe, provided with a ball flange to fit the branch from the main. Other types of flanges are to be provided if set out in the detailed specifications. Drain openings shall be provided in the hydrant shoe to drain the hydrant after use.

The operating stem shall be made of steel or wrought iron and shall be sheathed in bronze or other suitable material where it passes through the stuffing box. Working parts of iron or steel against other iron or steel will not be permitted. All working parts, including main valve assembly, shall be removable through the barrel without excavating. All materials and workmanship used in the construction of hydrants shall be in accordance with the current specifications adopted by the AWWA Designation C-502.

Each fire hydrant shall be tested to 300 pounds hydrostatic pressure supplied from the inlet side, first, with the main valve closed for testing valve seats; 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 of field paint shall be applied as specified by the Engineer.

7. RESPONSIBILITY FOR MATERIAL

Responsibility for material shall be as follows:

- 7.1. Responsibility When Furnished by Contractor: 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.
- 7.2. Responsibility When Furnished by Owner: The Contractor's responsibility for material furnished by the Owner shall begin at the point of delivery thereof to said Contractor. Materials already on 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, be replaced with sound material by the Owner. The Contractor, however, shall at his own expense furnish all supplied, labor and facilities necessary to remove said defective material and install the sound material in a manner satisfactory to the Engineer.
- 7.3. Responsibility for Safe Storage: 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.
- 7.4. Replacement of Damaged Material: Any material furnished by the Owner that becomes damaged after acceptance by the Contractor shall be replaced at his own expense.

8. HANDLING OF MATERIAL

All materials shall be handled as outlined herein.

- 8.1. Hauling: 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.

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.

- 8.2. Care of Pipe Coating and Lining: Pipe shall be so handled that the coating and lining will not be damaged. If, however, 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.

9. ALIGNMENT AND GRADE

The water main shall be laid and maintained to the required lines and grades with fittings, valves and hydrants at the required locations, spigots centered in bells and all valves and hydrant stems plumb.

- 9.1. Deviations Occasioned by Other Structures: Wherever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade or arrange with the Owners of the structures for the removal, relocation or reconstruction of the obstruction.
- 9.2. Caution in Excavation: The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.
- 9.3. Depth of Pipe: All pipe shall be laid to the depth shown on the contract drawings or as required in the detailed specifications. Any variation therefrom shall be made only at the order of the Engineer.

10. EXCAVATION AND PREPARATION OF THE TRENCH

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. The trench shall be so braced and drained that the workmen may work therein safely and efficiently. It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains or sewers.

- 10.1. Width of Trench: The width of the trench shall be ample to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing and handling of specials.
- 10.2. Bell Holes: Where pipe types require the use of bell holes, they shall be provided

at each joint and be made properly.

- 10.3. Pipe Clearance in Rock: Ledge rock, boulders and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves and fittings for pipe 24 inches in diameter, or less than 9 inches for pipe larger than 24 inches in diameter. The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe and appurtenances being laid and any part, projection or point of such rock, boulder or stone.

- 10.4. Excavation to Grade: The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid or undisturbed ground at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. Any part of the bottom of the trench excavated below the specified grade shall be corrected with approved material, thoroughly compacted as directed by means of hand tools.

The subgrade beneath the centerline of the pipe shall be finished to within 0.03 feet of a straight line between pipe joints or batter boards, 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 12.5, 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.

- 10.5. Excavation Below Grade: The trench shall be excavated to at least three inches (3") and not more than six inches (6") below the specified grade. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in three inch (3") uncompacted layers. The layers shall be thoroughly tamped as directed by the Engineer so as to provide a uniform and continuous bearing and support for the pipe at every point between bell holes, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of eighteen (18") near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. The finished subgrade shall be prepared accurately by means of hand tools. The subgrade beneath the centerline of the pipe shall be finished by 0.03 feet of a straight line between pipe joints or batter boards, and all tolerances shall be above the specified grade.

- 10.6. Excavation in Poor Soil and Refilling to Grade: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetal or other organic materials, or large pieces or fragments of inorganic material which in the judgment of the Engineer 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 inch (3") uncompacted layers. The remainder of the installation of the pipe and preparation of the subgrade shall be in accordance with the specifications outlined in Section 10.5 above.

- 10.7. Special Foundation in Poor Soil: 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 for the pipe, consisting of piling, timbers or other materials, in accordance with plans prepared by the Engineer. Extra compensation will be allowed for the additional work.
- 10.8. Subgrade in Rock Trenches: Where excavation is made in rock or boulders and the clearance specified in Section 10.3 is provided, the subgrade shall be made in backfilling with an approved material in three inch (3") uncompacted layers. The preparation of the subgrade and the installation of the pipe shall be in accordance with the provisions outlined in Section 10.5.
- 10.9. Rock Excavation: Unless the detailed specifications and proposal make provision for payment for rock excavation, 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.

The word "rock" or "solid rock" wherever used as the name of an excavated material, shall mean igneous, metamorphic, and sedimentary rock that cannot be excavated without blasting, hydraulic hammering, or power-operated hand tools. The contractor shall be responsible for removing all excess solid rock so excavated from the project.

- 10.10. Blasting: Blasting for excavation will be permitted only after securing the approval of the Engineer and only when proper precautions are taken for the protection of persons or property. The hours of blasting will be fixed by the Engineer. Any damage caused by blasting shall be repaired by the Contractor at his expense. The Contractor's methods of procedure in blasting shall conform to the State laws and municipal ordinances.
- 10.11. Occupation Safety and Health Act of 1970: Requirement for protective systems. The contractor shall be in compliance with Subpart P - Excavation.
- 10.12. Care of Surface Material for Reuse: All surface materials which, in the opinion of the Engineer, are suitable for reuse in restoring the surface shall be kept separate from the general excavation material as directed.
- 10.13. Piling Excavated Material: All excavated material shall be piled in a manner that will not endanger the work and that 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 until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.

- 10.14. Trenching by Hand or Machine: 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.
- 10.15. Barricades, Guards and Safety Provisions: 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 highway. 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 lights 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."
- 10.16. Maintenance of Traffic and Closing of Streets: The Contractor shall carry on the work in a manner 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. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways. The Contractor shall post, where directed by the Engineer, suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic.
- 10.17. Structure Protection: 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. The structures which may have been disturbed shall be restored upon completion of the work.
- 10.18. Protection of Property and Surface Structures: Trees, shrubbery, fences, poles and all other property and surface structures shall be protected unless their removal is shown on the drawings or authorized by the Engineer. When it is necessary to cut roots and tree branches, such cutting shall be done with a chain saw and not removed with a backhoe or trackhoe bucket. The contractor shall minimize the area cleared for the pipeline installation.
- 10.19. Permits: Unless otherwise stated in the Detailed Specifications, the Owner shall obtain the necessary permits for Street, Highway, County Road and Railroad Crossings as required by the respective agencies and local ordinances. The Owner shall pay any deposits required by the respective entities to insure satisfactory restoration of properties involved, and shall deduct that amount from the first payment due to 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.

11. SETTING VALVES AND FITTINGS

Valves, fittings, plugs and caps shall be set and jointed to pipe in the manner heretofore specified for cleaning, laying and jointing pipe.

11.1. Location of Valves: Valves in water mains shall, where possible, shall be located on the street property lines extended unless shown otherwise on the plans, or as directed by the Engineer.

11.2. Valve Boxes and Valve Pits: A valve box or a masonry pit shall be provided for each and every valve.

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. 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 with the box cover flush with the surface of the finished pavement or other level as may be directed.

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 the 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.

11.3. Drainage of Mains: Mains shall be drained through drainage branches or blow-offs to dry wells from which the water can be pumped. 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 siphonage into the distribution system.

11.4. Dead Ends: All dead ends on new mains shall be closed with cast iron plugs or caps, with or without a blow-off cock, as shown on the drawings.

12. SETTING HYDRANTS

12.1. Location: Hydrants shall be located as shown on the plans or as directed by the

Engineer, and in a manner to provide complete accessibility and also in such a manner that the possibility of damage from vehicles or injury to pedestrians will be minimized. 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 inches (6") nor more than twelve inches (12") from the gutter face of the curb. When set in the lawn space between the curb and the sidewalk, or between the sidewalk and the property line, no portion of the hydrant or hose nozzle cap shall be within six inches (6") of the sidewalk.

- 12.2. Position: All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb or road, with the pumper nozzle facing the curb or road, except that hydrants having two hose nozzles 90° apart shall be set with each nozzle facing the curb at an angle of 45°. Hydrants shall be set to the established grade, with the nozzles at least twelve inches (12") above the ground, as shown or as directed by the Engineer.
- 12.3. Connection to the Main: Each hydrant shall be connected to the main with a six inch (6") cast iron branch controlled by an independent six inch (6") gate valve, except as otherwise specified.
- 12.4. Hydrant Drainage in Impervious-Soil: Wherever a hydrant is set in clay or other impervious soil, a drainage pit two feet (2') in diameter and three feet (3') deep shall be excavated below each hydrant and filled compactly with coarse gravel or crushed stone mixed with coarse sand, under and around the elbow of the hydrant and to a level of six inches (6") above the waste opening. No drainage pit shall be connected to a sewer.

13. ANCHORAGE

- 13.1. Anchorage for Hydrants: The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with stone slabs or concrete backing, or it shall be tied to the pipe with suitable metal tie rods or clamps, as shown or as directed by the Engineer.
- 13.2. Anchorage for Plugs, Caps, Tees and Bends: All plugs, caps, tees and bends deflecting 22-1/2° or more on mains eight inches (8") in diameter or larger shall be provided with a reaction backing, or movement shall be prevented by attaching suitable metal rods or clamps as shown or specified. All plugs, caps, tees and bends deflecting 22-1/2° or more on mains less than eight inches (8") in diameter shall be backed as shown on the Typical Details sheet of the plans.
- 13.3. Reaction Backing: 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. The backing shall, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repair.

- 13.4. Metal Harness: 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 galvanized or otherwise rustproof treated, or shall be painted as directed by the Engineer.

14. BACKFILLING

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

- 14.1. Use of Excavated Material as Backfill: When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material, provided that such material consists of loam, clay, sand, gravel or other materials which, in the opinion of the Engineer, 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, the Contractor shall furnish the required amount of sand, gravel or other approved material.
- 14.2. Sand or Gravel Backfill: Where sand or gravel backfill is not indicated on the drawings or specified herein, and in the opinion of the Engineer should be used in any part of the work, the Contractor shall furnish and backfill with sand or gravel as directed as an extra.
- 14.3. Backfilling Under the Pipe: 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 approved material placed in layers of four inches (4"), and compacted by tamping. Pipe embedment shall have no particle size in excess of 3/4" angular rock or 1" rounded stones. Bedding will be required where native material does not meet the requirements for embedment as described. Backfilling approved material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously.
- 14.4. Backfilling Over the Pipe: From the centerline of the pipe, fittings and appurtenances to a minimum depth of one foot (1') above the top of the pipe, the trench shall be backfilled with select materials (3/4" angular or 1" rounded stone) by hand or by approved mechanical methods, as described in 14.3 and as shown on the drawings. The Contractor shall use special care in placing this portion of the backfill so as to avoid injury or moving of the pipe.

- 14.5. Backfilling to Grade: From one foot (1') above the pipe to the grade shown on the drawings or specified herein, the trench shall be backfilled by hand or by approved mechanical methods.
- 14.6. Backfill Under Permanent Pavement: 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. Such material shall be thoroughly compacted with air 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.
- 14.7. Backfilling Where Settlement is Unimportant: Unless otherwise specified, the Contractor may backfill the trench from one foot (1') 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.
- 14.8. Backfilling in Freezing Weather: 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.

15. REMOVAL, RESTORATION AND MAINTENANCE OF SURFACE

- 15.1. Allowable Removal of Pavement: The Contractor shall remove pavement and road surfaces as a part of the trench excavation and the amount removed shall depend upon the width of the 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, manholes or other structures. The width of the 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 inches (6") on each side of the trench. The width and lengths of the pavement removed for the installation of gate valves, specials, manholes or other structures shall not exceed the maximum linear dimensions of such structures by more than six inches (6") each side. 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. The Contractor shall use such methods, either drilling or chipping, as will assure the breaking of the pavement along straight lines. The surface of the remaining pavement shall be approximately vertical.

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.

- 15.2. Restoration of Damaged Surfaces and Property: 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.
- 15.3. Replacement of Pavement and Structures by the Contractor: The Contractor shall restore, unless otherwise stipulated, all pavements, sidewalks, curbing, gutters, shrubbery, fences, poles or other property and surface structures removed or disturbed as a part of the work to a condition equal to that before the work began, furnishing all labor and materials incidental thereto. In restoring pavement, sound granite blocks, sound brick or asphalt paving blocks may be restored unless and until, in the opinion of the Engineer, the conditions of the backfill is such as to properly support the pavement.
- 15.4. Cleaning-Up: 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 the construction site left clean to the satisfaction of the Engineer. 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. All surplus water main material furnished and delivered by the Owner shall be removed by the Owner.

16. CONNECTION TO EXISTING LINES

Where connections to existing lines are to be made, such fittings as are shown on the plans shall be installed. If fittings are not specified, then such fittings as are 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.

Wherever it is necessary to connect existing lines in use, the Contractor shall notify the water superintendent of the Owner at least 24 hours prior to the time he is ready to make the connection. Together with the Engineer, an agreed time shall be set for such connection to be made. If water service is to be interrupted, the time for making the connection shall be at the discretion of the water superintendent and Engineer, and the Contractor shall make such connections at the time specified.

When making connections to water lines in service, it is of the utmost importance that the Contractor shall make such connections as quickly as possible and water service shall not be cut off until the Contractor has everything in readiness to the satisfaction of the Engineer. No valves or hydrants in service shall be opened or closed by anyone other

than the persons authorized by the Owner.

Where connections, other than service taps are to be made under pressure to water lines in service, standard cutting-in sleeves and valves shall be used. The sleeves shall be of the types which use mechanical joints. They shall be placed according to the recommendation of the manufacturer and all necessary equipment has been set in position, the cut shall be made in the presence of the Engineer and the water superintendent of the Owner so if trouble should develop it could be remedied in the most speedy manner possible.

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

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 to allow joints as herein specified shall be provided.

17. DISINFECTION OF PIPE

Disinfection of water mains shall be in accordance with AWWA C651. All pipe is to be disinfected after laying is completed by holding 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 no less than 25 ppm chlorine through the length of the main. Sterilization may be carried on at the same time the leak test is made, as outlined in Section 16. After the lines are sterilized, they shall be thoroughly flushed, filled with water from the system, then samples shall be taken by the Contractor from each of the respective sections of the lines and tested in an approved laboratory. The lines shall not be placed in operation until two consecutive samples showing negative reports are received on each of the respective sections.

18. PAYMENT

Unless otherwise set out in the proposal or the detailed specifications, payment for pipe shall be according to the actual measurements of linear feet of pipe, complete in place. No deduction shall be made for valves, fittings, hydrants or other specials included in the length of the line, but measurements shall be made from the centerline of connections to end of line or centerline of the 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 from the end of the first piece of pipe laid. In special structures such as creek crossings, building or other items in which lump sum or other methods of payment include payment for pipe and fittings, such pipe and fittings shall not be included in the unit measured for payment for pipe in place.

**DETAILED SPECIFICATIONS
WATER MAIN EXTENSION
(SHILOH ROAD & MURRAY ROAD)
MOUNT SHERMAN WATER ASSOCIATION**

SCOPE OF WORK

Under this contract, the Contractor shall complete all water main extensions shown on the plans and described herein including the furnishing of all labor, supplies, tools, equipment, materials, transportation, and any other items necessary for the work.

QUALITY OF PLANS

The construction plans have been prepared with care but should not be expected to be correct in every detail. Therefore, the Owner or Engineer may make minor changes to facilitate construction, preserve existing features, reduce construction costs, etc.

GENERAL SPECIFICATIONS

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

WATER RATE

The Contractor will be billed at a rate of \$1.25 per one thousand gallons for water used during construction, sterilization, and testing.

ARKANSAS ONE CALL

The Contractor shall be responsible for performing all communication and correspondence with Arkansas One Call. The Contractor shall comply with Arkansas State Law Chapter 271. The Owner and the Engineer are not responsible for contacting Arkansas One Call. The telephone number for Arkansas One Call is 800-482-8998.

MEASUREMENT AND PAYMENT

In some cases, methods of measurement provided in the *General Specifications* are superseded by specific conditions set out in these *Detailed Specifications*. In such cases, the provisions of the *Detailed Specifications* shall apply.

Payment for each bid item shall be at the unit price bid or for the lump sum price each as designated 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 contained in the *Schedule of Bids*, follows.

BID ITEMS 1 THROUGH 5

WATER MAINS

For this bid item, the Contractor shall furnish all materials labor, equipment, and supplies necessary to install the various mains and fittings shown on the plans and as directed by the Engineer. These items shall be installed in a workmanlike and satisfactory manner. Pipe shall be laid in accordance with the applicable portions of the *General Specifications, "Water Pipe, Force Main, and Pipe Laying"*.

These bid items shall include all excavation and trenching (except solid rock excavation), furnishing and installing the water mains, backfilling, initial and final clean-up and repairing settlement. **Full payment for this item will not be made until the initial clean-up has been completed.** The intent is that the initial clean-up progress along with the installation of the pipe. Initial clean-up shall be defined as, but not limited to, disposal of debris/brush and excess excavation; restoration of personal property, fences, utility or pipe lines, walls, driveways, hedges, lawns, sidewalks, pavements, etc., disturbed or removed during construction of the water mains. Initial clean-up shall also include repairing excessive settlement when, in the opinion of the Engineer, the condition presents an unsafe situation for persons, livestock, or property. Final clean-up shall be limited to repairing final settlement and the final dressing of the ground.

All efforts shall be made to minimize the area disturbed during construction. Trees which are not removed shall not be scuffed or scared. Limbs interfering with construction shall be cut, not removed with the backhoe bucket. All brush, stumps, logs, and trees shall be burned to ash or removed from the site. No burying is permitted on the easement.

The Contractor shall flush, sterilize, test, take water samples, and place in service all water mains which are constructed under this contract. The Contractor shall be responsible for the cost of water used to flush, sterilize, and test the new water mains. Sampling and testing costs shall be the responsibility of the Contractor. The minimum amount of flush water that will be used is equal to three times the volume of the pipeline. If a metering device is not utilized an amount of five (5) times the volume of installed piping will be paid by the Contractor.

Please note the connections to the existing water mains shall not be performed until the newly installed water main has been tested for leaks, sterilized, and received approval (based on the bacteriological samples) from the Arkansas Department of Health.

The Contractor's attention is called to crossing existing utility lines. It is the Contractor's responsibility to locate all existing utility lines prior to construction. No additional payment will be made should crossing existing utility lines require extra depth. If encasement is required, payment for encasement will be made under the corresponding bid item for Gravel Road Crossing or Concrete Encasement at that bid price per linear foot of encasement installed.

Safety barricades, night lighting, warning lights, warning 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 contract item shall be included in the price per foot on these items.

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*.

In all cases, the following construction procedures shall be strictly adhered to and enforced: a) At the end of each days work and when for any reason the laying of pipe is discontinued for an appreciable period, open ends of pipe shall be closed with a water tight plug or cap firmly secured in place. b) All pipe and fittings shall be lowered carefully into the trench in such a manner as to prevent damage to pipe, fittings, coatings, or linings. Neither pipe nor fittings shall be dropped or dumped into the trench. In such cases, the item dropped shall be marked as bad, removed from the site, and replaced with a new item. c) Pipe shall be laid with the bell ends facing in the direction of progress. d) No pipe shall be installed when the temperature is less than 25°F. e) Skipping sections of pipe due to rock or other situations within control of the Contractor will be prohibited.

Trenching and Bedding

Trench depth shall be such to maintain a minimum of thirty-six (36") inches cover from the top of the pipe to finished grade.

Pipe bedding shall be placed in accordance with the Typical Detail Sheet of the plans. The granular bedding four (4") 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. The suitability of material excavated from the trench as to compliance with specified bedding requirements shall be determined by the Engineer.

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

For PVC pipe, bedding material shall consist of fine sand and clayey gravel, including fine sands, sand-clay mixtures, and gravel-clay mixtures with particles having no dimension greater than 1" rounded material and 3/4" angular material.

Tracer Wire

Copper tracer wire consisting of #12 AWG solid, single conductor, insulated copper wire shall be installed in the trench with all PVC piping to permit location of the pipe with electronic detectors. The wire shall not be spiraled around the pipe. All wire connections are to be made by stripping the insulation from the wire and soldering with silver solder or using Burndy crimp connections. All connections shall be waterproofed and protected from ground moisture by using an epoxy sealing system.

Tracer wire shall also be installed with service line into the meter box so that the service line may be located. The tracer wire shall be made accessible in the meter box for connecting locating devices to the tracer wire. In addition the tracer wire shall be made accessible at other locations such as valves, blow-offs, and fire hydrants. The tracer wire shall extend along the outside and to the top of all valve boxes.

All tracer wire shall be tested for continuity using a MEG tester once a section of water main has been installed and end points developed. This test shall be done in the presence of the Engineer. Also if a portion of the water main is uncovered for any reason (i.e. leak location), the Contractor shall retest the tracer wire for continuity after all repairs are completed.

At the end of each roll of wire and the beginning of the next, a tracer wire pedestal shall be located midway between access points greater than 1,320 feet in distance. At no time shall the distance between locator access points be greater than 1,320 feet.

Typical Creek Crossings

All water mains shall be encased in concrete when crossing each creek, as per the concrete encasement detail. After cut sections have been constructed, the tops of the back slopes shall be rounded to blend the slopes of the natural ground. Disturbed areas where entering and exiting the creek shall be stabilized with seed and mulch to prevent erosion. A siltation screen shall be utilized to minimize debris from entering the creek. No harmful chemicals, fuels, lubricants, concrete drum wash water, or other harmful waste shall be discharged into or along any waters. *Concrete encasement shall be paid under a separate bid item.* All other items associated with creek crossings shall be considered incidental to the price per linear foot of pipe.

Sterilization

All newly installed water mains shall be disinfected in accordance with AWWA Standard 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.

After the lines are sterilized, they shall be thoroughly flushed, filled with water from the system, then samples shall be taken by the Contractor from each of the respective sections of the lines and tested in an approved laboratory. (See Section 15 of the *General Specifications* for Water Pipe, Force Main, and Pipe Laying) Each sample documentation submitted should be labeled with the Line #, Street Name (if applicable), and Station #, and Meter # (if applicable).

Easements

No additional compensation will be made to the Contractor in the event that the Contractor is required to skip properties in his pipe laying operation and then come back to them at a later time due to easement problems.

Farm Fence Repair

The Contractor shall take all precautions necessary to not cut or damage farm fences during construction of the water main. The Contractor shall coordinate with the property owners to utilize existing gates from pasture to pasture and shall dig under the fencing when possible from each side to avoid cutting fences.

If it is necessary that the farm fence be removed for the construction operation to proceed. The following specification shall apply:

The barbed wire fencing shall be untied and removed from the nearest corner post or point of termination to the area of construction. Once the fence wire has been untied and the construction operation has passed. The fence wire shall be IMMEDIATELY re-stretched (using wire stretchers) and re-attached (tied and stapled) to the corner post. Standard wire clips shall be installed in order to secure the barbed wire to the intermediate steel fence posts. If fence posts are damaged during construction, the posts shall be replaced with like kind material. Fence ties shall be re-installed to secure the barbed wire in place. In the event that additional barbed wire is required, 12 gauge Red Brand Barbed Wire shall be used.

Meter Installation

Meter Services shall be installed as the water line is being laid. The Contractor is required to install these meter services as the line is being laid and will not be allowed to wait and have a separate crew install meter services at a later date. If meters are not installed as the pipe installation progresses, the Contractor will not receive full pay for this bid item.

Field and Pasture Seeding

Under this item the Contractor shall furnish all materials, labor, equipment, and supplies necessary to restore the pipe trench in a workmanlike and satisfactory manner. The work under this item shall be accomplished as soon as practical after the grading in an area has been completed in order to deter erosion. All efforts shall be made to preserve trees, shrubs, bushes, etc., including transplanting, if practical.

Seedbed Preparation

Areas to be seeded shall be dressed to the shape which existed prior to the waterline construction. All debris such as rocks, limbs, etc., shall be removed from the site and disposed of as required in the general specifications.

Seed

The seed shall be labeled in accordance with current rules and regulations of the Arkansas State Plant Board and shall have a minimum of 98% pure seed and 85% germination by weight, and shall contain no more than 1% weed seeds. Seeding may be accomplished by hand seeders or by approved power equipment. Either method shall result in a uniform distribution and no work shall be performed during high winds. Johnson grass seed, wild onion seed, wild garlic seed, field bindweed seed, nut grass seed, and seed which has become wet, moldy, or otherwise damaged in transit will not be acceptable. Seed shall be composed of the varieties and amount by weight as shown below. Option No. 1 shall be used for restoration of areas where bermuda grass is common and Option No. 2 shall be used for restoration of areas where fescue is common.

March 1 – June 15

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Option #1	Bermuda Grass (Common) unhulled	10
	Bermuda Grass (Common) hulled	5
	Crimson Clover (Dixie)	20
Option #2	Fescue	60
	Rye Grass (Annual)	50

June 16 – August 31

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Option #1	Bermuda Grass (Common) unhulled	20
	Bermuda Grass (Common) hulled	10
Option #2	Fescue	60
	Rye Grass (Annual)	50

September 1 – October 31

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
Option #1	Rye Grass (Annual)	50
	Bermuda Grass (Common) unhulled	15
	Crimson Clover (Dixie)	20
Option #2	Fescue	60
	Rye Grass (Annual)	50

Mulch Cover

Mulch will be required on slopes and other areas as directed by the Engineer. Mulch cover shall be applied at the rate of 2,000 pounds per acre, or as directed by the Engineer, immediately after seeding and shall be spread uniformly over the disturbed area by an approved method. Mulch cover shall consist of straw from threshed rice, oats, wheat, barley, or rye; of wood excelsior; or from hay obtained from various legumes or grasses, or a combination thereof. Mulch shall be dry and reasonably free from Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advanced state of decomposition. All materials shall be approved by the Engineer's Representative prior to use.

Restoration

The Contractor shall maintain seeded areas from the time of completion until final acceptance of the project. Additional work and materials required due to the Contractor's negligence in maintaining completed work shall be accomplished at the Contractor's expense.

Measurement and Payment

Measurement shall be from center to center of fittings or valves. No deduction will be made for fittings or valves. Payments for fittings, valves, and fire hydrants will be made under separate items. Payment for water mains shall be made at the unit price bid in the *Schedule of Bids* under the appropriate bid heading for all properly installed water main.

BID ITEM 6

SERVICE LINE

Service line shall be 1" diameter high-density polyethelylene plastic tubing (HDPE), "Driscopipe" or the approved equal suitable for 200 psi working pressure at 73 degrees F. **In areas where the water main being tapped is PVC Class 315 pipe or above, 1" (Type K) copper tubing shall be used in lieu of the high-density polyethelylene plastic tubing.** A type other than that specified must have prior approval of the Engineer, and must be a product of a manufacturer who is a member of the Plastic Pipe Institute.

The tubing or pipe shall be laid in the trench with sufficient slack to prevent undue strain on the corporation stop and on the water meter yoke. (See "Typical Details" sheet on the plans.) A tapping machine shall be utilized when connecting to the water main.

All service line shall be installed with #12 AWG solid, single conductor, insulated copper tracer wire from the main to the meter box so that a locator can be connected to trace the service line. The cost of the tracer wire shall be included in the price of the service line. The tracer wire shall be in accordance with the specifications for water mains.

Where service lines cross roadside ditches, a minimum bury depth of 24" will be maintained to prevent freezing or damage by road maintenance equipment. When streets are crossed, the backfill shall be thoroughly tamped and the street returned to its original or better condition. Backfilling shall be in accordance with the General Specifications Section *Water Pipe Force Main and Pipe Laying*.

Pipe bedding shall be placed in accordance with the Typical Detail Sheet of the plans. The granular bedding four (4") 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.

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

Measurement and Payment

The tubing installed will be measured to the nearest foot from the corporation stop to the meter yoke connection, and payment shall be made for the actual linear feet installed, measured as above described, at the unit price bid in the *Schedule of Bids* for "Service Line".

BID ITEM 7 through 8

ENCASED GRAVEL ROAD CROSSINGS

Gravel county road crossings shall be installed in accordance with the requirements of Newton County and the detail shown on the Typical Detail Sheet. The backfill for the crossing shall be full depth AHTD Class 7 crushed limestone material. The detail shall be strictly complied with. Included in this item shall be an encasement pipe of Class 200 PVC, as shown on the Typical Details. The inside diameter of the encasement pipe shall be at least 2" larger than the outside diameter of the bell or flange of the carrier pipe.

Traffic and safety controls shall be maintained with sign, flagmen, or otherwise as needed or directed by the governing authority.

Also included under this bid item are approved casing spacers to center the carrier pipe inside the encasement pipe. Casing pipe seals shall be flexible casing seals for concentric or eccentric installation, U-Seal by T.D. Williamson, Inc. or approved equivalent. Casing insulators shall be high density polyethylene, injected molded, M-2 plastic thinsulator by T.D. Williamson, Inc. or approved equivalent.

The Owner shall obtain the permit from the County. The Contractor shall post the required bond with the County to insure satisfactory restoration of County property.

Payment

Under these items the Contractor shall be paid by the linear foot at the unit price bid in the *Schedule of Bids* for the appropriate item which shall include all compensation for extra labor involved including pavement replacement, or rock excavation, if necessary, exclusive of the price per foot of pipe, in completing this item. Carrier pipe will be paid for separately.

BID ITEM 9

GRAVEL DRIVEWAY CROSSINGS

The Contractor shall restore and replace concrete and asphalt driveways disturbed or damaged by the process of the construction. Replacement shall be in like kind, the extent of which shall be as directed by the Engineer. The replacement detail on the Typical Detail Sheet of the plans shall be strictly complied with.

The Contractor shall restore and replace existing gravel driveways with SB-2 material. The gravel driveway crossing shall be backfilled full depth with SB-2. Also, a PVC sleeve shall be utilized to encase the water main. The detail shown on the detail sheet shall be strictly complied with.

Payment

The gravel driveway crossings installed will be measured to the nearest foot, and payment shall be made for the actual linear feet installed, at the unit price bid in the *Schedule of Bids* for "Gravel Driveway Crossings".

BID ITEM 10 through 11

GATE VALVES

The Contractor shall furnish and install in the water mains gate valves with boxes at the locations shown on the plans in accordance with the *General Specifications* "Water Pipe, Force Main, and Pipe Laying."

Gate valves shall be Mueller and Company No. A-2360-20, or approved equivalent, and shall have a two (2") square wrench nut, transition gaskets (depending on type of pipe used) with O-ring seals or approved equal. Valves shall open when the operating nut is turned left (counter clockwise). Valves shall be equipped and installed with a three piece, plus lid, screw type valve box No.562-S, as manufactured by Tyler Pipe, or the approved equal. A concrete protective collar is required for all valve boxes. Concrete for protective collars shall be redi-mixed concrete. A minimum of 3" granular base shall be provided under the collar. Pre-cast valve collars may be accepted if they are provided with the gravel base, leveled, and have non-shrink epoxy installed between the precast concrete collar and the top of the valve box. Approval of pre-cast valve collars shall be at the discretion of the Engineer.

Each valve shall be operated (via a valve wrench) prior to placing the concrete collar around the valve box. If the valve wrench cannot fit on the 2" square operating nut, or if the 2" operating nut is significantly off-center, the valve box shall be excavated, re-centered, and carefully backfilled to insure the 2" square nut remains centered.

Payment

The Contractor shall be paid for each valve and box actually installed and accepted by the Engineer 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 concrete collar and operating wrenches.

BID ITEM 12

2" BLOW-OFF HYDRANT

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. The hydrants shall be non-freezing, self-draining with a 3 ft bury. This hydrant will be furnished with a 2" inlet, a non-turning operating rod, and shall open counter clockwise. All working parts shall be bronze to bronze design and serviceable without digging. All piping shall be either cast or ductile-iron. The outlet shall also be bronze and be 2-1/2" NST. Hydrants shall be lockable to prevent unauthorized use. Hydrants shall be Eclipse No. 2 Post Hydrant. Hydrants shall be connected to the water main by means of a mechanical joint shoe to be manufactured with the hydrant.

Payment

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 Hydrant" and such payment shall include all work incidental to completing the installation.

BID ITEM 13

AIR RELEASE VALVES

Under this bid item the Contractor shall furnish and install all materials, equipment, and labor for the satisfactory installation of combination air release and vacuum valves at the locations shown on the plans and in accordance with the detail shown on the plans as directed by the Engineer. This installation shall include all piping, fittings, valves, vaults and related accessories.

Air release valves shall be Model No. 38 as manufactured by Val-Matic Valve and Manufacturing Corp., 425 North Claremont Avenue, Chicago, Illinois 60612, with 1" NET inlet and 1/2" NET outlet with a 3/16" orifice suitable for a maximum working pressure of 150 psi.

Piping shall be threaded copper or brass pipe or galvanized pipe.

The vault shall be a standard Brooks 24" x 24" cast iron, concrete, or pre-approved water meter box, with a cast iron lockable lid. The box to be used must receive prior approval of the Engineer.

Payment

Payment shall be at the unit price bid in the *Schedule of Bids* for this item, for each complete combination air release/vacuum valve installation and shall be full compensation for each complete installation.

BID ITEM 14

PRESSURE REDUCING VALVE

Under this bid item, the Contractor shall furnish all material, equipment, and labor for the satisfactory installation of the pressure reducing stations shown on the plans and described herein. This installation shall include all ductile iron piping, fittings, valves, pressure reducing valves, pressure gauges, reinforced concrete vault, entrance hatch, drain line, and related accessories.

All materials for this bid item shall be submitted to the Engineer for approval prior to ordering, installing, or constructing.

Pressure Reducing Valves

The pressure reducing valves shall be a Cla-Val 90-01D-BY with CK2 Cock, X43 "Y" Strainer, and Check Valve, or approved equal. The pressure reducing valve shall be sized as shown on the plans.

Gate Valves

Gate valves shall be Mueller and Company No. A-2360-20, or approved equivalent, and shall have a two (2") square wrench nut, transition gaskets (depending on type of pipe used) with O-ring seals or approved equal. Valves shall open when the operating nut is turned left (counter clockwise). Valves shall be equipped and installed with a three piece, plus lid, screw type valve box No.562-S, as manufactured by Tyler Pipe, or the approved equal. A concrete protective collar is required for all valve boxes. Concrete for protective collars shall be redi-mixed concrete. A minimum of 3" granular base shall be provided under the collar. Pre-cast valve collars may be accepted if they are provided with the gravel base, leveled, and have non-shrink epoxy installed between the precast concrete collar and the top of the valve box. Approval of pre-cast valve collars shall be at the discretion of the Engineer.

Each valve shall be operated (via a valve wrench) prior to placing the concrete collar around the valve box. If the valve wrench cannot fit on the 2" square operating nut, or if the 2" operating nut is significantly off-center, the valve box shall be excavated, re-centered, and carefully backfilled to insure the 2" square nut remains centered.

Piping

Piping shall be as shown on the plans. All piping shall be schedule 40 steel pipe or Class 350 Ductile Iron conforming to AWWA C110 and shall have a cement mortar lining and seal coat conforming to AWWA C104. Fittings shall be ductile iron fittings conforming to AWWA C110 with flanged connections. Flanges shall conform to AWWA C110 and must be adequate for water service of 250 psi. All flange bolts and nuts must be stainless steel. Ductile iron pipe shall have flanged ends on the portion installed within the vault. All flange bolts and nuts must be

stainless steel. **Ductile-Iron piping shall extend a minimum of five (5') outside the vault as shown on the Typical Details sheet of the plans. This piping and all pipe and fittings within the vault shall be included in the lump sum price bid.** The inlet and outlet pipe shall be cast-in-place and shall have a retainer gland cast in the wall of the vault. **All piping shall be painted with approved paints and methods BEFORE the introduction of water into the piping.** The piping shall be painted as follows: (1) Surface Prep: SSPC-SP6 commercial Blast Cleaning; (2) 66-Color Hi-Build Epoxoline, minimum of 4.0 mils and maximum of 5.0 mils; (3) 66-Color Hi-Build Epoxoline, minimum of 5.0 mils and maximum of 6.0 mils. Color shall be AWWA blue.

Pressure Gauges

Two (2) pressure gauges reading from 0-300 psi upstream and 0-200 psi downstream in two (2) pound increments shall be installed on the piping shown. Gauges shall be glycerin filled, stainless steel case, bronze internals with a 6" face. Brass fittings and valves shall be supplied with each gauge so that each gauge can be isolated from main line pressure.

Vault

The concrete vault shall be constructed as shown on the detail sheet of the plans. Concrete shall be Class A(AE) conforming to the requirements of the General Specifications for Concrete. Reinforcing steel shall be of the size and spacing shown on the plans and conforming to the General Specifications for Reinforcing Steel. The access door shall be hinged with retractable handles and shall be lockable as shown on the plans. Access doors shall be Halliday Products model S1R33030 access door with lockable hasp, or approved equal. The access door shall be installed with a gasket to seal the seam to prevent water from entering the vault.

The concrete vault shall be either cast-in-place or precast. A submittal for use of precast vault will be required. The vault will be set on a minimum of 6" Class 7 base material. The sump pit shall be cast-in-place in the vault when the floor is poured. The drainline shall be bedded and shall drain to daylight. A headwall and flap valve shall be placed on the end of the drainline. The location of the sump pit and drain line location will be determined in the field by the Engineer and Contractor. It is important that the clearances specified be maintained between the piping and vault walls and floor to facilitate maintenance of the various units. The floor shall be reinforced concrete construction sloped to drain to the floor sump at 1" per 12".

Payment

Payment shall be made for each completed and accepted installation at the unit price bid in the *Schedule of Bids* and shall be full compensation for all equipment, materials, and labor necessary to complete the work.

BID ITEM 15

CONNECT TO EXISTING WATER MAIN

Under this item, the Contractor shall furnish all labor, materials and equipment required to connect to the existing water main. This item includes coordination with the local utility of when the existing water main should be taken out of service and connected to the proposed water main. The Contractor shall coordinate VERY CLOSELY with the Owner to minimize the interruption of service. In no event shall the interruption of water service be more than 2 hours.

Connections shall be made to the existing mains at the locations shown on the plans. Connections to the existing mains shall be made within a limited time frame in order to prevent the existing customers from being out of service for over 2 hours. Each connection shall be leak tested immediately after the connection is performed, so that the existing main may be placed back into service.

All connections shall be ductile iron and use restrained fittings (i.e. Mega-Lugs).

PAYMENT

Payment for this item shall be at the unit price bid in the *Schedule of Bids*, based on each connection properly installed.

BID ITEM 16

1" SERVICE LINE CONNECTION (SADDLE, CORP. STOP, ETC.)

Under this item, the Contractor shall furnish all labor, materials and equipment required for a 1" service line connection to the water main.

Tapping Saddles

All 1" service saddles shall be made from stainless steel and designed for a minimum working pressure of 200 psi. A rubber gasket shall be provided between the casting and pipe surface. Saddle straps and bolts shall be high strength corrosive resistant alloy steel (Mueller DR 1S0854 CC 100). The outlet threads shall be compatible with AWWA CC 100 type 1" corporation stops.

Corporations Stops

Corporation Stops shall conform to AWWA C800-84 without a positive stop. The inlet shall be AWWA CC 100 tapered threads and the outlet with a compression coupling. The corporations shall be AWWA red brass with precision machined castings and compatible with conventional tapping machines (Mueller H 15008).

Service Tubing

SDR 9 (Driscopipe) shall be utilized.

PAYMENT

Payment for this item shall be at the unit price bid in the *Schedule of Bids*, based on each connection properly installed.

BID ITEM 17

METER SERVICES

Under this item, the work includes the furnishing and installation of a corporation stop, service clamp, where required, meter box, meter setter, yoke, and meter at points to be designated in the field. This installation includes also the making of the tap and providing the fitting on the water main. The materials utilized in these connections shall receive approval from the Owner prior to installation.

The meter boxes shall be of ample size to fit the service installed and shall be *not less than eighteen (18") inches deep or twenty-four (24") deep as specified*. Meter boxes shall be 1200 series for double meter services and 2200 series for single meter services as manufactured by Brooks Products, Inc or approved equal. Lids shall be cast iron with locking capabilities.

The copper meter yoke shall have a riser height of seven (7") inches and shall be a Model B-2434 or Model B-2422, as specified, with lock wing Mueller 300 angle meter ball valve as manufactured by Mueller Company. The setter shall be centered in the meter box. The setter inlet shall have a conductive compression connection fitting (Mueller 110-1"x3/4") to connect to the 1" CTS service line. The discharge size shall be 1" for residential and agricultural customers. A 1" x 5'-0" section of HDPE service line shall be installed on the discharge side of the meter, via a conductive compression connection fitting. A 24" length of rigid PVC piping shall be installed through the brace eyes to support the meter setting in a vertical position. The PVC brace piping shall extend from wall to wall of the meter box.

Meters shall be sealed register water meters as manufactured by Sensus Technologies and shall meet or exceed the requirements set out by AWWA C700. Meters shall be Sensus model SR-II as specified. Meters shall have a bronze maincase, bottom plate, and cap screws. The bronze register bonnet shall be secured to the maincase with a unique locking screw that can only be removed with a special tool available to the water utility. Meters shall be guaranteed to meet AWWA standards for new meter accuracy for five (5) years and to repaired meter standards for an additional ten (10) years, for a total guarantee period of fifteen (15) years.

The contractor shall install the meter services as the water line is being laid. The meters shall be given to the association after completion of the project.

Payment

Payment shall be made at the price bid in the *Schedule of Bids*, and shall include the complete installation as specified, except for the service line which shall be paid for separately.

BID ITEM 18

DUCTILE-IRON FITTINGS

Ductile iron fittings are required for all installed water main. The Contractor shall furnish and install the ductile-iron fittings and joint restraints "megalugs" as shown on the plans, or as directed by the Engineer. These fittings shall conform to AWWA C110 and shall be cement-mortar lined in accordance with ANSI-A21.4 (AWWA C104). Ductile-iron compact fittings conforming to AWWA C153 with a cement-mortar lining will also be approved. Also for this bid item, the Contractor shall provide blocking of fittings as required and shown on the Typical Detail sheet in the plans. The cost of such blocking shall be included in the price per pound bid for this item. *The Contractor is required to furnish and install Megalugs to restrain fittings. The cost for Megalugs shall be included in the price bid per pound for fittings.*

PAYMENT

For this bid item, the Contractor shall be paid the unit price bid in the *Schedule of Bids* per pound. The weight of fitting installed shall be determined from the weights shown in AWWA C153. The bare weight of the fitting shall be the basis of payment. No weight for items such as retainer glands or Megalugs shall be added for payment, but shall be included with the installation as necessary.

BID ITEM 19

ROCK EXCAVATION

Under this item, the Contractor shall remove solid rock encountered in the pipe trench as specified herein. *Solid rock excavation shall be defined as igneous, metamorphic, and sedimentary rock that cannot be excavated, in the opinion of the Engineer, without blasting or hydraulic hammering.* Also for this bid item, the Contractor shall remove from the site all excess solid rock so excavated. No boulder exceeding eight (8") inches in any dimension shall be placed in or on top of the trench backfill. The Contractor shall conform to all requirements for insurance and the protection of private property, and to Arkansas Labor Department Safety Bulletin No. 9.

Measurement and Payment

The rock shall be measured on the basis of the actual thickness in the trench at the required depth, as per the detail, and a width equal to eighteen (18") inches greater than the diameter of the pipe being laid. Over blasting or excavation will not be paid. Payment will be at the price bid per cubic yard in the *Schedule of Bids* and shall be full compensation.

BID ITEM 20

BEDDING MATERIAL

For this bid item, the Contractor shall place pre-approved bedding and embedment material where directed by the Engineer. Bedding and embedment shall be placed as shown on the detail in the plans.

For PVC pipe, bedding material shall consist of crushed limestone and/or grit particles having no dimension greater than 1" rounded material and ¾" angular material.

For Ductile Iron Pipe, the material shall consist of fine well-graded material with a maximum particle size of three (3") inches.

All bedding material utilized shall be hauled in and be approved for use by the Engineer's Representative.

PAYMENT

Measurement will be by the linear foot of material *authorized* by the Engineer in the trench and around the pipe. Payment shall be made at the unit price bid in the *Schedule of Bids* and shall be full compensation for all equipment, materials, and labor necessary to complete the work.

BID ITEM 21

CONCRETE ENCASEMENT

Under this item the Contractor shall furnish all materials and labor necessary to install concrete encasement at the locations shown on the plans, and as directed by the Engineer. The concrete provided for the encasement shall be Class A (F) concrete with a minimum 28 day compressive strength of 3,000 psi. The concrete encasement shall be installed as shown on the detail sheet.

Measurement will be per linear foot of concrete encasement approved for placement in the field by the representative of the Engineer. The quantity shown on the plans is for bidding purposes only. It should be noted that the actual amount will vary from the amount shown on the plans. The concrete encasement shall be placed in accordance with the detail shown on the plans. The *exact* length of encasement required shall be determined by the Engineer or Engineer's Representative. The *actual* length of the encasement shall be so noted in the inspector's diary, and initialed by the Contractor or his representative, which shall constitute full agreement by all parties to the quantity in question. The cost of the concrete shall be in addition to the cost of the carrier pipe. The carrier pipe shall be sleeved with a Class 200 PVC encasement pipe for PVC carrier pipe or smooth steel pipe with welded joints for Ductile Iron carrier pipe. The diameter of the encasement pipe shall be of sufficient diameter to allow the carrier pipe to easily pass through it. The cost of the encasement pipe shall be included in the cost per foot for concrete encasement.

The encasement pipe needs to be supported off the bottom of the trench by the use of concrete blocks, or other approved material, so that concrete can be placed around and under the encasement pipe as shown in the detail on the plan sheets.

Also included under this bid item are approved casing spacers to center the carrier pipe inside the encasement pipe. Casing pipe seals shall be flexible casing seals for concentric or eccentric installation, U-Seal by T.D. Williamson, Inc. or approved equivalent. Casing insulators shall be high density polyethylene, injected molded, M-2 plastic thinsulator by T.D. Williamson, Inc. or approved equivalent.

Payment

Payment will be at the unit price bid in the *Schedule of Bids* and shall be full compensation for all equipment, materials, and labor necessary to complete this item of work, which includes the encasement pipe and the concrete encasement. The Carrier pipe (water main) will be paid for under a separate pay item.

BID ITEM 22

YARD RESTORATION

Under this item the Contractor shall furnish all materials, labor, equipment, and supplies necessary to restore yards/lawns in a workmanlike and satisfactory manner. The work under this item shall be accomplished as soon as practical after the grading in an area has been completed in order to deter erosion. All efforts shall be made to preserve trees, shrubs, bushes, etc., including transplanting, if practical. Areas to be seeded shall be dressed to the shape which existed prior to the waterline construction. A minimum of three (3") inches of topsoil shall be placed and hand raked over the disturbed areas to provide a smooth clean surface (IN YARDS ONLY). All debris such as rocks, limbs, etc., shall be removed from the site and disposed of as required in the general specifications. Seeding types and quantity shall be as specified below. Mulching shall be as specified and at the rate stated below, with the approval of the Engineer prior to placement.

Fertilizer: (In Yards Only)

Fertilizer shall be (13-13-13) and shall be applied at the rate of 300 pounds per acre and spread uniformly across the yard restoration area. Fertilizer shall be a commercial grade, uniform in composition and suitable for application. The fertilizer shall be in labeled containers, conforming to current Arkansas fertilizer laws and bearing the name, trademark and warranty of the producer.

Restoration

The Contractor shall maintain seeded areas from the time of completion until final acceptance of the project. Additional work and materials required due to the Contractor's negligence in maintaining completed work shall be accomplished at the Contractor's expense.

March 1 – June 15

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
<i>Option #1</i>	Bermuda Grass (Common) unhulled	10
	Bermuda Grass (Common) hulled	5
	Crimson Clover (Dixie)	20
<i>Option #2</i>	Fescue	60
	Rye Grass (Annual)	50

June 16 – August 31

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
<i>Option #1</i>	Bermuda Grass (Common) unhulled	10
	Bermuda Grass (Common) hulled	5
<i>Option #2</i>	Fescue	60
	Rye Grass (Annual)	50

September 1 – October 31

	<u>Variety</u>	<u>Weight, Lbs. Per Acre</u>
<i>Option #1</i>	Rye Grass (Annual)	50
	Bermuda Grass (Common) unhulled	15
	Crimson Clover (Dixie)	20
<i>Option #2</i>	Fescue	60
	Rye Grass (Annual)	50

Mulch Cover

Mulch cover shall be applied at the rate of 2,000 pounds per acre, or as directed by the Engineer, immediately after seeding and shall be spread uniformly over the disturbed area by an approved method. Mulch cover shall consist of straw from threshed rice, oats, wheat, barley, or rye; of wood excelsior; or from hay obtained from various legumes or grasses, or a combination thereof. Mulch shall be dry and reasonably free from Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advanced state of decomposition. All materials shall be approved by the Engineer's Representative prior to use.

Payment

Yard restoration will be measured by the linear foot, full width of the disturbed ground, along the centerline of the water main. Payment shall be at the unit price bid in the *Schedule of Bids* per linear foot of yard restoration and shall be full compensation for furnishing and completing the work required including all labor, materials, tools, equipment, and other related items of work necessary to complete this item of work.

BID ITEM 23

WATER PIPELINE SIGNS

Under this Bid Item the Contractor shall furnish and erect water pipeline signs at locations to be determined by the Owner or Engineer. Sign details are shown on the "Typical Detail Sheets." The signs shall be as manufactured by Little Groundhog Manufacturing (with a 5' galvanized coated sign stake), or approved equal. The signs shall read "MSWA". The "Water Main" signs shall be placed at each side of all road crossings. Also, signs shall be placed at gate valves or cluster of valves and air release valves, and/or where indicated by the Engineer. The sign shall have a white background with blue lettering. The sign shall become the property of the water utility at the completion of the project.

Payment

Payment for this item shall be at the unit price for each sign. The bid item for Water Pipeline Signs shall be full compensation for materials, paint, labor, tools, equipment and incidentals necessary to complete this item of work.

BID ITEM 24

EROSION CONTROL AND MITIGATION

Under this item the Contractor shall furnish all materials, labor, equipment, and supplies necessary to implement and install in a workmanlike and satisfactory manner a best management practice plan and completion and approval of all required permits from the Arkansas Department of Environmental Quality, including the Notice of Intent and Storm Water Pollution Prevention Plan.

The Contractor is responsible for complying with State and Federal Regulations regarding minimizing erosion and limiting sediments and other pollutants to water and air resulting from construction.

The Owner shall be responsible for the following:

- a. Filing a Notice of Intent for the project to be covered under Arkansas General Permit for Storm Water Discharge with the Arkansas Department of Environmental Quality. The Owner is responsible for all fees required for submittal.
- b. Developing a Stormwater Pollution Prevention Plan (SWPPP)

The Contractor shall be responsible for the following:

- a. Implementing requirements of the SWPPP and the General Permit.

A copy of the SWPPP shall be maintained by the Contractor at the project site. A copy of the SWPPP and Notice of Intent shall be submitted to the Engineer for general information purposes. The Engineer in no way accepts responsibility for preparation or implementation of the SWPPP or interpretation of the regulations of the Arkansas General Permit for Storm Water Discharges.

The Contractor is responsible for the costs to provide and install erosion control and stormwater pollution prevention devices. No additional payment shall be made.

Payment

Payment will be made for this item at the unit price in the *Schedule of Bids* and shall be full compensation for all equipment, materials, and labor necessary to complete the work.

BID ITEM 25

OSHA'S STANDARD FOR EXCAVATION AND TRENCHES SAFETY SYSTEM

For this bid item, the Contractor shall comply with OSHA's Standard for Excavation and Trenches Safety Systems, 29 CFR Part 1926, Subpart P, as mandated by Act 291 of the Arkansas 79th General Assemble.

Enforcement and interpretation of this requirement will be by OSHA, not the Owner nor the Engineer.

Payment

Payment shall be at the lump sum price bid in the *Schedule of Bids* for complying with OSHA's Standard for Excavation and Trenches Safety System, 29 CFR Part 1926, Subpart P, and shall be full compensation for all materials, equipment, labor, and incidentals necessary to comply.