SPECIFICATIONS

AND CONTRACT DOCUMENTS

ALABAMA HIGHWAY 202
WATER TRANSMISSION PROJECT, PHASE 2
PIR NO. 5535

THE WATER WORKS & SEWER BOARD
OF THE CITY OF ANNISTON
131 West 11th Street
PO Box 2268
Anniston, AL 36202-2268

DECEMBER 2008

PROPOSAL

MADE BY: _____

ADDRESS: _____

TO: ANNISTON WATER WORKS AND SEWER BOARD
ANNISTON, ALABAMA

The undersigned, as Bidder, proposes and agrees, if this Bid is accepted, to enter into a Contract with **The Water Works and Sewer Board of the City of Anniston, Alabama** in the form of Contract specified and shown in the attached Contract Documents, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation, and labor necessary to complete the construction of the work described in the Advertisement for Bids, and in the Contract Documents attached hereto, which are hereby referred to and made a part of the same extent as if fully set herein, and in full and complete accordance with the shown, noted described and reasonably intended requirements of the Plans, Specifications, and Contract Documents, to the full and entire satisfaction of the Owner, with a definite understanding that no money will be allowed for extra work except as set forth in the attached Instructions to Bidders, General Conditions, and other Contract Documents, for the following unit prices and/or lump sum prices as applicable:

PROPOSAL FORM

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Item No.	Approximate Quanities	Description of Item	Unit Price	Total Price for Item
1	75 FT	8" Class 350 Ductile Iron Pipe, Furnish and Install - PER LF		
2	4887 FT	12" Class 350 Ductile Iron Pipe, Furnish and Install - PER LF		
3	530 FT	16" Class 350 Ductile Iron Pipe, Furnish and Install - PER LF		
4	1 EA	8" Gate Valves, Furnish and Install - PER EACH		
5	3 EA	12" Butterfly Valves, Furnish and Install - PER EACH		
6	0 EA	16" Butterfly Valves, Furnish and Install - PER EACH		
7	2 EA	1" Automatic Air Release Assembly, Furnish and Install - PER EACH		
8	4 EA	Valve Boxes, Furnish and Install - PER EACH		
9	4 EA	Valve Markers, Furnish and Install - PER EACH		
10	7 EA	8" MJ Retainer Glands, Furnish and Install - PER EACH		
11	2 EA	12" MJ Retainer Glands, Furnish and Install PER EACH		
12	6 EA	16" MJ Retainer Glands, Furnish and Install PER EACH		
13	3 EA	8" PO Restrained Joint Gaskets, Furnish and Install - PER EACH		
14	2 EA	12" PO Restrained Joint Gaskets, Furnish and Install - PER EACH		
15	6 EA	16" PO Restrained Joint Gaskets, Furnish and Install - PER EACH		
16	2 EA	8" MJ Bends, Furnish and Install - PER EACH		
17	0 EA	12" MJ Bends, Furnish and Install - PER EACH		
18	2 EA	16" MJ Bends, Furnish and Install - PER EACH		
19	1 EA	8" MJ Tee, Furnish and Install - PER EACH		
20	0 EA	12" MJ Tee, Furnish and Install - PER EACH		

Item No.	Approximate Quanities	Description of Item	Unit Price	Total Price for Item
21	1 EA	16"X8" MJ Tee, Furnish and Install - PER EACH		
22	1 EA	8" MJ Solid Sleeve, Furnish and Install - PER EACH		
23	0 EA	12" MJ Solid Sleeve, Furnish and Install - PER EACH		
24	1 EA	16" MJ Solid Sleeve, Furnish and Install - PER EACH		
25	1 EA	16"X12" PE Reducer, Furnish and Install - PER EACH		
26	2 EA	Connection to Existing System, Furnish and Install - PER EACH		
27	1 EA	Stream Crossing, Furnish and Install - PER EACH		
28	37 CY	Graded Rip Rap, Furnish and Install - PER CY		
29	185 SY	Pavement Replacement, 6" Concrete Bridge w/ 1" Wearing Surface, Furnish and Install - PER SY		
30	20 SY	Pavement Replacement, 6" Concrete, Furnish and Install - PER SY		
31	290 SY	Pavement Replacement, 6" Aggregate Base, 5" Binder, 1" Wearing Surface, Furnish and Install - PER SY		
32	1 LS	Erosion Control BMP's and NOR, Furnish and Install - PER LS		

TOTAL AMOUNT OF BID: _____

The Bidder declares that he has examined the site of the work, that he has fully informed himself of conditions that would affect the proposed work, that, prior to the tender of his bid, he has examined the Plans, Specifications and Contract Documents for the work and has read all special instructions and provisions contained in the Documents, and that he has satisfied himself with respect to the quality and extent of work to be performed.

The Bidder declares that he understands that, when quantities of work for which unit price bids are requested are shown in the Advertisement for Bids and in the Proposal, such quantities are approximate only and are subject to either increase or decrease, that, should the quantities of any of the work items be increased, the Bidder proposes to perform the additional work at the unit prices bid by him, that, should the quantities of any of the work items be decreased, payment will be made only for the actual quantities of work performed and such payment will be based upon the unit prices bid by him, and that he shall make no claim for profits anticipated on the decrease in quantities of work. Actual quantities will be paid for as the work progresses, in accordance with the provisions of the Contract Agreement, and such quantities shall be subject to final measurements and determinations made upon completion of the work.

The Bidder understands that the Owner reserves the right, in the Owner's discretion, to reject any or all bids, to waive any informality in any bid, and to accept any bid considered to be advantageous to the Owner.

The Bidder agrees that his bid shall be valid for a period of sixty (60) calendar days after the date set for receipt of bids, and shall not be withdrawn for a period of sixty (60) calendar days after the date set for receipt of bids.

The Bidder has attached hereto either a cashier's check drawn on an Alabama bank or a Bid Bond, executed by a Surety Company duly authorized and qualified to make such bonds in the State of Alabama, payable to The Water Works and Sewer Board of the City of Anniston, Alabama in the amount of 5% of his total bid amount.

The Bidder agrees that, should he be notified that his Bid on the work has been accepted, he will, within ten (10) days from receipt of such notice, execute the formal Contract Agreement bound herein, and will furnish with the Contract, Bonds and Certificates of Insurance Coverage of his construction operations and all of his operations associated with the project, all in accordance with the requirements of the General Conditions.

The Bidder further agrees that, in case of failure on his part to execute said Contract Agreement, and to furnish all Bonds and Certificates of Insurance required by the Contract Documents, within ten (10) consecutive calendar days after receipt of notice of award of Contract to him, the monies payable to the Obligee of his Bid Bond, in accordance with the terms and conditions of the Bond, shall be paid to the Owner as liquidated damages for the delay and additional expense to the Owner caused by such failure on the part of the Bidder.

The Bidder hereby agrees that, should the work under the Contract be awarded to him, he will commence work under this Contract on such date as specified in written "Notice to Proceed" given by the Owner, and that he will fully complete the Contract within **sixty (60) consecutive calendar days** thereafter.

The Bidder further agrees to pay, as liquidated damages, the sum of **$250.00** for each consecutive calendar day after the date set for completion of the work as provided in the General Conditions. The Bidder further agrees that he will not make any claim for extra compensation should completion of work under the Contract be accomplished in advance of the time specified hereinabove.

The undersigned Bidder states that he fully understands the meaning of "low, responsive, responsible Bidder" as defined in these Documents, and that these criteria will be applied in the evaluation of this Bid.

The Bidder acknowledges receipt of the following addenda: NONE

The undersigned, as Bidder, hereby declares that the name (or names) of the only person (or persons) interested in this Proposal, as principal (or principals), is (or are) as hereinbelow set out and that no person other than that (or those) hereinbelow stated has any interest in this Proposal, or in the Contract to be entered into; that this Proposal is made without connection with any other person, firm or corporation making a proposal; and that it is in all respect fair and in good faith, without collusion or fraud.

Following are the names and addresses of all persons, firms, and corporation interested in the foregoing bid:

_____ _____

_____ _____

Address: Respectfully submitted,

_____ _____

_____ By: _____

_____
Title

Date: _____

Contractor's license No. _____

(SEAL - if Bid is made by a Corporation)

NOTICE TO CONTRACTORS
ADVERTISEMENT FOR BIDS

Sealed Bids will be received by The Water Works and Sewer Board of the City of Anniston, Alabama at the Office of the of Board at 131 West 11th St. Anniston, Alabama, until 10:00 AM, local time **Thursday, January 15, 2009**, for furnishing all labor, tools, materials and equipment, and for doing the work of constructing, according to the Plans, Specifications and Contract Documents the Alabama Highway 202 Water Transmission Project, Phase 2 as described in the Bid Documents available for review at the Board Office or at awwsb.org. No bids will be received after the time set forth hereinabove, and the Proposals will be publicly opened and read. For Plans, Specifications, and Contract Documents please call Phillip T. Burgett at (256) 236-5660 or go to awwsb.org and click "Opportunities".

THE WATER WORKS & SEWER BOARD OF THE CITY OF ANNISTON, ALABAMA

By: _____
James D. Miller, General Manager

INSTRUCTIONS TO BIDDERS

RECEIPT OF BIDS

Sealed Bids will be received by The Water Works and Sewer Board of the City of Anniston, Alabama at the office of the Board at 131 West 11th Street, Anniston, Alabama until 10:00 AM local time **Thursday, January 15, 2009**, for furnishing all labor, tools, materials and equipment, and for doing the work of construction, according to the Plans, Specifications and Contract Documents the Alabama Highway 202 Water Transmission Project, Phase 2 as described in the Bid Documents available for review at the Board Office. No bids will be received after the time set forth hereinabove, and the Proposals will be publicly opened and read.

PLANS AND SPECIFICATIONS

Plans, Specifications, and Contract Documents are open to public inspection at the Office of the Board at 131 West 11th St., Anniston, Alabama. Plans, Specifications, and Contract Documents will be issued from Engineering Service's office to the Contractors and Suppliers in accordance with the following schedule:

A deposit of **$0.00 per set** will be required for each set of Plans, Specifications, and Contract Documents issued.

The full amount of deposit for all returned sets of Plans, Specifications, and Contract Documents will be returned to bidders submitting bonafide Sealed Bids for construction of the project, provided all Plans, Specifications, and Contract Documents are returned to Engineering Services in reusable condition within ten (10) days after the opening of the bids.

All other deposits will be partially refunded in amount equal to one-half of deposit made on each set of Plans, Specifications, and Contract Documents returned to the Engineers in reusable condition within ten (10) days after the opening of Bids.

Also, Plans, Specifications, and Contract Documents can be viewed and printed by going The Water Works and Sewer Board of the City of Anniston website at awwsb.org.

DEFINITIONS

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

(a) "Contractor" or "Contractors": The person, firm or corporation signing the Contract with the Owner.

(b) "Sub-Contractor": One who contracts with the Contractor to perform all or any part of the Contract to be performed by the Contractor under the attached Documents.

(c)	"Work at Site of Project":	Work to be performed, including work normally done at the location of the project.

(d)	"Purchaser, Owner, Authority":	The Water Works and Sewer Board of the City of Anniston, Anniston, Alabama
(e)	"Engineer" or "Engineers":	Anniston Water Works and Sewer Board Manager - Engineering Services, or his duly authorized representative.
(f)	"Days":	Calendar days, unless otherwise specified.
(g)	"Proposal" :	Wherever "Proposal" is used, it shall mean "Bid".

PROPOSAL FORM

The Engineers will furnish Bidders with a form of Proposal. No bid will be considered unless submitted on such form. All papers bound with, or attached to the Proposal Form (including Instructions to Bidders, Advertisement for Bids, General Conditions, Specifications, Contract Documents, Bond Forms, Addenda, etc.) are a necessary part thereof and must not be detached.

The Bidders shall complete the Proposal Form in the manner prescribed, using ink for writing figures, or figures may be typed. The Bidder must sign the Bid correctly and legibly; and shall state his interest, title, or office in the company submitting the Bid. If the Bid should be made by an individual, his full name and address shall be shown; if made by a firm or partnership, the full name and address of each member of the firm or each partner shall be shown; and if made by a corporation, the full names and addresses of the president, secretary and treasurer shall be shown.

Should the Proposal Form not be fully completed in ink by the Contractor, the Bid may be deemed to be informal and may be rejected. The amount in the Column "Total Amount for Item", in the Proposal Form, will be calculated by multiplying the number of units shown for each item by the Unit price for the item. The sum total of all the amounts, including the amounts bid for any lump sum price items, will be the Total of Amount Bid.

The Proposal Form shall be fully completed in accordance with the Instruction to Bidders, in accordance with any instructions to bidders given in the Specifications, and without any excisions, alterations, special conditions or alterations made by the Bidder. The Bidder shall be fully responsive to all instructions relating to the Proposal.

BIDS

Bids shall be enclosed in a sealed envelope, endorsed **Alabama Highway 202 Water Transmission Project, Phase 2, PIR No. 5535,** and addressed to The Water Works and Sewer Board of the City of Anniston, Anniston, Alabama.

The Bidder shall show, on the outside of the envelope and on the last page of the Proposal Form, his Contractor's License Number for the State of Alabama, and shall also show, on the outside of the envelope, his name and address.

No Bid will be received after the time specified in the Advertisement for Bids.

Any Bidder may withdraw his bid, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for the receipt of bids.

No Bidder may withdraw his bid for a period of sixty (60) days after the scheduled closing time for receipt of bids, as set forth in the Advertisement for Bids.

The Owner reserves the right to reject any or all bids, to waive any informalities in any bid, and to accept any bid considered advantageous to the Owner.

AWARD OF CONTRACT

The Contract, if awarded, will be awarded to the low, responsive, responsible bidder as soon as practicable, provided a satisfactory bid has been received. In order to be considered for the award of the Contract, the Bidder shall demonstrate to the Owner that he possesses all of the above named qualifications.

GUARANTY

Each Bidder must enclose with his Proposal a bid bond executed by a surety company duly authorized and qualified to make such bonds in the State of Alabama, or a cashier's check drawn on an Alabama bank in the amount of not less than five percent (5%) of the total bid. The payee of such bond or cashier's check shall be **The Water Works and Sewer Board of the City of Anniston, Anniston. Alabama.** The Bid Bond or cashier's check shall bear the same date as that set for receipt of bids.

Bid Bonds shall be returned to all bidders, other than the low and two next low bidders, when the low bids have been determined. Those of the three low bidders will be returned after execution of the Contract.

If a bidder to whom a contract is awarded shall refuse or neglect to execute the contract and furnish security in the amount required within ten (10) days after the notice has been given him of such award, his bid bond shall be forfeited to the Owner as liquidated damages for such refusal or neglect.

The successful bidder will be required to furnish, through an authorized agent in the State of Alabama a Performance Bond, Labor and Material Bond, Employer's Liability and Workmen Compensation Insurance, Public Liability and Property Damage Insurance, Comprehensive Automobile Liability Special Hazards or Perils and shall furnish proof of carriage of all of the above insurance all as set out in detail under "General Conditions" of these Specifications. The Performance Bond and the Labor and Material Bond must be countersigned by an agent whose office is located in the State of Alabama and who is authorized to do business in the State of Alabama; and a valid Power-of-Attorney shall be attached to each Bond.

INTERPRETATIONS

If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the Plans, Specifications, or other proposed Contract Documents, he may submit a written request to the Engineers for interpretations thereof. The persons submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made by addendum duly issued, and copy of such addendum will be mailed by certified mail (with return receipt requested) or delivered to each person receiving a set of such documents. The Owner will not be responsible for any other explanation or interpretation of the proposed documents.

COMMENCEMENT AND COMPLETION OF WORK

Following the execution of the Contract by the Owner and the Contractor, the Contractor will be authorized to commence work by written order from the Owner. The Contractor shall then commence work on the project within the time stated in the Proposal, unless such time stated is extended by mutual agreement between the Owner and the Contractor, and shall fully complete all work under the Contract within the number of consecutive calendar days specified in the Contract.

FAMILIARITY WITH LAWS

The Bidder is assumed to have familiarized himself with all state laws and with all local ordinances and regulations which, in any manner, may affect the conduct of the work or those engaged or employed on the work, and no pleas of misunderstanding will be considered.

The attention of bidders is called to the provisions of State law Governing General Contractors, as set forth in Sections 34-8-1 to 34-8-24, inclusive, Code of Alabama of 1975 and Supp. 1996 and, as amended; and bidders shall be governed by the provisions of said law insofar as it is applicable. The above mentioned provisions of the Code make it illegal for the Owner to consider a bid from anyone who is not properly licensed under such code provisions. The Owner, therefore, will not consider any bid unless the bidder produces evidence that he is so licensed. Neither will the Owner enter into a Contract with a foreign corporation which is not qualified under State Law to do business in the State of Alabama.

The attention of nonresident bidders is called to the provisions of Alabama Law, Act No. 84-227, requiring every nonresident contractor, as defined in Section 39-2-14, Code of Alabama 1975 and Supp. 1996, as amended, to register with the Department of Revenue prior to engaging in the performance of a Contract in the State of Alabama, and to deposit with the Department of Revenue an amount, or approved corporate surety bond in lieu thereof, equal to five percent (5%) of the amount such contractor is to receive for performance of the contract, such amount or bond to be held pending completion of the contract and the payment of taxes due the State and the governmental bodies.

The attention of nonresident bidders is called to the provisions of Alabama Law, Section 39-3-5, Code of Alabama 1975, as amended, relating to preference to be given to resident contractors in Alabama over nonresident contractors in the award of contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the nonresident contractor, and to the requirements that the bid documents tendered by any nonresident contractor must be accompanied by "a written opinion of an attorney-at-law licensed to practice law in such nonresident contractor's state of domicile as to the preference, if any or none, granted by the law of that state to its own business entities whose principal places of business are in that state in the letting of any or all public contracts" (sic).

The bidder is advised that the above referenced act is subject to the opinion of the Attorney General of the State of Alabama.

ASSIGNMENT OF CONTRACT

The Contractor shall not assign his Contract, nor any part thereof, nor any monies due, or to become due thereunder, without prior written consent of the Owner. In case the Contractor, with the consent of the Owner assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in or to any monies due or to become due to the Contractor shall be subject to prior valid claims of all persons, firms, and corporation for services rendered or materials supplied for the performance of work under his Contract.

SUB-CONTRACTING

No part of the Contract shall be sublet without the prior written consent of the Owner. The Contractor shall, following execution of the Contract, immediately submit to the Owner the names of sub-contractors whom he proposes to employ on the project.

EXECUTION OF CONTRACT

The Contract Documents shall be executed in duplicate, each counterpart of which shall be considered as an original without accounting for the absence of any of the other counterparts or copies.

QUALIFICATIONS OF BIDDERS

A responsive bid shall be evidenced by: (1), a Proposal Form complete in accordance with the Instruction to Bidders and with instructions and/or requests contained in any other sections of the Contract Documents; (2), a Proposal Form not evidencing any apparent unbalanced pricing for performance of the items of work; (3), a Proposal Form without excisions, alterations, special conditions or qualifications made by the Bidder; and, (4), a Proposal Form containing no alternative bids or offerings (by inclusion, attachment, or otherwise) for any items unless such alternative bids or offers are requested in the Technical Specifications.

That a Bidder is responsible may be evidenced by the following facts: (1), that he maintains a permanent place of business; (2), that he has adequate financial capability for meeting the obligations contingent to the work; (3), that he has adequate plant equipment to properly perform the work within the time limit specified; and (4), that he has a competent and experienced organization. In order to be considered for the award the Bidder shall present to the Owner satisfactory evidence that: (1), he has the necessary capital and financial resources to undertake and complete the project; (2), he has equipment, in good working order, adequate for performance of work within the time specified; (3), he has within his organization, at the time the construction management and supervisory personnel available for assignment to the project; (4), the construction management and supervisory personnel are skilled and experienced in the particular type of work to be undertaken on the project; and (5), he has performed and completed similar work of similar magnitude in a satisfactory manner.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____

as Principal, and _____

as Surety, are hereby held and firmly bound unto _____

as owner in the penal sum of _____

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

Signed, this _____day of _____, 20___.

The condition of the above obligation is such that whereas the Principal has submitted to _____

_____ a certain Bid, attached hereto and hereby made a part hereof to

enter into a contract in writing, for the _____

_____

_____

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate,

(b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

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

_____ (L.S.)
Principal

_____
Surety

SEAL By: _____

CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into as of the _____ day of _____

in the year of 200__, by and between The Water Works and Sewer Board of the City of Anniston, (hereinafter called the Owner), and

_____

_____

(hereinafter called the Contractor)

WITNESSETH: That the Owner and the Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article I. CONTRACT DOCUMENTS. The Contract Documents shall consist of: this Agreement; Contractor's Proposal; Contractor's Bid Bond; Notice to Contractors (Advertisement for Bids); Instructions to Bidders; General Conditions; Supplemental Conditions; Performance Bond; Labor and Material Payment Bond; all Addenda issued prior to the submittal of the Proposal; all Modifications issued and agreed upon by the Owner and the Contractor prior to and subsequent to the execution of this Agreement; and the Plans (Contract Drawings) and Specifications as prepared by Engineering Services of The Water Works and Sewer Board of the City of Anniston, and as on file in the office of the Owner. The documents enumerated hereinabove form the Contract and all are as fully a part of the Contract as if attached to this Agreement and/or fully set forth herein.

Article II. SCOPE OF WORK. The work to be done under this Contract by the Contractor, at his own cost, shall consist of furnishing all labor, materials, supplies, tools and equipment, and of performing all work necessary to construct and fully complete the project entitled, **Alabama Highway 202 Water Transmission Project, Phase 2, PIR No. 5535,** all in accordance with the Contract Drawings and Specifications and with the requirements and provisions of the Contract Documents, all of which form this Contract.

Article III. TIME OF COMPLETION. The work to be performed under this Contract shall be commenced within 7 calendar days after the date on which the Notice to Proceed is issued. The work shall be fully completed within **60 calendar days** after the date on which the Notice to Proceed is issued, subject, however, to such extensions of time as may be authorized in accordance with the provisions of the Contract Documents.

Should the work under this Contract not be fully completed within the time specified, it is

understood and agreed that there will be deducted from the periodic and final estimates of work performed by the Contractor a sum computed at the rate of $ 250.00 per day for each additional day required to fully complete the work, beginning from the specified date of completion and extending to the date of final acceptance of the work. It is understood and agreed that the sum thus deducted is not a penalty, but money due to reimburse the Owner for the extra cost and expense caused by the delay in the completion of the work. It is also understood and agreed that, in the event that the work should be completed in advance of the completion date specified, the Contractor will make no claim for extra payment therefore.

Article IV. CONTRACT PRICE. The Owner shall pay the Contractor in full payment for performance of work under this Contract, in accordance with the price or prices set forth in the Proposal submitted by the Contractor, which proposal is bound herewith and made a part hereof to the same extent as if fully set out herein, but subject to such additions and deductions as provided for in the Contract Documents, the sum of

_____($_____)

The Contract Price shall be equitably adjusted to compensate for any changes in the work as may be ordered by the Owner.

Article V. CHANGES IN WORK AND EXTRA WORK. The Owner shall have the right to increase or decrease quantities of work, to make changes in the work, and to require the Contractor to perform extra work necessary for the satisfactory completion of the project.

Where new and/or additional items of work are found to be necessary for the satisfactory completion of the project, and where the character of the work is such that a reasonable price for the performance of the work cannot be established by use of contract prices or combinations thereof, such new and/or additional items of work shall be classed as Extra Work.

Where the satisfactory completion of the project requires that changes in work be effected or extra work be ordered, the procedure to be followed in such cases shall be in accordance with the provisions of the Articles of the General Conditions relating to CHANGES IN WORK, EXTRA WORK, and PAYMENT FOR EXTRA WORK.

Article VI. PROGRESS PAYMENTS. The Owner shall make progress payments to the Contractor in amounts equal to values of work performed on the project through the closing dates of the preceding estimate periods, but less five percent (5%) of the combined values and less previous payments made. The five percent (5%) retained percentage may be held by the Owner until the value of work completed at end of any estimate period equals or exceeds fifty percent (50%) of the total amount of the Contract, after which time, no further retainage will be withheld. The retainage as set forth above shall be held until final completion and acceptance of the Contract. When the work has been substantially completed, reviewed by the Owner and the Engineer, and found to be in accordance with the provisions of the Contract Documents, the retainage may be reduced to such an amount as would reasonably cover the cost of correction of minor items of work heretofore found to be faulty and the cost of work remaining to be done in order to effect the completion of all of the work in full accordance with the provisions of the

Contract Documents. Progress payments will be made in accordance with the provisions of the General Conditions, Periodic or Partial Payments.

Article VII. FINAL PAYMENT. Final payment, constituting the entire balance of the Contract Price, shall be paid by the Owner to the Contractor within thirty days after the acceptance of the work. The work will not be accepted until the Contractor has certified that he has completed all of the work in full accordance with the provisions of the Contract Documents, the Owner and the Engineer have completed the final review of the work and found that it has been fully completed in accordance with the provisions of the Contract Documents, the Contractor has advertised completion of the work in accordance with the General Conditions, and the Contractor has presented to the Owner satisfactory evidence that all indebtedness connected with the work has been fully paid and satisfied, all as set forth in of the General Conditions.

Article VIII. MISCELLANEOUS PROVISIONS. Terms used in this Agreement which are defined in the General Conditions and in the Instructions to Bidders shall have the same meanings as designated in those component parts of the Contract Documents.

The Contract Documents, which constitute the entire agreement between the Owner and the Contractor are listed in Article I of this Agreement and, except for Modifications issued after the execution of this Agreement, are enumerated hereinbelow. The signatures which appear hereunder shall have the same force and effect as if appearing on all of the Contract Documents enumerated as follows:

1.	Contract Agreement	Pages _____
2.	Proposal	Pages _____
3.	Bid Bond	Pages _____
4.	Advertisement for Bids	Pages _____
5.	Instructions to Bidders	Pages _____
6.	General Conditions	Pages _____
7.	Supplementary Conditions	Pages _____
8.	Performance Bond	Pages _____
9.	Labor and Material	Pages _____
10.	Payment Bond	Pages _____

11. Specifications — Pages _____ and Sections

_____

_____

_____

_____

_____

12. Drawings — Pages _____

_____

_____

_____

_____

13. Addenda

_____ _____

In Witness Whereof, the parties have executed this Contract on the day and date first above written in two (2) original counterparts.

The Water Works and
Sewer Board of the City of Anniston

By: _____ By: _____

Title:_____ Title: _____

Witness: _____ Witness: _____

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That we, _____

_____, hereinafter called the Principal, and

_____

hereinafter called the Surety, do acknowledge ourselves to be held and firmly bound unto _____

_____

hereinafter called the Owner, in the penal sum of _____

_____ ($ _____)

for payment of which sum well and truly to be made in lawful money of the United States, we bind ourselves, our successors, heirs, executors, administrators, assigns and personal representatives, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION OR BOND IS THIS: WHEREAS, the Principal has entered into a certain written contract with the OWNER, bearing the date of, _____ _____ 20_____ for the construction of _____

_____

_____

a copy of which contract is attached hereto, incorporated herein by reference, and made a part of to the same extent as if set out herein in full, and the Principal and Surety are bound under this Bond which shall remain in full force and effect until all claims and demands with respect to labor and materials connected with the work under the contract have been satisfied, subject however to statutory limitations and to such other conditions as hereinafter stated.

NOW, THEREFORE, if the Principal and all Subcontractors to whom any portion of the work provided for in the contract is sublet, and all assignees of said Principal and said sub- contractors, shall promptly make payment to all persons, firms, subcontractors and corporations for furnishing said Principal and said Subcontractors with labor, materials, equipment, machinery, parts, fuel, foodstuffs, supplies, or repairs on machinery or equipment used in or incorporated in the work, for performing any work in connection with the prosecution of the work under the Contract, and under any modifications or extensions thereof, for all insurance premiums in connection with the work, for all labor performed in connection with the work whether by subcontractor or otherwise, or for reasonable attorney's fees incurred by any claimant or claimants in suits under this Bond, then this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees

that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or to the Specifications accompanying the same, shall in any wise affect the obligation of the Surety under this Bond, and the Surety does hereby waive notice of any such change, extension of time, or alteration or addition to the terms of the Contract or to the Specifications.

PROVIDED FURTHER, that this Bond is subject to the following limitations and conditions:

(a) Any person, firm or corporation who has furnished labor, materials, equipment, machinery, fuel, parts, foodstuffs, supplies, or repairs for machinery or equipment used or incorporated in the prosecution of the work under the Contract, or amendment or extension thereof, and who has not received due payment for furnishing such items, shall have a direct right of action in his or their name or names against the Principal and Surety on this Bond, which right of action shall be asserted in a proceeding instituted in a Court of competent jurisdiction in the area in which the work under the contract has been performed. Such right of action shall be asserted in a proceeding brought in the name of the claimant for his or their use and benefit against said Principal or Surety, or either of them not later than one year after the final settlement of the contract, in which action such claim or claims shall be adjudicated and judgment thereon.

(b) In addition to any other legal mode of service, service of summons and other process in suits brought on this Bond may be had on the Principal or Surety by leaving a copy of the summons and complaint, or other pleading or process, with the

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and the principal and the Surety agree to be bound by such mode of service above described, and consent that such service shall be the same as personal service on the Principal or Surety.

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

(d) In no event shall the Surety be liable for a greater sum than the penalty of this bond, or subject to any suit, action or preceding thereon that is instituted later than one year after final settlement of the said Contract.

(e) No final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall, without proof of or accounting for the other counterparts, be deemed an original, on this day the _____ day of _____, 20 ____.

ATTEST:

_____
Principal

By: _____
(Principal Secretary)

By: _____

Title _____

_____
Address

_____
Witness as to Principal

_____
Address

_____
Surety

ATTEST:

_____
(Surety)Secretary

By: _____
Attorney-in-fact

_____

_____
Address

_____
Witness to Surety

_____

_____
Address

Countersigned: _____

_____
Resident Agent of Surety

_____
Address of Resident Agent
of Surety

_____
Phone No.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that we _____

_____

_____

hereinafter called the Principal, and _____

_____

hereinafter called the Surety, do acknowledge, ourselves to be held and firmly bound unto _____

_____

_____

hereinafter called the Owner, in the penal sum of ($_____)

for payment of which sum well and truly to be made in lawful money of the United States, we bind ourselves, our successors, heirs, executors, administrators, assigns and personal representatives, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION OR BOND IS THIS:

Whereas, the Principal has entered into a certain written contract with the Owner, bearing the date of _____, 20____, for the construction of_____

_____

_____

a copy of which contract is attached hereto, incorporated herein by reference, and made a part of to the same extent as if set out herein in full, and the Principal and Surety are bound under this Bond which shall remain in full force and effect until all of the work under the Contract has been fully completed in full accordance with the covenants, terms, conditions, agreements and provisions of the Contract.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform all his duties, undertakings and obligations, all in accordance with the covenants, terms, conditions, agreements and provisions of the Contract during the original term thereof, and during any extensions thereof which may be granted by the Owner with or without the consent of the Surety, and if the Principal shall satisfy all claims and demands incurred under the Contract, shall fully correct all faulty work, shall fully indemnify and save harmless the Owner from all costs and damages whatsoever which the Owner may suffer by reason of any failure on the part of the Principal to do so, and shall fully reimburse and repay the Owner for any and all outlay and expense, including all additional engineering costs, all legal costs and attorney's fees, which the

Owner may incur in making good any default, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Be it also understood that should the Principal be declared in default under the terms of the Contract, the Owner having performed Owner's obligations thereunder, the Surety shall promptly:

(1) Remedy the default of the Principal, or

(2) Complete the work under the Contract in full accordance with the terms and conditions of the Contract, using a contractor chosen by the Surety and approved by the Owner, or

(3) Assist the Owner in securing a contractor who shall fully complete the work under the Contract in full accordance with the covenants, terms, conditions, agreements and provisions of the Contract.

"Promptly", as used herein, shall be defined as "initiating the resumption of full-scale construction work by the Contractor and all sub-contractors under the Contract within thirty (30) days from the date on which the Owner has declared the Principal to be in default" .

Whichever of the three methods may be used by the Surety to complete the work under the Contract (after the Principal has been declared to be in default), the Surety shall pay to the Owner any extra or additional costs incurred by the Owner by reason of the default of the Principal and the subsequent completion of the work under the Contract by the Surety .

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

PROVIDED FURTHER, that no final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall, without proof of or accounting for the other counterparts, be deemed an original, on this day the _____ day of _____, 20 _____.

ATTEST:

_____
Principal

By: _____
(Principal Secretary)

By: _____

Title _____

_____
Address

_____
Witness as to Principal

_____
Address

_____
Surety

ATTEST:

_____
(Surety)Secretary

By: _____
Attorney-in-fact

_____

_____
Address

_____
Witness to Surety

_____

_____
Address

Countersigned: _____

_____
Resident Agent of Surety

_____
Address of Resident Agent
of Surety

_____
Phone No.

INDEX

EXHIBIT "A"

DIVISION 1

GENERAL CONDITIONS

01000 PAYMENT

The Owner shall, on or before the 15th day of each calendar month, make a progress payment to the contractor, and such payment shall be based upon a duly certified and approved estimate of the work performed under the Contract during the preceding calendar month, but, to ensure the proper performance of the work under this Contract, the Owner shall retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered under this Contract. Such periodic payment shall, however, be subject to the following provisions:

A. That the Contractor or his Superintendent on the work shall have agreed with the representative of the Engineer regarding value of work performed during an estimate period before the estimate is submitted to the Engineer.
B. That the estimate of value of work performed in the month preceding the month during which payment is to be made be submitted to the Engineer by the first day of the calendar month during which payment is to be made.
C. That payment may not be made for work on which satisfactory test reports have not been received before the submittal of the estimate.
D. That payment shall not be made for defective work, or faulty work not completely corrected before the submittal of the estimate.
E. That if, after fifty percent (50%) of the construction work, including the value of materials and/or equipment stored, has been satisfactorily completed, no additional deduction for retainage will be made from the succeeding periodic payments made to the Contractor after the retainage amount becomes equal to five percent (5%) of one-half of the completed construction value of the project. The intent of this provision is that, at the time when the value of the completed Contract work equals or exceeds fifty percent (50%) of the completed contract value no additional retainage will be withheld so that the retainage amount shall be equal to two and one-half percent (2 ½ %) of the completed Contract value, and this amount shall be retained until the Contract has been completed and the work has been accepted subject, however, to other provisions of these General Conditions.
F. That, following a certification by the Engineer that the work has been substantially completed in accordance with the provisions of the Contract Documents but has not yet been fully completed and accepted, the retainage may be reduced to such an amount as would reasonably cover the cost of correction of minor items of work heretofore found to be faulty and the cost of the work remaining to be done in order to effect the completion of all of the work in full accordance with the provisions of the Contract Documents. The consent of the Surety shall be obtained prior to any reduction in retainage.

The value of preparatory work done and the value of materials and/or equipment stored on the site may be taken into consideration in the preparation of estimates, provided that materials stored meet the requirements of the Contract Documents.

The Contractor agrees that he will indemnify and save the Owner harmless from all claims arising out of the lawful demands of subcontractors, labors, workmen, mechanics, and suppliers of machinery, parts, equipment, power tools, fuel, materials and other construction items, incurred in the performance of work under this Contract. The Contractor shall, at the Owners request, furnish satisfactory evidence that all obligations of the nature hereinabove described have been paid, discharged, or waived. If the Contractor should fail to do so, then the Owner may, after having served written notice on the Contractor, either directly pay those unpaid bills of which the Owner has received written notice, 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 presented that all such liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed in accordance with the terms of this Contract, but, in no event, shall the provisions of this sentence be construed to impress upon the Owner any obligations to either the Contractor or the Surety. In paying any unpaid bills of the Contractor the Owner shall be deemed to be the temporary agent of the Contractor for this specified purpose; and any payment so made by the Owner shall be considered a payment made under the Contract by the Owner to the Contractor, and the Owner shall not be liable to the Contractor for any such payments made in good faith.

01010 LOCATION OF THE WORK

The location of the work is shown on the Contract Drawings. The Owner will provide access to the work site (or sites) as shown on the Drawings.

01015 WORK TO BE PERFORMED

The work to be performed under this Contract shall include, but without limitation, the furnishing of all materials, labor, tools, appliances, equipment, transportation and services necessary to accomplish the work, and the construction complete of all facilities and improvements as described and/or shown on the Plans and/or Specifications.

01026 INSURANCE

The Contractor shall not commence any work on the project until he obtains at his own expense all required insurance; and the Contractor shall not, at any time, conduct any operations on the project or associated with the project unless such operations are covered by the specified insurance. Such insurance must have the approval of the Owner as to limit, form, and amount. The Contractor shall not permit any subcontractor to commence work on the project until the same insurance requirements have been complied with by such subcontractor (or sub-contractors). The insurance coverage shall be maintained throughout the full period of the contract. Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guaranty period.

As evidence of specified insurance coverage the Owner may in lieu of receipt of actual policies accept certificates issued by the insurance carrier showing such policies to be in force for the specified period.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the

Contractor's responsibility for payment of damages resulting from his operations under this Contract.

The types of insurance that the Contractor shall be required to obtain and maintain for the full period of the Contract are listed hereinbelow:

a. Workman's Compensation and Employer's Liability Insurance shall be in strict accordance with the requirements of the current and applicable Workmen's Compensation Laws of the State. The insurance shall cover all of the Contractor's employees employed or associated with the project; and where any part of the work is subcontracted, the Contractor shall require the subcontractor to provide similar Workmen's Compensation and Employer's Liability Insurance for all employees of the subcontractor 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 is not protected under the Workmen's Compensation Statute the Contractor shall provide, and shall cause such subcontractor to provide, adequate coverage for the protection of all employees on the project not otherwise protected under applicable provisions of the Statutes relating to Workmen's Compensation and Employer's Liability Insurance.

b. Comprehensive General Liability Insurance shall protect the Contractor and any subcontractors performing work under this Contract from any claims for bodily injury, for sickness or disease, for death, for personal injury, and for property damages which may arise either directly or indirectly out of, or in connection with, the performance of work under this Contract. The minimum limits of coverage shall be as follows:

Bodily Injury $1,000,000 each occurrence, $1,000,000 aggregate
Property Damage $500,000 each occurrence, $600,000 aggregate
Personal Injury $250,000 each occurrence, $250,000 aggregate

The naming of minimum limits of coverage shall not be construed as limiting the Contractor's responsibility to provide contractual coverage sufficiently broad to ensure the provisions of the Section of these General Conditions relating to Indemnity, or limiting the responsibilities of the Contractor as outlined under the aforesaid Section.

c. Comprehensive Automobile Liability Insurance shall protect the Contractor and any subcontractor performing work under this Contract from any claims for bodily injury, for death, and for property damages which may arise either directly or indirectly out of, or in connection with, the performance of work under this Contract. The minimum limits of coverage shall be as follows:

Bodily Injury - $600,000 per person, $1,000,000 each occurrence
Property Damage - $260,000 each occurrence

The naming of minimum limits of coverage shall not be construed as limiting the Contractor's responsibility to provide contractual coverage sufficiently broad to ensure the provisions of the Section of these General Conditions relating to Indemnity, or limiting the responsibilities of the Contractor as outlined under the aforesaid Section.

d. Property Insurance shall afford protection against physical damage to the insured

property during the entire construction period. Insurable portions of the project shall be covered on a completed value basis; and at any given time the dollar coverage provided shall be actual value of completed work, value of work in progress, and value of stored materials. The policy by its own terms or by endorsement shall specifically permit partial or beneficial occupancy or use prior to completion or acceptance of the entire work. Perils named in the policy shall be Fire and Lightning, Extended Coverage, Vandalism and Malicious Mischief, and other perils associated with the particular nature and character of the work.

e. Special Hazards or Perils. The Liability and Property Damage Insurance Coverage of the Contractor's operations shall provide adequate protection against any death any bodily injury or any property damage resulting from the blasting operations in connection with the Contractor's work, or in connection with the work of his subcontractors.

Insurance carried by the Contractor on the insurable portions of the work shall not relieve the Contractor of the responsibility for the protection of all materials and all work until the project has been accepted by the Owner. Any loss suffered on the project by reason of the perils named under Section 01026d, or under this sub-part of Section 01026, shall be borne by the Contractor and/or the Insurance Company providing the coverage for the Contractor; and the Owner shall not be liable for any cost of replacement of lost of damaged work or material.

The Contractor shall purchase Builder's Risk "all risk" insurance providing protection against losses stemming from natural disasters.

f. Protection of the Owner and the Engineers. The Owner and his agents, and the Engineers shall also be named insured's in all insurance policies provided by the Contractor for his own protection and for that of his subcontractors.

In the event that the Contractor or his Surety is prevented by law or by charter from naming the Owner and his agents, and the Engineers, as insured's in the policies providing the coverage's listed under this Section, the Contractor shall purchase and maintain during the life of this agreement Owner's & Contractor's Protective Liability Insurance in amount of not less than $1,000,000.00; and the named insured's shall be the Owner, his agents, and the Engineers. The insurance shall protect the Owner and his agents, and the Engineers, from any claim or loss arising from any act of the Contractor or his subcontractors or any failure to act on the part of the Contractor or his subcontractors, during the performance of, work under this agreement.

01030 INDEMNITY

The Contractor shall hold harmless, indemnify and defend the Owner and the Engineer, and each of their officers, agents and employees, from and against all loss or expense (including costs and attorney's fees) by reason of any or all suits, actions or claims of any character, name or description brought for or on account of any injuries or damages received or sustained by any person or persons, by any property, or by the Contractor or any of his employees, as a consequence of any action of the Contractor or actions of his employees in connection with the prosecution of the work, or by or on account of any claim arising from or any amounts recovered

under the Workmen's Compensation Law of any other law, ordinance, or decree, excepting only such injury or damage as shall have been occasioned by the sole negligence of the Owner or Engineer.

01036 PATENTS AND ROYALTIES

The Contractor shall pay the costs of all royalties, license fees and patent fees involved by use, or manner of use in the work of all designs, devices, materials, equipment or processes, and the Contractor shall provide for such use or manner of use by legal agreement with the Owner of the patent or a duly authorized licensee of such owner. All such costs referred to hereinabove shall be included in the price bid for the work under this Contract.

The Contractor shall save harmless the Owner and the Engineer from any and all loss or expense by reason of use, or manner of use, in the work of any design, device, material, equipment or process covered by latter of patent or copyright; and the Contractor shall defend all suits resulting from claims for royalties, license fees or patent fees on designs, devices, materials, equipment or processes purchased by the Contractor for use in the work, and from claims for royalties, license fees or patent fees involved by use, or manner of use, of such items by the Owner.

01040 LICENSES AND PERMITS

The Contractor is reminded that it shall be his responsibility to take out and pay for all necessary licenses and permits, and no claims for extra compensation will be allowed by reason of the Contractor's failure to take such items and costs into consideration in the preparation and tender of his proposal. The Contractor shall contact the authorities having jurisdiction in the area of the work in order that he may be fully informed of the requirements relative to licenses and permits. Prior to the beginning of any work, including the placement of a construction trailer on or near the project site, all necessary permits and licenses must be obtained and all licensing requirements shall be met.

01045 COMPLIANCE WITH LAWS, ORDINANCES, AND REGULATIONS

The Contractor shall comply with all Federal, State, and Local Laws, Ordinances and Regulations which in any manner affect the work or the conduct of the work; shall comply with all orders and decrees as may have been adopted or as may be enacted by bodies or tribunals having any legal jurisdiction or authority over the work. The Contractor shall file all reports and give all notices as required for compliance with the above. The Contractor shall indemnify and save harmless the Owner and the Engineer against any suits or actions of any kind or nature brought, or may be brought, against them for any claim or liability arising from or based upon the violation of any such laws, ordinances, work regulations, safety and health regulations, orders or decrees by the Contractor, his subcontractors, his agents, his representatives, his employees, or employees of his subcontractors.

01050 SAFETY

The Contractor, in the prosecution of his work under the Contract, is bound by the requirements of “Safety and Health Regulations for Construction” of the Occupational Safety and Health Administration, U.S. Government Department of Labor, and of other authorities having

jurisdiction in safety matters.

Under the terms and conditions of this Contract, the Engineers shall not act as Safety Engineer or Safety Supervisor, since such responsibility remains solely with the Contractor. The Engineer shall not be responsible for establishing safety practices or for prescribing safety measures for the contractor.

The Contractor is solely and completely responsible for conditions of the job site, including safety of all persons and property affected directly or indirectly by his operations during the performance of the work; and this requirement is not limited in application to normal working hours, but applies continuously twenty-four (24) hours per day until acceptance of the work by the Owner, and thereafter shall be subject to the terms and conditions of the Guaranty.

The duty of the Engineer to review the work in order to determine its acceptability in accordance with the Specifications and to conduct construction review of the Contractor's performance for the benefit of the Owner, shall not be construed as a duty to review the adequacy of the Contractor's safety measures on or near the construction site and/or to direct the actions of the Contractor's employees in the performance of the work as such duties are not included among the responsibilities of the Engineer.

01055 WARNING SIGNS AND BARRICADES

The provision by the Contractor of warning signs, warning lights, barricades and watchmen is subject to the requirements of "Safety and Health Regulations for Construction" of the Occupational Safety and Health Administration, U.S. Government Department of Labor, of the State "Manual on Uniform Traffic Control Devices for Streets and Highways," and of other authorities having jurisdiction in the areas of safety and traffic control. The Contractor is solely responsible for satisfying the safety and traffic control requirements of authorities concerned with or affected by this work.

01060 PUBLIC CONVENIENCE

The Contractor is required to conduct his work as to ensure the least possible obstruction to traffic, to ensure the least possible inconvenience to the general public and the residents in the vicinity of the work, and to ensure the protection of persons and property. Permission of the proper authority is required before any road or street is closed to the public. The maintenance of accessibility of fire-fighting equipment to fire hydrants and to such areas as are necessary for the provision of fire protection is a requirement of the Fire Department of the authority having jurisdiction. The provision of temporary measures as required to ensure the safe use of sidewalks and streets by the public is the responsibility of the Contractor. The proper functioning of all gutters, sewer inlets, drainage ditches and irrigation ditches is to be ensured by constant clean-up along with the work and by provision of temporary facilities where required for the maintenance of natural surface drainage. The implementation of all such maintenance measures and safety precautions is the responsibility of the Contractor.

01065 SANITARY PROVISIONS

The Contractor is responsible for the maintenance of proper sanitary conditions in the area of his work. The provision and maintenance of such sanitary accommodations as may be required for

the use of his employees and of his subcontractor's employees is subject to the Rules and Regulations of the State Board of Health and to all local Codes end Ordinances. Refer to Section 01045.

01070 EXISTING CONSTRUCTION AND FACILITIES

Where construction work under this Contract is adjacent to or crosses highways, railroads, streets, roads, access facilities, or utilities under the jurisdiction of State, County, City or other public agency, public utility or private entity, the Contractor is required to secure written permission from the proper authority and to furnish such bond (cash or surety as required), or insurance agreement as may be required before executing such construction work. A copy of the written permission and bond or insurance agreement (when required) must be filed with the Owner before any work is done. The Contractor is responsible for the replacement and/or repair of all existing construction, utilities or facilities damaged in the execution of work under this Contract. The Contractor will be required to furnish releases from all authorities affected by the work before final acceptance of the work under this Contract.

01075 AVOIDANCE OF POLLUTION CONTRIBUTION DURING CONSTRUCTION OPERATIONS

The employment of all safeguards and all precautions necessary to minimize contributions of pollution to water courses during the construction operations is the responsibility of the Contractor. The proper performance of excavating and backfilling operations, the interception and diversion of surface drainage around excavated areas or areas having the soil cover disturbed, the construction of temporary terraces or dikes, the use of silt fences or other silt retaining means will be necessary to prevent concentration of run-off over freshly excavated or backfilled areas and to minimize stream pollution resulting from soil transported in run-off from the construction site. At the conclusion of the work, and after all temporary facilities have been removed, all areas disturbed by construction operations shall be restored to as good a condition as when found, or to condition as may be specified for the particular area.

01080 USE OF CHEMICALS

All chemicals used during construction of the project or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reagent, or of other classification, must show approval of EPA, USDA, or FDA, according to the purpose for which the particular chemical is to be used. Application of all such chemicals and disposal of residues therefrom are dependent upon the instructions and recommendations of the manufacturer's of the respective chemicals.

01095 SUPERVISION OF THE WORK

The Contractor shall be responsible for planning, scheduling, organization and prosecution of the work in accordance with the Plans, Specifications and Contract Documents. Observations, construction reviews, tests, recommendations or comments made by the Engineer, or by persons other than the Contractor, shall in no way relieve the Contractor of his obligation to complete all work in accordance with the Plans, Specifications and Contract Documents. All work shall be done under the direct supervision of the Contractor. The Contractor shall be responsible for construction means, methods, technique and procedures. The Contractor is solely responsible for safe access to the work, safe use of the work, safe working conditions, and safe occupancy of the

work by and/or for all authorized persons.

The Contractor shall maintain on the project a qualified superintendent who is acceptable to the Owner, and who is capable of providing the efficient supervision required for the successful and satisfactory completion of the work. The superintendent shall have the authority to act in behalf of the Contractor, and all communication with the superintendent shall be considered a communication with the Contractor. The Contractor's superintendent is responsible for coordinating the work of all subcontractors, and his presence at the site of the work is necessary for the adequate performance of his supervisory duties and for the coordination of the work of all subcontractors.

The responsibilities of the Contractor relating to supervision of the work as outlined hereinabove, and the duties of the Contractor as outlined hereinabove, are all a part of the Conditions of this Contract as referred to in the Contract Agreement.

01100 SUBCONTRACTORS

The Contractor may utilize the services of specialty subcontractors on those parts of the work, which under normal contracting practices, are performed by subcontractors. No part of the work, however, shall be sublet by the Contractor without the prior written consent of the Owner, or the Engineer acting upon the instructions of the Owner. Following the execution of the Contract, the Contractor shall submit in writing for review by the Owner the names of subcontractors to whom he proposes to subcontract portions of the work. The early selection of subcontractors, in the case where the Contractor proposes to subcontract any part of the work, is essential to the proper organization of the work, and the Contractor shall therefore submit any names of proposed subcontractors upon or before request by the Owner. The names of proposed subcontractors so submitted shall not be changed by the Contractor after submittal of the list to the Owner unless the consent of the Owner is first obtained.

The Contractor shall be responsible to the Owner for the acts, deficiencies, and omissions of his subcontractors and those of their direct and indirect employees to the same extent as he is responsible for the acts, deficiencies, and omissions of his own and those of his employees.

The Contractor shall bind all subcontractors to the terms of the General Conditions and Contract Documents insofar as they are applicable to the work under subcontract, and shall insert in all agreements with subcontractors appropriate provisions such as 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. The Contractor is required to submit evidence of compliance with such conditions to the Owner before commencement of work by the particular subcontractors.

Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any subcontractor and the Owner.

For convenience of reference, to facilitate organization of the work, and for convenience in evaluating work in progress, the Specifications have been separated into titled Sections. Such separation shall not, however, operate to make the Owner or the Engineer an arbiter to establish limits of work in the contracts between the Contractor and subcontractors. The general charge to the Contractor is that all work be fully completed in accordance with the Plans, Specifications

and Contract Documents, and that the Contractor adhere to the terms and provisions of the Contract Agreement, of which these Conditions are a part.

01110 SUNDAY. HOLIDAY AND NIGHT WORK

Work on Sundays and Holidays, or at night, will be permitted only when the Contractor has received the written permission of the Owner. Work at such times may be required when special connections to existing systems are to be made, when new facilities are to be placed in service, when existing facilities are to be taken out of service, when it is more advantageous to the utilities involved, or when an emergency arises in the work schedule. In such cases the permission of the Owner must be secured prior to beginning work at such times, the work scheduled well in advance, and arrangements made for prosecution of the work with all safety and minimum inconvenience to the public. All work necessary to be performed on Sundays and Holidays, or at night shall be so performed without additional expense to the Owner.

Maintenance work normally required for protection of persons or for protection of the work or property, will be permitted at any time.

01115 EMERGENCY WORK

It is the Contractor's responsibility at all times to guard against bodily injury loss of life, damage to the Owner's property, damage to his own work on the site and damage to adjacent property. In the case of the development of an emergency which should threaten loss of life, injury to persons or damage to property, it is the Contractor's responsibility to furnish and install all necessary materials and equipment, and to perform all work as could possibly be accomplished to prevent loss of life, bodily injury, or damage to property. In all such cases the contractor is requested to immediately notify the Owner of the emergency, but he need not wait for advice or authorization from the Owner before proceeding to employ all measures necessary to protect life and property. Nothing stated hereinabove shall be construed as limiting the Contractor's responsibility under the terms and provisions of the General Conditions and Contract Documents. to protect life and property and to pay claims resulting from loss of life bodily injury, or damage to property. The substance of this Section of the General Conditions is that, in case of an emergency. the Contractor will act with all speed, with all force and in an expeditious manner, to avert loss of life bodily injury and property damage.

01120 CHANGES IN WORK

The Owner shall have the right to increase or decrease quantities of work as established by the number of units of various items of work set forth in the Proposal Form, to make changes in the work, and to require the Contractor to perform extra work necessary for the satisfactory completion of the project. Such increases, decreases, changes, and extra work shall not invalidate the Contract. Should the Contract Price or the Contract Completion Time be affected by such increases, decreases, changes or extra work the compensation and time shall be adjusted at the time when such increases, decreases, changes or extra work items are ordered.

01125 EXTRA WORK

Where new and/or unforeseen items of work are found to be necessary for the satisfactory completion of the project, and where the character of the work is such that a reasonable price for

the performance of the work cannot be established by use of contract prices or combinations thereof, such new and/or unforeseen items of work shall be classed as Extra Work. No Extra Work shall be undertaken except by written order from the Owner. The Contractor shall, upon receipt of written order from the Owner, perform such Extra work and furnish such materials as may be required for the proper completion of construction of the whole work contemplated. In the absence of such written order no claim for extra compensation by reason of performance of Extra Work shall be allowed. Extra Work shall be performed in accordance with the Specifications and Contract Documents, insofar as they are applicable; and where such Extra Work is not covered by the Specifications and Contract Documents, the performance of the work shall be consistent with the intent of these Specifications and Contract Documents.

01130 FAULTY WORK AND DEFECTIVE WORK

The performance of satisfactory work is, under the terms and conditions of this Contract, the obligation of the Contractor. Any faulty work or defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause, will neither be accepted nor paid for. Payment for faulty or defective work will not be made until such work has been removed, re-executed and corrected in manner and form satisfactory to the Owner and in accordance with the Plans and Specifications. The existence of any faulty or defective work will prevent the acceptance of the project. The fact that the Engineer may have previously overlooked such faulty or defective work shall not constitute acceptance of any part of it. The failure by the Engineer to discover faulty or defective work prior to the making of final payment by the Owner to the Contractor, or the discovery or appearance of faulty or defective work after the making of said final payment; shall not relieve the Contractor of responsibility for defective materials or faulty workmanship. The Contractor shall, at his own expense, promptly replace all defective materials or equipment and correct all faulty workmanship discovered and/or appearing within one year from date of written acceptance of the work.

01135 USE OF COMPLETED PORTIONS OF THE WORK

The Owner shall have the right to take possession of and use any completed or partially completed portion of the work, notwithstanding that the time for completing the entire work or such portions of the work may not have expired; but such taking possession and use shall not be deemed to be acceptance of any work not completed in accordance with the Plans, Specifications, and Contract Documents. If such prior use should increase the cost of or delay the completion of uncompleted work, or should cause refinishing of completed work subjected to such prior use, the Contractor shall be entitled to extra compensation or extension of time, or both, as agreed upon by the Owner.

01150 CONTRACTOR'S RESPONSIBILITY FOR PERFORMANCE AND ACTIONS OF WORKMEN

The Contractor is responsible for the conduct, performance and actions of those workmen on the project site who are engaged in the construction of work under this contract between the Owner and the Contractor, whether his employees, his subcontractors, or employees of his subcontractors. All workmen should have such skill and experience as would enable them to reliably, safely and properly perform the particular work or task assigned to them. It is in the best interest of the Contractor to terminate the employment of workmen whose performance endangers the safety of other workmen or any person, or results in unsatisfactory work, or

contributes to delay in the progress of the work, before the Contractor bears the burden of re-executing unsatisfactory work and suffers the cost of delays in the prosecution of the work.

The Contractor may be requested by the Owner to remove or to have removed from the job site for the duration of the project any of his employees, or any of his subcontractors, or any of the employees of his subcontractors who acts in a disorderly or intemperate manner, or who is abusive to representatives of the Owner or of the Engineers or of any Agency having jurisdiction over the project, or who acts in such a manner as would endanger the safety of any person or of the work, all of which acts could give cause for concern for the safety of any person or of the work for which safety the Contractor is solely responsible.

01155 GUARANTY

Neither the final certificate of payment, nor any provision of the Contract Documents, nor partial or entire occupancy and/or use of the work by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work which shall appear within a period of one year from the date of final acceptance of the work and shall pay for damages to other work facilities persons, or property resulting from such defects.

The Performance Bond shall remain in full force and effect during the guaranty period and the Surety shall be liable for the correction of any faults and/or defects that may have appeared within the guaranty period and have not been corrected by the Contractor.

01160 MATERIALS AND EQUIPMENT

The materials and equipment incorporated and/or installed in the work shall meet the requirements of the Contract Documents. All materials and equipment shall be subject to review by the Engineer and no materials and equipment shall be ordered until information relating to such materials and equipment has been reviewed by the Engineer. The Contractor shall be responsible for furnishing and installing all materials and equipment required for the complete work, and all materials and equipment so furnished and installed shall be guaranteed by the Contractor in accordance with the provisions of Section 01155.

In order to establish standards of quality the Engineer has, in the detailed Specifications or on the Plans referred to certain products by name or by name and catalog number. This procedure is not to be construed as eliminating from competition other products of equal or better quality as manufactured by other companies, unless specifically stated that no other manufacturers will be acceptable. Materials or articles which according to the judgment of the Engineer will fully meet the design criteria are equal in function and durability and are suitable for use in arrangement as shown on the Plans will be acceptable.

It must be understood that equipment and articles of different manufacture although they may be equal in construction quality durability and performance may not have the same dimensions configurations and arrangement of connections. It then becomes the responsibility of the Contractor to take into consideration any variations in dimensions and connection arrangement of the equipment or articles that he proposes to offer from those of equipment shown on the Drawings or called for in the Specifications and make certain that the proposed equipment or

article can be installed in a neat and efficient arrangement in the space available. In the layout of the equipment and connections thereto, accessibility for proper maintenance is a requirement in order to ensure satisfactory operation.

It is essential that all material, manufactured articles and equipment be applied, installed, erected, connected, cleaned, conditioned for use and placed in service in accordance with the instructions of the particular manufacturer of such materials, articles and equipment.

Only those manufactured and fabricated items fully complying with applicable standards of the Occupational Safety and Health Administration may be offered, and the manufacturer's or fabricator's certificate to that effect will be required with the submittal of each item by the Contractor.

Substitution of equipment, articles or materials other than those shown on the Plans or called for in the Specifications, when requested by the Contractor, will be considered, provided that the design and construction of such equipment, articles or materials indicate that they will meet the requirements of these Specifications. By tender of a request for a substitution, the Contractor implies that he has fully investigated and analyzed the product, and that he guarantees that the product will fully meet the design criteria of the product specified, has the durability and life expectancy of the product specified, is equal in function and performance to the product specified, and is suitable for installation in efficient arrangement in the space shown on the plans. The Engineer will review the proposed substitutions and make his recommendations within a reasonable time. The Contractor shall abide by the Engineer's decision when proposed substitute equipment, articles or materials are not recommended for installation and, in such case, shall furnish the specified article, item of equipment or material. The decision of the Engineer to accept the substitute product shall not relieve the Contractor of his guarantee as set forth hereinabove, and such guarantee shall be furnished before the equipment is ordered.

In order to be considered by the Engineer, any request by the Contractor for substitution of products must be made in a timely manner. By “timely” it is meant that any such requests should be made as early after the commencement of the project as is possible so that sufficient time will be allowed for: review by the Engineer along with review of other submittals in connection with the project; in case of rejection of the submittal, preparation of succeeding submittals covering other substitute products; reviews of the succeeding submittals; ordering and manufacture of an acceptable product; delivery of product to job site well in advance of the time that it is scheduled to be installed.

Items of equipment, articles or materials which are not equal to samples reviewed by the Engineer, do not conform to the requirements of the Specifications or the requirements of applicable standards, or are in any way unsatisfactory or unsuitable for the purpose or service for which they are intended, shall neither be furnished nor installed.

01165 SAMPLES OF MATERIALS

All samples called for in the Specifications or required by the Engineer shall be furnished by the Contractor and submitted to the Engineer for his review. Samples shall be furnished well in advance of the anticipated time of fabrication or use of materials represented, and the Engineer shall be allowed reasonable time for consideration of samples submitted.

When required, samples shall be accompanied by laboratory test reports and/or certified compliance statements indicating that the materials represented conform to the requirements of the Specifications. Sampling and testing of materials shall be performed in accordance with standard methods referred to in the Specifications.

All samples submitted by the Contractor shall be accompanied by a covering letter indicating that such samples are recommended by the Contractor and that the Contractor's Guaranty will fully apply. All materials, equipment, and workmanship represented by samples accepted for use in the work shall be guaranteed by the Contractor in accordance with the Guaranty provisions of the Contract Documents.

01170 TEST REPORTS AND CERTIFICATES

Laboratory test reports on materials proposed to be used in the work shall be furnished by the Contractor in accordance with the provisions of Section 01165.

Certified statements of compliance where required by the Specifications shall be furnished by the Contractor.

Certified mill test reports, where required by the Specifications, shall be furnished by the Contractor.

01175 SHOP DRAWINGS

The Contractor shall provide all shop drawings, setting layouts and schedules, pipe layout and installation schedules, piping installation details, and such other drawings as may be necessary for the proper and satisfactory prosecution of the work, all in accordance with the intent of the Drawings and Specifications to secure a complete and operable project capable of satisfactory performance of the service intended, except when, upon the request of the Contractor, the Engineer may waive the requirement in the case of standard manufactured items named in the Specifications. The Contractor may consult with the Engineer regarding specific items. The drawings shall be submitted in accordance with an orderly schedule based upon time required for fabrication or manufacture and delivery, and upon time at which materials fabricated items, or manufactured items will be required to be incorporated in the work.

Deviations from the Drawings and Specifications shall be called to the attention of the Engineer by the Contractor at the time when such shop drawings or other drawings are first submitted to the Engineer for his consideration. The Engineer's review of any drawings shall not release the Contractor for responsibility for such deviations, or any subsequent deviations not noted by the Contractor or the Engineer.

Shop drawings and other drawings submitted for review by the Engineer shall bear the Contractor's certification that he has reviewed, checked, and approved such drawings, that they are in harmony with the requirements of the project and with the provisions of the Contract Documents, and that he has verified all field measurements, construction criteria materials, catalog numbers, and similar data. The Contractor shall also certify that the work represented by the shop drawings is recommended by the Contractor and that the Contractor's Guaranty will fully apply.

The finished assemblies represented by the shop drawings and other such drawings are required to be in conformance with the standards of the Occupational Safety and Health Administration, wherever applicable. Refer to Section 01060.

01178 SUBMITTAL DATA

The Contractor is requested to carefully reed the provisions of Sections 01160, 01165, 01170, 01175 and 01180 of the General Conditions. The actions required to be taken by the Contractor during the submittal process shall include, but shall not be limited to the following:

1. The Contractor must thoroughly review all submittal data before forwarding such material to the Engineer for his review, shall indicate on the submittal material that he has made such a review, and shall verify such indication or statement by his signature or initials. Any submittals not having been reviewed by the Contractor will be returned to him for re-submittal. Each submittal shall be numbered consecutively in order of submission to the Engineer. Re-submittals shall be designated with the original submittal number and the suffixes A, B, C, etc., as required, to indicate consecutive resubmissions.

2. Submittal items shall be referenced to the applicable Division, Section and page numbers of the Specifications.

3. Submittal items shall be referenced to sheets (by number) of the Contract Drawings on which such items appear, when applicable.

4. Particular features of the items (submitted) that may deviate from those specified and/or shown on the Contract Drawings shall be indicated by notations on the submittals or by separate comments made by the Contractor.

5. Submittals shall be legible and should be original information. Copies of facsimiles will not be acceptable.

6. Submittals for equipment, materials, etc. from different specification divisions shall not be made under a single letter of transmittal.

Unless a greater number is called for in various portions of these Specifications the minimum number of copies of submittal data shall be **two (2)**.

01180 EQUIPMENT DATA

The Contractor shall submit, for review by the Engineer, complete catalog data for every manufactured item of equipment and all components to be used in the work, including: specific performance data material description, rating capacity working pressure, material gage or thickness brand name catalog number general type, and other pertinent data. Submittals shall be compiled by the Contractor and reviewed by the Engineer before equipment is ordered. Where details of items of equipment are affected by details of items of other equipment, submittals for such associated items of equipment shall be compiled by the Contractor and reviewed by the Engineer before any such associated items of equipment are ordered.

Catalog data for equipment submitted by the Contractor shall not supersede the Contract Documents. The Contractor shall check the equipment and work described by the catalog data against the requirements set forth in the Contract Documents in order to determine the existence of any errors or deviations. The review by the Engineer shall not relieve the Contractor of the responsibility for correcting and/or remedying such deviations from the Drawings and/or Specifications either by redesign or by submitting equipment fully meeting the requirements of the Contract Documents. The Contractor shall in writing call the attention of the Engineer to equipment deviations at the time of the submittal. If the equipment should be accepted the Contractor will ensure the proper fit of the equipment in the work and guarantee that the equipment is suitable for the service intended and that the performance of the equipment, with respect to life and efficiency will equal or exceed that of the equipment specified. The form, extent and specifics of the Contractor's Guaranty shall be subject to the decision of the Engineer. Review by the Engineer of the Contractor's submittals of catalog data shall not relieve the Contractor of responsibility for errors in the submittals.

Equipment data submitted for review by the Engineer shall be accompanied by a covering letter from the Contractor indicating that he has reviewed, checked and approved the data submitted; that equipment represented by the submittal is in harmony with the requirements of the project and with the provisions of the Contract Documents and that he has verified all field measurements construction criteria, material, catalog numbers, and similar data. The Contractor shall also certify that the work represented by the manufacturer’s drawings and equipment data is recommended by the Contractor and that the Contractor's Guaranty will fully apply.

The complete submittal of all data as called for hereinabove, all actions and statements of the Contractor as called for hereinabove, review by the Engineer and concurrence by the Engineer that the equipment is suitable for use on the project are all required as a prerequisite to the ordering of the equipment by the Contractor and, in the case where Shop Drawings may be required the acceptability of the Shop Drawings is also a prerequisite to the manufacture of the item.

01185 STORAGE OF MATERIAL AND/OR EQUIPMENT

Materials and/or equipment to be incorporated in the work shall be properly housed or otherwise protected from corrosion and damage so as to ensure the preservation of their finish quantity and fitness for the work. Where considered necessary to secure proper protection the materials shall be placed on racks, platforms, or hard clean surfaces not subject to surface drainage. Factory finished items shall be stored above ground, covered, individually sealed, or housed indoors as required. The Contractor shall be aware of the potential difficulties involved in the storage of equipment fitted with bearings which may suffer damage from a long period of idleness, and shall take such precautionary measures as may be required to preserve the life expectancy of the bearings. Materials not properly stored, housed and maintained in condition for service as intended will neither be paid for as stored materials nor as materials incorporated in the work.

Stored materials and equipment shall be located and arranged so as to facilitate observation. Private property shall not be used for storage purposes without the written consent of the owner or lessee of said property. The Contractor may elect to store material and equipment off-site if the said materials and equipment are suitably stored and insured. Any agreement for rental of such storage space by the Contractor shall contain a provision that the material and/or equipment stored in a warehouse shall not be subject to a lien for payment of storage. The Owner shall be

protected against loss of or damage to such stored equipment by the terms and endorsements of the Contractor's insurance policies.

01190 CONTRACT DRAWINGS

The Contract Drawings, titled Alabama Highway 202 Water Transmission Project, Phase 2 are on file in the office of the Owner.

The aforesaid Drawings, together with the Proposal, Advertisement for Bids, Bidder's Bond, Instructions to Bidders, General Conditions, Supplemental General Conditions (where required), Contract Agreement, Performance Bond, Labor and Material Bond, Specifications, and any Addenda, constitute the Contract Documents. The Drawings shall be used in connection with the Specifications and other Contract Documents, and shall constitute a part of the Contract Agreement as if set out therein in full.

The Owner reserves the right to amend or revise the Drawings, and to furnish such other detail drawings as, in the opinion of the Engineers, may be necessary for the proper prosecution of the work. All such additional drawings shall have equal force and effect as the original drawings.

Any seeming conflict between the Drawings, Specifications, and other Contract Documents, shall be submitted to the Engineer, and the Engineer's decision shall be final.

Drawings and Specifications are intended to be complementary, and where work is called for in one but not in the other, it shall be performed as though it were specified and/or indicated in both.

The figured dimensions and/or elevations shown on the Drawings shall be used by the Contractor for the layout of the work. Where the work of the Contractor is affected by finish dimensions, such dimensions shall be determined by the Contractor at the site of the work, and he shall assume the responsibility therefore.

01210 OBSERVATION OF THE WORK

The Engineer will decide questions which may arise as to the quality and acceptability of materials and/or equipment furnished, the quality and acceptability of work performed, interpretations of the Drawings and Specifications, and all questions with respect to the acceptable fulfillment of the Agreement on the part of the Contractor. The Contractor shall abide by these decisions. The duties and responsibilities of the Engineer as set forth herein shall not be extended except through written consent of the Engineer and the Owner.

All materials and each part or detail of the work shall be subject at all times to observation by the Engineer and the Owner, and the Contractor shall be held strictly to the intent of the Contract Documents in regard to quality of materials, equipment and workmanship, and also in regard to the diligent execution of the Contract. Observations may be made at the site or at the sources of supply of material whether mill, plant or shop. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make his observations and construction review.

The Engineer's decision as to the acceptability or adequacy of the work shall be final and binding

upon the Contractor. The Contractor agrees to abide by the Engineer's decision relative to the performance of the work.

All claims made by the Contractor shall be submitted to the Engineer for his decisions. Such decisions shall be final except that, in cases where time and/or financial considerations are involved, the claims shall be submitted to the Owner for his review and shall be subject to the approval of the Owner. Meritorious claims shall be resolved, if possible, by mutual agreement between the Contractor and the Owner.

01212 FIELD REVIEW OF CONSTRUCTION WORK

During the construction of the work, as defined by the Plans and Specifications therefore, a Field Representative will be assigned to the project. .

The duties of the Field Representative shall consist of visual review of materials, equipment and construction work for the purpose of ascertaining that the product of the Contractor's work substantially conforms to the Contract Drawings and is in substantial conformance with the reasonable intent of the Specifications for the project. The presence of the Field Representative at the site of the work shall not be relied upon by others as acceptance of the work, nor shall it be so construed as to relieve the Contractor in any way from his obligations and responsibilities under the Contract, the Specifications and the Contract Documents. Review of the construction work by the Field Representative or by the Engineer shall not require either the Engineer or the Field Representative to assume responsibilities for the means and methods of construction nor for safety on the project site, in areas adjacent to the project site, or in other areas affected by the work performed on the project.

01245 TESTING OF COMPLETED WORK

After completion of work and before acceptance of the work by the Owner, the Contractor shall perform all tests as required by the Specifications. The cost of all labor, tools, materials and equipment necessary for making the required test shall be borne by the Contractor. Any work found to be defective, faulty, or otherwise unsatisfactory shall be corrected by the Contractor without additional compensation. All work shall be guaranteed against defects for a period of one year after the acceptance of the work.

01810 CONTRACTOR'S QUALIFICATIONS, EXPERIENCE, AND RESPONSIBILITIES

By his tender of a bid for performing the work of constructing the waterworks improvements, the Contractor implies that he is experienced in such construction and is familiar with all phases of the work necessary for a complete job.

The Contractor shall have on the work at all times a superintendent who shall also be experienced in the particular type of construction, shall be familiar with all phases of the work, shall be capable of direction of work of all trades and crafts associated with the work, and shall be capable of making decisions relative to construction procedure.

It shall be the responsibility of the Contractor to ascertain whether his subcontractors have supplied him with all the components necessary for a complete job, since, in the making of a bid,

the Contractor has assumed full responsibility for a complete and satisfactorily operative job.

The Contractor is advised that, for equivalent equipment of different manufacture, control circuits and piping connections are not necessarily the same. The Drawings and Specifications do not presume to show or describe control circuits and piping connections necessary for the various types of equipment which may be used. It shall be the responsibility of the Contractor to secure detailed Drawings of connections and control circuits from the manufacturer of the equipment that he uses and make all necessary arrangements for a satisfactorily operative installation.

It is intended that all drawings be in substantial agreement. The indication on certain sheets of the Drawings of items of work to be performed at specific locations, although reference to same items of work at same locations may not appear on other sheets of the Drawings, shall be construed by the Contractor that such items of work are fully intended, and the Contractor shall be held responsible for the performance of such items of work. Where typical details and notes applicable to the type of work to be performed appear on certain sheets of the Drawings, but may be omitted on other sheets, the Contractor shall assume that such typical details and notes are applicable to similar situations throughout the entire work. If, however, any discrepancies or contradictions should be found, the Contractor shall immediately report such discrepancies or contradictions to the Engineer and ask for written interpretation or correction in form of Addendum.

It is intended that the Plans and Specifications shall be complimentary, and shall be so used by the Contractor. Any contradictions between Plans and Specifications found by the Contractor shall be immediately reported to the Engineer, and the Contractor shall ask for a written interpretation or correction in form of Addendum.

The Contractor shall be solely and fully responsive for all acts of his employees, subcontractors, and the suppliers at the site of the work in connection with the work.

01820 PROTECTION OF THE OWNER, AGENTS OF THE OWNER, WORKMAN, AND THE PUBLIC

The Contractor and Superintendent are requested to carefully read the Sections of the Division 1 – General Conditions relating to protection of the Owner, agents of the Owner, workman, and the public, such as Insurance; Indemnity; Licenses and Permits; Compliance with Laws, Ordinances and Regulations; Safety; Warning Signs and Barricades; Public Convenience; Sanitary Provisions; etc. This request is made to stress the importance of safe prosecution of the work, and does not imply that the Contractor and his Superintendent should not be completely familiar with all Sections of the General Conditions and all other provisions of the Contract Documents. Under the terms and conditions of this Contract, the Engineer shall not be required to act as Safety Engineer or Safety Supervisor since such responsibility remains solely with the Contractor, who, in the prosecution of his work, is bound by the requirements of "Safety and Health Regulations for Construction, Occupational Safety and Health Administration, U. S. Government Department of Labor", and of other authorities having jurisdiction. It is recommended that the Contractor seek the advise of the Safety Inspector of his Insurance Carrier in regard to job safety, and that he observe all precautions and safety provisions as outlined in the "Manual of Accident Prevention in Construction", as published by the Associated General Contractors of America, to the extent that such provisions are not inconsistent with applicable laws or regulations.

01850 LOCATION OF EXISTING FACILITIES

The type, size, and physical location of all facilities are shown from available records and the accuracy of said information is in no wise guaranteed. The Contractor is requested to make additional investigations as he may desire. The Contractor shall assume all risk arising from, or out of, performing work in the vicinity of existing facilities, or connecting to existing facilities.

01855 MAINTENANCE OF OPERATION OF EXISTING FACILITIES

The contractor shall conduct all of his construction operations in such a manner that interference with operation of the existing facilities will be kept to a minimum. All activities affecting the existing facilities shall be coordinated with the Owner. The Contractor is reminded of the necessity of maintaining continuous operation of the facilities.

Whenever the Contractor's construction operations should affect the incoming electrical service, or flow into or out of the facilities, the Contractor shall make all provisions for maintenance of flow of water through the facilities including temporary pumping and piping and around the clock scheduling of work.

01860 OPERATOR GUIDANCE DURING INITIAL OPERATION

After all equipment testing and adjustment has been performed to the satisfaction of the Engineers and after the mechanical shake-down has been completed the improvements shall be placed in operation with the assistance of the Contractor's forces. The personnel of the Owner shall then perform all operating functions in accordance with instructions previously received from equipment manufacturers through their respective representatives assigned to the job for the purpose of installing, testing and adjusting the various items of equipment in accordance with the operation manuals furnished by the manufacturers for the particular items of equipment incorporated in the work and in accordance with the Operation and Maintenance Manual for the improvements.

01870 SCHEDULE OF WORK

All proposed activities requiring partial or complete shutdown of the existing water system facilities shall be scheduled by the Contractor and approved by the Owner as far in advance as possible. The exact time and duration of any and all periods of shutdown of the existing systems or facilities shall be approved by the Owner.

01875 OPERATION AND MAINTENANCE CONSIDERATIONS

The Owner, in an attempt to optimize operating and maintenance costs, wishes to reduce parts inventory costs to the extent practicable and to simplify operation and maintenance procedures to the extent practicable. All electrical and mechanical equipment fully meeting the requirements of these Specifications shall therefore conform insofar as is practicable to types of equipment already in use in the existing system.

DIVISION 2

SITE WORK

02110 PREPARATION OF SITE

Preparation of site shall consist of the relocating, maintaining and/or removal of all fences, railings, poles, pipelines, culverts, structures, pavement, walkways, etc., located within the areas to be graded or to be occupied by new structures, pipelines, or other, components of the project. Such relocations, maintenance and/or removal may be required when the permanent use of such facilities will be required during construction or after construction, or when the temporary use of such facilities will be required. Site preparation work shall also include the provision of such drainage ditches, banks, travel-ways, etc., as may be required for proper prosecution and protection of the work.

02115 CLEARING AND GRUBBING

Clearing and grubbing shall consist of cutting, removing, burning and disposal of all trees; brush, stumps, grass, woods, roots, etc., within areas indicated to be graded, filled, or occupied by structures or other facilities. All roots projecting from walls of excavation shall be either cut or removed so that minimum clearance of three (3) feet from outside line of structure will be secured. No vegetation or other perishable material shall be left within the area to be occupied by any part of the work. Trees which are damaged or have root systems effected by the work to the extent that they will likely die in the judgment of the Owner shall be removed by the Contractor at no additional cost to the Owner.

Any areas where clearing and grubbing is undertaken for construction of the water line shall be cleared and grubbed ten feet on both sides of the waterline.

02120 SITE GRADING

The Contractor shall perform all excavation, shall construct all fills and embankments, and shall perform all grading work in accordance with the elevations and contours shown on the Drawings.

The grading operations shall begin with stripping the topsoil from areas to be excavated, to be covered by embankment or fills, or to be occupied by pipelines, structures, roads and walks. The depth of top soil to be stripped shall be twelve inches (12") or the depth of topsoil shown in the subsurface investigation, whichever is greater. If stored on site for reuse, topsoil shall be placed on the site at locations acceptable to the Owner.

Excavation shall conform to the limits shown on the Drawings or specified herein. Excavation shall not be made below grade except to provide depth required for bedding material or to remove unstable material. Extra excavation for removal of unstable material shall be performed only upon authorization by the Engineer. Any unauthorized excavation below grade shall be backfilled with material as specified herein and such excavation and backfill shall be at the expense of the Contractor.

Excavated material suitable for use as backfill around structures, as trench backfill or as

embankment fill may be stored at the site of the work until backfilling operations have been completed. Material which is unacceptable for use as backfill around structures, as trench backfill, as embankment fill, or as general fill on the site of the work shall be removed from the site and disposed of at the Contractor's expense. All excess excavated material shall be removed from the site of the work and disposed of at the Contractor's expense.

Final backfill on the site of the work, except over areas to be occupied by structures, walks, roadways, paved areas, etc., shall be of such material as will support vegetation. The entire area disturbed by the construction operations shall be restored to original conditions by seeding and development of grass cover to prevent stream pollution resulting from soil erosion in accordance with the requirements of the **GENERAL CONDITIONS.**

All fill material, not specified to be crushed stone, which is placed in areas to be occupied by structures, bearing slabs, footings, roadways, walks, embankments, dikes, or other earth structures shall be compacted to 95% of maximum density or the degree of compaction called for in the subsurface investigation report, whichever is greater.

All fill material, not specified to be crushed stone, which is placed in areas of general fill, as distinguished from areas described hereinabove, shall be generally compacted to approximately 85 % of maximum density or the degree of compaction called for in the subsurface investigation report, whichever is greater. The exception to this rule is backfill for trenches which shall be governed by the requirements of these specifications which specifically describe backfill for trenches.

The Contractor shall consult with the Owner regarding use of the site for fill areas and spoil areas, the purpose being: to conserve the maximum amount of topsoil for use in final grading; to avoid rendering any usable part of the work site unfit for future use; to, insofar as is practicable, handle and dispose of material in a manner conforming to final landscaping or grading plan; and to maintain maximum access to the construction work and existing or new facilities.

02125 DISPOSAL OF CLEARING DEBRIS

It shall be the responsibility of the Contractor to dispose of all debris resulting from clearing and grubbing operations. No materials resulting from the clearing and grubbing operations shall be left on the site except those materials temporarily used to form silt barriers or those materials processed into chips for landscaping or erosion control. After permanent erosion-prevention cover established by the Contractor has been satisfactorily developed the temporary silt barriers shall be removed. Processed chips may be left on the site provided that the concurrence of the Owner is first secured, and then only in locations satisfactory to the Owner.

All holes and/or depressions caused by the removal of stumps, roots, snags, etc. shall be filled with backfill in accordance with finished contours shown on the Drawings and fill requirements specified herein.

Disposal of debris shall be accomplished in such a manner as to fully comply with all laws, codes, ordinances, and requirements of these Specifications.

Burning of material on the work site, when permitted, shall be performed in accordance with the Air Pollution Control Rules and Regulations of the Alabama Department of Environmental

Management (ADEM) and with the Air Pollution Control Rules and Regulations of the County Department of Health. The Contractor shall secure written approval of burning and method of burning from the County Health Officer or appropriate local authority.

The burning of stumps, timber, logs, trimmings, brush, or other combustible materials where allowed shall be accomplished in such a manner that there will be no smoke or fly ash nuisance. Burning shall not be initiated when atmospheric conditions are such as would cause a static cover in the area. Burning shall be strictly controlled; and quantities of materials being burned shall be limited so as to prevent damage to trees and/or growth adjacent to the cleared area, or to facilities or structures located in the surrounding area. Fires shall be attended at all times.

02130 EROSION CONTROL AND PREVENTION OF STREAM POLLUTION

The Contractor shall plan his clearing work and construction operations in such a manner as to effectively control soil erosion and runoff. The Contractor shall prevent pollution of streams and/or storm drains as would result from silt or soil runoff, or as would result from any material used in the construction operations such as oil, grease, paints, chemicals, fuels, solvents, or any construction debris.

The Contractor shall intercept and block drainage from the construction site by means of silt fences, silt barriers and sedimentation pools as required. Silt fences, wherever used on the site, shall consist of hay bales securely fastened in place or of suitable permeable-barrier fabric designed to filter water and retain silt. Fabric shall be securely set in the ground and firmly held in place. **Silt fences and hay bales will be paid for on a lump sum basis for erosion control as set forth in the Proposal Form**.

Before beginning work on the site the Contractor shall submit to the Owner and the Alabama Department of Environmental Management, as required, a Notice of Registry and a plan and descriptive narrative indicating the Contractor's proposed measures and management practices for control of soil erosion, runoff, and prevention of stream pollution.

02135 PROTECTION OF WOODED AREAS, UNDERGROWTH, AND GROUND COVER

All construction, clearing and grubbing work shall be performed within the limits shown on the Drawings. Trees, undergrowth, and ground cover outside of the construction limits shall not be damaged or disturbed. Any tree scarred by equipment shall be immediately repaired and painted with approved asphaltic coating material. All damaged limbs shall be pruned by a clean cut, and cut shall be painted with approved asphaltic coating material. Damaged undergrowth shall be pruned and treated. Ground cover disturbed shall be restored by seeding.

All areas adjacent to the construction site that may be disturbed or damaged by the Contractor's operations, or that may be used by the Contractor during his construction operations, shall be restored in accordance with these Specifications.

02140 OWNERSHIP OF ANYTHING OF VALUE EXCAVATED DURING PROGRESS OF WORK

Anything of value found during the progress of the work, as determined by the Engineer and

Owner, shall become the property of the Owner, who will determine the method of disposal.

02145 DISPOSAL OF MATERIALS REMOVED FROM CONSTRUCTION SITE

The Contractor shall remove from the construction site all materials and debris resulting from the clearing and grubbing operations, all materials and debris resulting from the construction operations, and all material unsuitable for use as backfill or for use in restoration of surface of the construction site.

The Contractor shall make all necessary arrangements for disposal of the materials and debris described hereinabove. It shall be the Contractor's responsibility to fully satisfy the requirements of the landowners whose property he has used as disposal sites for materials and debris removed from the project site. Should such properties or disposal locations be adjacent to the project site and not of remote location, the surfaces of such adjacent lands shall be restored in accordance with the provisions of these Specifications as well as in accordance with requirements of the owner of such adjacent lands.

The provisions of these Specifications may be waived in the event that the Contractor should elect to dispose of materials and debris removed from the project Site at a landfill meeting the requirements of the Alabama Department of Environmental Management and/or the local Authority having jurisdiction. In such case it shall be the responsibility of the Contractor to dispose of the materials at the landfill in accordance with the Rules and Regulation established by the Authorities and/or Agencies mentioned hereinabove for operation of the landfill.

All costs associated with the removal and disposal of materials and all costs associated with the restoration of surfaces of disposal areas shall be included in the unit prices and/or lump sum prices bid for the work under the Contract. There shall be no extra cost to the Owner for such removal, disposal and surface restoration work.

02152 SILT FENCE

Silt fences shall consist of a geotextile filter fabric attached to posts by means of adjustable belts or loops or other means that will securely hold the fabric in an upright position.

The filter fabric shall be a polymeric fabric formed from a plastic yarn of longchain synthetic polymer composed of at least 85% by weight of propylene ethylene, amide, ester or vinyledene chloride and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure for at least six months. The filter fabric shall be a minimum of three feet in width. The filter fabric shall conform to the following physical requirements:

Grab Strength	ASTM D-4632	175 Lb. Min.
Grab Elongation	ASTM D-4632	20% Min.
Permeability	ASTM 4491	30 gpm/Ft2 Max.
UV Resistance	ASTM 4355	70% Min.

Silt fences shall be installed at locations as indicated on approved erosion control submittals and at such additional areas as may be directed by the Owner or Engineer. Silt fences shall be in place before the major construction in an area is begun. Installation of silt fences shall be in

conformance with the silt fence manufacturer's recommendations and instructions.

The Contractor shall maintain, clean, repair-or replace the silt fence as may be required during the construction period. Should a silt fence reach its capacity to function properly and the need for a back-up fence becomes evident, the Contractor shall install a secondary line of silt fence at such area as required and authorized by the Engineer. Failure to maintain a silt fence shall not be cause for the Contractor to claim additional compensation for installation of a new line of fence.

After stabilization of the erosion activity in an area has been reached, the Contractor shall remove and dispose of the silt fence and dress out the area.

Costs associated with silt fence shall be included in the lump sum price bid for erosion control under this Contract. These costs shall include all costs for materials, equipment, labor and suppliers, including overhead and profit for furnishing, installing, maintaining, repairing; and removal, disposal and clean up.

02155 RIP-RAP

Rip-rap shall be placed over the backfill for trenches, back of head walls and around headwalls for erosion control and channel protection, and in locations as shown on the Drawings. The widths and lengths shown for riprap coverage are the minimums judged to be required. Field conditions or changes in field conditions may dictate that the coverage at a particular location be decreased or increased. The quantities of rip rap shown in the Proposal Form to be furnished and placed are therefore approximate.

Rip-rap shall be stone conforming to the requirements of ALDOT Specifications Section 814.01, Class 2 Rip-rap. Rip-rap material shall consist of reasonably well graded stones ranging in weight from approximately 10 pounds to approximately 200 pounds, with not over 10% weighing over 200 pounds, at least 50% weighing over 80 pounds, and not more than 10% weighing less than 10 pounds.

Rip-rap bedding where shown to be required shall consist of gravel or crushed stone ALDOT Size #467. Thickness of bedding shall be as shown on the Drawings.

All stone for rip-rap and bedding, such as shot rock, quarry rock, quarry waste or other materials, shall be sound, durable, and free from seams, cracks or other structural defects. All stone shall be limestone.

Rip-rap shall be placed in accordance with ALDOT Specifications Section 610 for placement of Class 2 rip-rap. Rip-rap shall be placed in such a manner as to produce a reasonably well graded mass or rock having the minimum practical percentage of voids. Riprap shall be placed to its full course thickness in one operation, and in such a manner as to avoid displacement of the bedding material. The finished rip-rap shall be free from objectionable pockets of small stones and clusters of larger stones. Dumping of rip-rap will be allowed provided, however, that mechanical equipment is used to dress the stones to a reasonably uniform slope (where placed for erosion control). Riprap shall be furnished and placed in layer trenches of not less than 12".

Stones deposited contrary to the locations shown on the Drawings will be considered to have been wasted, and no payment will be due therefore. The Contractor shall maintain the rip-rap

protection until the project is accepted, and any material displaced by any cause prior to acceptance of the project shall be replaced at the Contractor's expense.

Rip-Rap furnished and placed at locations identified on the Drawings in accordance with the requirements of and the details shown on the Drawings will be paid for on the basis of unit price bid per cubic yard when such pay item is included in the Proposal Form, except where rip-rap is included in lump sum items or incorporated in other items of work. Payment shall be compensation in full for furnishing all labor materials, tools, equipment and for performing all work in placing the rip-rap.

When a pay item for rip-rap is <u>not</u> included in the Proposal Form, no separate payment for rip-rap shall be made. Compensation for rip-rap in this case shall be included in the Lump Sum Price Bid or the other unit prices in the Proposal Form.

02208 EARTH EXCAVATION

The term Earth Excavation shall be considered as a removal of all materials, not including that specified under the Clearing and Grubbing and "Rock Excavation" items. Rocks and boulders eight (8) cubic feet or less in volume shall be classified as earth.

In the event that the Contractor should excavate below the grade specified, and excess excavation is not authorized by the Engineer, such excess excavation shall be backfilled to the grade specified and/or indicated with compacted crushed stone or compacted backfill material. All such backfilling of excess excavation shall be done at the Contractor's expense.

The Contractor is reminded that all excavation for structures, trench excavation, rock excavation and sheeting and shoring is under the protective guidelines and requirements of OSHA. Safety and Health Regulation for Construction, as set forth in the Federal Register, latest revision, and all such protections are the responsibility of and shall be provided at the Contractor's expense.

02210 ROCK EXCAVATION

In general, rock excavation shall consist of the loosening, removing, and disposing of all rock in original bed, in well defined ledges, or in boulder form. Boulders having a volume of eight (8) cubic feet or less shell not be classified as rock. Material that can be loosened, separated, or ripped by means of heavy duty power tools or excavating equipment shall not be classified as rock.

Heavy blasting in rock which is to form a foundation will not be permitted. Blasting of rock for structures shall conform to the requirements of the specification section Explosives.

02213 EARTH EXCAVATION FOR STRUCTURES

Care shall be exercised in excavating for all footings, foundations and floor slabs, all of which shall be founded on firm undisturbed soil, rock, or compacted backfill or approved material. In the event that, at the elevation shown on the Drawings, soil over the general area to be occupied by a bearing slab is found to be unsuitable for supporting the design load, the Contractor shall remove such soil and replace it with borrow material placed and compacted in accordance with these Specifications. In the event that, at the elevation shown on the Drawings, soil over the area

to be occupied by footings is found to be unsuitable for supporting the design load, the Contractor shall remove such soil and replace it with backfill material (compacted as specified herein), crushed stone, or concrete as concurred with the Engineer.

02215 ROCK EXCAVATION FOR STRUCTURES

Where rock is found to be the supporting material for footings, foundations, or floor slab, the Contractor shall reasonably clean the foundation area in order that proper inspection and evaluation of foundation conditions can be made. If unusual conditions such as would be indicated by presence of seams, fissures or voids should be found, the Contractor my be directed to perform additional cleaning work, utilizing air jets, water jets, or other suitable methods. All seams, voids or fissures found shall be filled with crushed stone of gradation suitable for the particular situation encountered.

In the event that, when excavation to grade line has been completed, it is found that the footing, foundation or slab would bear partly on soil and partly on rock, the rock shall be excavated to depth of six inches (6") below the grade line indicated on the Drawings and/or specified herein, and a compacted crushed stone cushion shall be placed on the rock surface before the concrete is poured. The compacted cushion shall be wetted before placement of concrete.

02218 BACKFILL FOR STRUCTURES

Backfill for structures shall be reasonably dry (within limits required for compaction) silty-clay, weathered shale or other suitable soil mixtures; and such soils shall not contain rock or stone in sizes greater than ½". Native soils as excavated from the site may be used provided that they satisfy the above criteria.

Material for structural and general backfill may be that excavated on the site; but in the event that the excavated material is not in suitable condition at the time when it is required for backfilling purposes, or the quantity of material excavated is not sufficient to make the finished fills indicated on the Drawings, the Contractor shall provide, at his own expense, such additional suitable material as is required.

Backfill shall be made around the walls of the structures as shown on the Drawings; and backfill shall be placed only after the walls have gained sufficient strength to support the load. No rock shall be placed in fill within three (3') feet of the walls of structures. In all fill work the best dirt shall be used as top soil for any planting, sprigging, or sodding that may be required.

Backfill material placed within foundation walls, under footings or slabs, under and around piping installed under footing or slabs, under and around piping located in areas of general excavation (where because of proximity of several pipe lines individual trenches could not be excavated) shall be backfill material as specified. All such backfill material for purposes specified hereinabove shall be furnished and placed by the Contractor at his own expense.

The Contractor shall be responsible for maintenance of the backfill; and shall promptly refill any areas where settlement of backfill has occurred. All backfill around structures shall be sloped and graded as shown on the Drawings or as requested by the Engineers.

Crushed stone, where specified to be used as backfill or a stone cushion for structures shall be

crushed stone meeting Alabama Department of Transportation Gradation #57.

02220 EARTH EXCAVATION IN TRENCHES

The term “Earth Excavation” shall be considered as a removal of all materials, not including that specified under the “Clearing and Grubbing” and “Rock Excavation” items. Rocks and boulders eight (8) cubic feet or less in volume shall be classified as earth.

All trenches for pipe shall be excavated in open cut unless otherwise specified or shown on the Drawings, and to such depths as shown on the Drawings or as required to secure the specified minimum cover over the pipe. Where trenches are excavated in native soil, excavation shall be carried to a depth of approximately 4" under barrel of pipe for placement of the specified bedding material.

The trench shall have a uniform cross section and bottom conforming to the grades shown on the Plans. The pipe shall be laid on firmly compacted approved bedding material and the barrel of the pipe shall have uniform bearing for its full length. Any part of the trench excavation below the grade shown on the Drawings, or intended in these Specifications shall be corrected with bedding material placed and compacted in accordance with the requirements of these Specifications. Where unsuitable or unstable material is encountered at the elevation shown on the Drawings the Contractor shall excavate below the grade (or elevation) shown and backfill such excavation with bedding or stabilizing material.

Boulders and large stones, rock or shale, shall be removed to provide a clearance of at least six (6) inches below all parts of the pipe or fittings and to clear width of at least six (6) inches on each side of all pipe and appurtenances. Where the trench is excavated in rock or shale, the six (6) inch space below the pipe shall be filled with crushed stone finely compacted in accordance with these Specifications to form a cushion for the pipe. Bell holes of ample dimensions shall be dug to permit joining to be properly made and to insure that the pipe is evenly supported throughout its length rather than on joints or couplings.

The Contractor is reminded that all excavation for structures, trench excavation, rock excavation and sheeting and shoring is under the protective guidelines and requirements of OSHA “Safety and Health Regulations for Construction”, as set forth In the Federal Register, latest revision, and all protective measures required are the Contractor's responsibility and shall be provided at the Contractor's expense.

02223 ROCK EXCAVATION IN TRENCHES

In general, rock excavation shall consist of the loosening, removing, and disposing of all rock in original bed, in wall defined ledges, or in boulder form. Boulders having a volume of eight (8) cubic feet or less shall not be classified as rock. Material that can be loosened, separated, or ripped by means of heavy duty power tools or excavating equipment shall not be classified as rock.

Where rock is encountered in trenches, the excavation shall be carried to a depth of six (6) inches below the barrel of the pipe. In no case shall any rock be left nearer than six inches (6") from the outside of the pipe.

02228 BACKFILL FOR TRENCHES

The Contractor shall notify the Engineer prior to backfilling any trench in which pipe has been installed. The Engineers shall review the backfilling operation with respect to character of backfill material, manner of placement and accomplishment of a consolidated and compacted backfill as specified.

Backfill material throughout the trench section shall be thoroughly compacted by means of pneumatic tampers or mechanical tampers. Each layer shall be carried up to the same level on both sides of the pipe so as to avoid unbalanced loading; and each layer shall be evenly compacted on both sides of pipe before the next layer is placed.

Backfill for pipe line trenches shall be placed in 4" layers from the bottom of the trench to a level 12" above the top of the pipe. Backfill above a level 12" above the crown of the pipe shall be placed in layers not exceeding 6" in areas beneath pavement, slabs, footings, etc. and 12" in thickness elsewhere. Each layer shall be thoroughly compacted. After the pipe has been covered to elevation three (3) feet above top of pipe, backfilling may be accomplished by use of bulldozer, bucket or other mechanical equipment if carefully performed in a manner satisfactory to the Engineers. Crushed stone, where specified to be provided, shall be evenly distributed and compacted in layers not exceeding 6".

The Contractor shall properly drain the work and remove water from trenches while bed preparation, pipe laying, and backfilling operations are in progress; shall maintain a firm and stable bed for the pipe during the pipe laying, and backfilling operations and shall continue such pumping and draining until all trenches in which pipe has been laid during a day's operation have been safely backfilled and the pipe secured against movement.

Where the character of the soil is such that the employment of proper and adequate drainage of the work will not enable the Contractor to secure a satisfactory bed for the pipe, the Engineer may request the Contractor to excavate below the specified bedding depth backfill the excess excavation with crushed stone of size suitable for the conditions encountered. Such stone shall be choked with fines (stone screenings). Backfill throughout remainder of trench depth shall be as specified.

Where trenches are excavated in the native soils (other than rock) the bottom of the trench shall be uniform so as to provide even bearing for the barrel of the pipe and shall be at such elevation as will provide the cover shown on the Drawings or the minimum cover specified herein, as the case may be. In no case shall any rock be left nearer than six inches (6") from the outside of the pipe.

Trenches Excavated in Soil (General Purpose)

Bedding and Backfill to a depth of 12" below finished grade shall be reasonably dry (within limits required for compaction) silty-clay, weathered shale or other suitable soil mixtures; and such soils shall not contain rock or stone in sizes greater than 4". The top foot of depth shall be backfilled with soil that can be smoothly dressed to match surface of ground adjoining the edges of the trench, and that will support the vegetation desired for the finished surface and required by the finished grading and grassing requirements. Under no circumstance shall saturated soil material be placed in trench line. Native soils as excavated from the site may be used provided

that they satisfy the above criteria.

In areas of general excavation (where pipe lines are installed and where, because of proximity of several pipe lines, individual trenches cannot be excavated) the backfill shall be crushed stone meeting ALDOT Gradation #57 to within 12" of finished grade.

No extra compensation will be allowed to furnish and Install suitable native soil materials, crushed stone, or flowable fill as specified herein. Contractor shall furnish and install all backfill materials at his or her own expense.

Trenches Excavated in Soil (Beneath Paved Streets or Areas to be Paved, Slabs, Footings, Walks, or Specifically Noted on Drawings)

Bedding and all backfill shall be crushed stone meeting ALDOT Gradation #57 compacted as specified above or ready mix flowable fill.

Flowable fill shall meet the general requirements of the Alabama Concrete Industries Association. Flowable fill mix design shall be the responsibility of the supplier. In general, however, the ready mixed flowable fill shall be of a flowing, self-leveling consistency which requires no placing in lifts, tamping, or compacting. The ultimate compressive strength of the flow able fill material shall be approximately 150 psi so that the fill material may be easily re-excavated in the future. The mix design shall be adjusted as required so that traffic may be restored as soon as possible. Flowable fill shall be installed from the bottom of the trench so that it encases the pipe to 2" below the surface of existing paving. For paving, a minimum of 2" of asphalt shall be installed on top of the flow able fill so as to restore the existing road to existing grades.

No extra compensation will be allowed to furnish and install suitable native soil materials, crushed stone, or flowable fill as specified herein. Contractor shall furnish and install all backfill materials at his or her own expense.

Trenches Excavated In Rock (General Purpose)

Where trenches are excavated in rock the excavation shall be carried to a depth of 6" below the barrel or shell of the pipe. Where the Contractor has blasted the rock to a depth of greater than 6" under the barrel or shell of the pipe he shall remove such blasted rock and replace the blasted rock with a layer of crushed stone so as to bring the crushed stone bed up to level 6" below the barrel of the pipe. Bedding and Backfill to a depth of 12" above the pipe shall be crushed stone meeting ALDOT Gradation #57. Backfill from a depth of 12" above the pipe to a depth of 12" below finished grade shall be reasonably dry (within limits required for compaction) silty-clay weathered shale or other suitable soil mixtures; and such soils shall not contain rock or stone in sizes greater than 4". The top foot of depth shall be backfilled with soil that can be smoothly dressed to match surface of ground adjoining the edges of the trench and that will support the vegetation desired for the finished surface and required by the finished grading and grassing requirements. Under no circumstance shall saturated soil material be placed in the trench line. Native soils as excavated from the site may be used provided that they satisfy the above criteria. In areas of general excavation (where pipe lines are installed and where, because of proximity of several pipe lines, individual trenches cannot be excavated) the backfill shall be crushed stone meeting ALDOT Gradation #57 to within 12" of finished grade.

No extra compensation will be allowed to furnish and install suitable native soil materials, crushed stone, or flowable fill as specified herein. Contractor shall furnish and install all backfill materials at his or her own expense.

Trenches Excavated in Rock (Beneath Paved Streets or Areas to be Paved, Slabs, Footings, Walks, or Specifically Noted on Drawings)

Where trenches are excavated in rock beneath paved streets, paved areas, or areas to be paved as part of the contract, slabs, footings, walks, or as specifically indicated on the drawings, the excavation shall be carried to a depth of 6" below the barrel or shell of the pipe. Where the Contractor has blasted the rock to a depth of greater than 6" under the barrel or shell of the pipe, he shall remove such blasted rock and replace the blasted rock with a layer of crushed stone so as to bring the crushed stone bed up to level 6" below the barrel of the pipe. Bedding and all backfill shall be crushed stone meeting ALDOT Gradation #57 compacted as specified above; or ready mix flowable fill.

Flowable fill shall meet the general requirements of the Alabama Concrete Industries Association. Allowable fill mix design shall be the responsibility of the supplier. In general, however, the ready mixed flowable fill shall be of a flowing, self-leveling consistency which requires no placing in lifts, tamping, or compacting. The ultimate compressive strength of the flowable fill material shall be approximately 160 psi so that the fill material may be easily re-excavated in the future. The mix design shall be adjusted as required so that traffic may be restored as soon as possible. Allowable fill shall be installed from the bottom of the trench so that it encases the pipe, to 2" below the surface of existing paving. For paving, a minimum of 2" of asphalt shall be installed on top of the flowable fill so as to restore the existing road to existing grades.

No extra compensation will be allowed to furnish and install suitable native soil, materials, crushed stone, or flowable fill as specified herein. Contractor shall furnish and install all backfill materials at his or her own expense.

02230 MATERIALS FOR TRENCH BEDDING AND BACKFILL

When crushed stone is not required for bedding and backfill material, the materials for bedding and backfill purposes and the conditions governing use of such materials shall be as specified below.

Bedding and Backfill to 1'0" Above Pipe

Soil for bedding material and for backfill material up to the level 1'0" above top of pipe, where soil bedding and backfill is specified to be used, shall be reasonably dry (within limits required for compaction) silty-clay, weathered shale or other suitable soil mixtures; and such soils shall not contain rock or stone in sizes greater than ½". Native soils as excavated from the site may be used provided that they satisfy the above criteria.

Backfill Materials 1'0" Above Pipe to Grade

The use of native soil material excavated from the trench shall be subject to the following

conditions: (1) broken rock mixed in the backfill material between level 12" above crown of pipe and level 4'0" above crown of pipe shall not exceed 4" in any dimension; (2) broken rock mixed in with backfill between 4'0" above crown of pipe and level 1'0" below ground surface shall not exceed 18" in any dimensions; (3) materials placed in top foot of trench depth shall be selected so as to be suitable for support of vegetation as hereinafter specified; and (4) backfill material placed in trenches cut in streets but not under paving shall not contain rock greater than 4' in any dimension. Under no circumstance shall saturated soil material be placed in trench line.

Crushed Stone

Crushed stone for bedding material and for backfill material up to level 1'0" above top of pipe shall be crushed stone meeting Alabama Department of Transportation Gradation #8910.

Crushed stone, where specified to be used under the bedding layer or in sections of the trench depth above level 1'0" above top of the pipe, shall be crushed stone meeting Alabama Department of Transportation Gradation #8910.

Crushed stone bedding under slabs, footings, manholes, or other locations shown on the Drawings or called for in these Specifications shall be crushed stone meeting Alabama Department of Transportation Gradation #8910.

02233 EMBANKMENT AND FILL WORK

Embankments and fills shall not be started without the concurrence of the Engineers. The material used in embankments and fills shall be free from frost, stumps, trees, roots, sod, muck or debris of any kind. Only materials as specified herein shall be used. Fill and embankment material shall not be placed on frozen ground.

If embankment or fill is to be placed on a surface which slopes more than 4:1, the surface shall be scarified and compacted to provide bond with the new material. Steep slopes may require the surface to be stepped.

Wet ground to be covered by fill shall be drained. The lower part of the fill shall be composed of a blanket of sand, gravel, or other acceptable material.

Compacted fills shall be constructed by depositing fill materials in successive, uniform layers of not more than eight (8) inches in depth, loose measurement, over the entire foundation area; and the surface of each layer shall be kept parallel to the elevation of the finished compacted "fill by use of blade graders, except in proximity to existing structures where leveling shall be accomplished by use of small spreaders, bulldozers, or hand method. Each layer shall be compacted by use of sheep's foot roller, or other suitable roller, the use of a particular type being dependent upon character of material. The density of each layer shall not be less than ninety-five (95) percent of the maximum density of the same material when tested in accordance with AASHTO Designation T -99, latest revision, Standard Method of Test for the Compaction and Density of Soils (the degree of compaction and measurement may be as indicated elsewhere, with the minimum compaction required not less than 96%). Each layer shall be rolled and compacted to the specified density before the succeeding layer is placed. The final layer shall be brought to elevation of finished compacted fill before topsoil is placed to conform to finished contour shown on the Drawings.

Rock greater than two (2) inches in any dimension shall not be placed in compacted fills for embankments, dikes or earth sections forming the walls of water containing structures (holding ponds, reservoirs, lagoons, etc.) unless all voids are filled with fine material and the complete fill is compacted to a dense mass as specified in Paragraph 4 hereinabove.

Rock greater than one (1) cubic foot in volume, or having any dimension greater than one (1) foot, shall not be placed in compacted fills in areas to be occupied by structures, bearing slabs, footings, roadways, walks, etc. Rock of permissible size deposited in such fills shall be placed in layers not greater than one (1) foot in depth, and such rock layers shall be separated by not less than one (1) foot (compacted thickness) of clay or other acceptable backfill material. Rock shall not be placed nearer than two (2) feet to the surface of any fill, nor nearer than three (3) feet to the wall or surface of any structures.

Rock shall not be placed in fill areas which pipes, conduits, cables, etc., are to be laid, nor shall rock be placed in trench backfill except as described in these Specifications.

All sampling and testing work shall be performed by an independent testing laboratory selected by the Owner. The cost of initial sampling and testing shall be borne by the Owner. Subsequent re-testing of any samples or locations failing the initial test shall be performed at the expense of the Contractor.

02238 SHEETING, SHORING AND BRACING

The Contractor is reminded that all excavation for structures, trench excavation and rock excavation is to be prosecuted in accordance with the protective guidelines and requirements of OSHA "Safety and Health Regulations for Construction", as set forth in the Federal Register, latest revision, and that the employment of protective measures is at the Contractor's expense. Sheeting, shoring, bracing and sloping are methods of accomplishing the work, and such methods may vary according to the Contractor's methods of dewatering, excavating and installing the work. All such methods of accomplishing the work are the sole responsibility of the Contractor, in accordance with the OSHA guidelines referred to hereinabove, and the sole responsibility of the Engineer is to review the finished product (finished work) for compliance with the requirements of the Plans and Specifications therefore.

02250 EXPLOSIVES

It shall be the sole responsibility of the Contractor to observe all laws and regulations relating to explosives, including but not limited to all federal laws, all OSHA regulations, and all state and local laws, regulations and ordinances applicable to explosives.

Persons responsible for blasting shall be present and supervise all blast design, loading, and shot firing. All blasting shall be done by competent experienced blasters. Persons responsible for directing blasting operations shall have sufficient insurance to cover the responsibilities associated with blasting operations. All laws and regulations pertaining to blasting, if more stringent than specified herein, shall become the minimum standards.

The successful bidder shall carry sufficient liability insurance to cover damages and claims caused by his actions or those of his employees. This coverage shall apply, but shall not be

limited to, all properties or persons on, or adjacent to, the site of the construction activity that might be damaged or injured as a result of blasting operations.

The Contractor shall be solely and completely responsible for the conditions on, in or near the job site, including safety of all persons and property during performance of the work. The required duty of the Engineers to conduct construction review of the Contractor's performance does not, and is not intended to, include review of the adequacy of the Contractor's safety measures in, on or near the construction site. Precautions shall be exercised at all times by the Contractor for the protection of persons, employees and property. The observation of safety provisions of applicable laws and local building and construction codes shall be the responsibility of the Contractor.

02407 PRECAST CONCRETE MANHOLES

Precast concrete manholes shall be of the following types and sizes:

Standard Manholes - Manhole barrel diameter 4'-0" for use on sewers less than 15 feet deep.

Type IA Manhole - Manhole barrel diameter 6'-0" for use on sewers equal to 15 feet or deeper.

The precast reinforced concrete manholes shall be constructed in accordance with American Society for Testing and Material Standard Requirements for Precast Reinforced Concrete Manholes, ASTM Designation C-478 latest revision. These manholes shall consist of circular precast concrete riser sections not less than 4'-0" in diameter. The precast concrete top section may be either concentric or eccentric cone shape and shall be suitable for mounting cast iron manhole frames and covers described in these Specifications.

Portland cement concrete used in the precast reinforced concrete manholes shall have a minimum compressive strength of 4000 psi at 28 days. Concrete mix shall contain not less than 6 bags of cement per cubic yard. Cement shall be Type II with a C3A content of 5.5%, or less. Aggregate for concrete, except for maximum size and gradation, shall be as specified in applicable sections of these Specifications. The concrete of the manholes shall be cured by spraying with water or other equally effective means for a period of three weeks.

Reinforcing steel shall be bars of intermediate grade, open hearth, billet steel conforming to ASTM Designation A-16, latest revision; or Cold-Drawn Steel Wire for Concrete Reinforcement, ASTM Designation A-82, or of wire fabric conforming to Specifications for Welded Steel Wire Fabric for Concrete Reinforcement, ASTM Designation A-15. The circumferential reinforcement in the riser and conical top sections shall have an area of not less than 0.12 square inches per lineal foot.

The interior and exterior surfaces of the manholes shall have smooth hard finish; and shall be free from cracks, chips and spalls.

The interior surfaces of the manhole shall be coated with a high-build glass-flake Cementous epoxy coating to dry film thickness of not less than 20 mils. Cementous epoxy coating shall be

PCS-9043 Type II Coating as manufactured by Permit Coatings, or equivalent.

Risers shall be furnished in suitable increments to an elevation (for the particular manhole) not more than 12 inches below the base of the cast iron frame and cover to be set on that particular manhole. Maximum elevation of riser shall be that which will permit setting top of manhole frame at the finished grade shown on the Drawings. Joints between manhole sections shall be offset tongue and groove type. Joints shall be installed using a pre-lubricated manhole gasket consisting of a compression section and a serrated mantel section which slides over the compression section as the manhole sections are placed together. A controlled expansion water stop sealant shall also be used to seal the joint. The manhole gasket shall be Tylox Super-Seal manufactured by Hamilton Kent, Ltd. of Canada, or equivalent. The controlled expansion water stop sealant shall be ConSeal CS-231 as manufactured by Concrete Sealants, Inc., of New Carlisle, Ohio, or equivalent.

Openings for sewer pipes shall be provided in the manhole sections at positions as required by alignment and elevations shown on the Drawings. Openings may be cast into the manhole wall or mechanically cored. The method of sealing these openings will depend upon the diameter of the pipe being installed, as follows:

a. For pipes 18 inches in diameter and smaller, sewer pipes shall be sealed into the manhole wall using flexible manhole connectors suitable for use in precast of cored openings. Such flexible manhole connectors shall be remolded shapes positioned with expansion rings and shall comply with the requirements of ASTM C923. Internal expansion ring for securing connector in manhole opening shall be 304 stainless steel with bolt assembly of 305 stainless steel. Connectors shall be installed in accordance with manufacturer's recommendations. Flexible manhole connectors shall be as manufactured by Kor-N-Seal Co., Press Seal Gasket Corporation, or equivalent.

b. For pipes larger than 18 inches in diameter, sewer pipes shall be sealed into the manhole wall with mortar. Such openings in manhole walls shall be large enough to permit variations in both vertical and horizontal position as field conditions may dictate. Mortar for sealing pipelines into manhole shall be one part Portland cement (Type III) and two parts sand by volume. Enough water shall be used in the mixture to produce a stiff workable mix but shall not exceed five and one-half gallons per sack of cement.

Precast concrete bases, risers, transitions, and cones shall be fabricated with two non-penetrating lifting inserts. Lifting inserts shall be Manhole Lifting System inserts as manufactured by Press-Seal GASKET Corporation or equivalent. Lifting eye bolts manufactured by the insert manufacturer shall be supplied to the Contractor.

All components of a manhole for a particular location shall be clearly marked in order that the manhole may be correctly assembled to suit construction conditions existing at that particular location.

All precast concrete manholes shall be set on foundation bed of compacted crusher run stone, choked with fines, 12 inch minimum thickness, and covering the entire bottom of the excavation for the manhole.

Steps, frames and covers shall conform to the requirements of these Specifications. Consideration will be given to use of cast iron steps of 2-piece type upon submission of details to the Engineers for approval.

Payment for manholes shall be made on the basis of unit price bid for the particular size and type manhole and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

0240S MANHOLE TESTING

All new manholes shall be tested by the Contractor using the vacuum test method, following the manufacturer's recommendations for proper and safe procedures. Any leakage in the manhole or structure, before, during, or after the test shall be repaired.

All pipes for vacuum testing entering the manhole shall be installed at the top access point of the manhole. A vacuum of 10 inches of mercury (Hg) (5.0 psi) shall be drawn on the manhole, and the time shall be measured for the vacuum to drop to 9 inches of mercury (Hg) (4.5 psi). Manholes will be considered to have failed the vacuum test if the time to drop 1 inch of mercury is less than what is shown in the following table.

Vacuum Test Timetable
Manhole Diameter - Inches

Depth - feet	48 inches	60 inches	72 inches	96 Inches
4	10 sec.	13 sec.	16 sec.	19 sec.
8	20 sec.	26 sec.	32 sec.	38 sec.
12	30 sec.	39 sec.	48 sec.	57 sec.
16	40 sec.	52 sec.	64 sec.	76 sec
20	60 sec.	65 sec.	80 sec.	95 sec.
+ Each 2'	+ 5 sec.	+6.5 sec.	+8.0 sec.	+9.5 sec.

Manhole depths shall be rounded to the nearest foot. Intermediate values shall be interpolated. For depths above 20 feet, add the values listed in the last line of the table for every 2 feet of additional depth.

If the manhole or structure fails the vacuum test, the Contractor shall perform additional repairs and repeat the test procedures until satisfactory results are obtained.

After the installation work has been completed and all testing acceptable, the contractor shall cleanup the entire project area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. The work area shall be left in a condition equal to or better than prior condition. Disturbed grassed areas shall be seeded or sod placed as directed by the Engineer at no additional cost to the Owner.

The Contractor shall guarantee his work for a warranty period of five (5) years from the date of acceptance. If, at anytime during the warranty period, any leakage, cracking, loss of bond, or other discontinuity is identified, the Contractor shall make repairs at no additional cost to the Owner.

DIVISION 3

CONCRETE

03100 CONCRETE FORMWORK

The Contractor shall furnish, maintain, erect, and remove all forms, molds, centers, and bulkheads, templates or profiles, and shall furnish and maintain all screeds and bonding grooves, keyway materials or other forms necessary for construction of the concrete included in this Contract. Except as hereinafter specified otherwise, forms shall be of wood or metal, and of type and condition as acceptable to the Engineers.

Material for contact surfaces (against which concrete is poured) of forms shall be plywood of such thickness that there will be no bulging, bending, or deviation from true line between studs, waler braces, or cut girts. Plywood shall be of Douglas Fir or equal lumber, multiply with all laminations bonded with water-proof glue, and specially manufactured for concrete form work. The surfaces shall be treated at the manufactures plant for concrete form work. The surfaces shall be treated at the manufacturer's plant to provide maximum water resistance. All sheets shall be uniform in thickness, shall have all edges square, and shall be of such size as to result in as few panel joints as possible.

A pre-fabricated form section designed to permit sectional pours of circular structures my be utilized provided that the circular ring members of the formwork are cut to true radii, that the plywood contact surfaces are set and maintained to true radii, and that when the structure pour has been completed, no breakpoint around the circumferences of the circles will be visible.

Considerations will be given to the use of prefabricated form assemblies in the construction of straight walls provided that the type of assembly selected by the Contractor will result in a finished concrete structure having surfaces free from joint indentations, joint projections and objectionable match marks.

The Contractor shall be responsible for the design, erection, bracing, sealing and finishing of the form work in such a manner as to contain and support the concrete during the placement thereof, and thereafter until the concrete has attained sufficient strength to withstand the construction loads imposed on the concrete work by the Contractor during the prosecution of his work and/or the design loads to be imposed on the concrete work during the operation of the completed project.

All formwork is to be well-built, substantially unyielding, tight, properly spaced, set true to line and elevation, properly braced and anchored, and tied together with tie rods, form ties and spacers. No tie shall be used which leaves a hole through the concrete section, or which leaves metal within 1 inch of the surface of the concrete. Form ties shall be equipped with integral waterstops.

Bevel strips shall be placed at all comers of walls, at all points where angles occur in walls and at all tops (both edges) of exposed walls. All such corners, angles, or intersections exposed to view shall be chamfered.

The inside (contact) surfaces of forms shall be coated with non-staining mineral oil before being

set in place. Oil shall not be allowed to contact reinforcing steel or surfaces to which the concrete is to be bonded. Contact surfaces of forms shall have tight, flush, watertight joints, packed and taped where required so as to prevent loss of water or paste. Bottom edges of forms shall be set true and tight against footings or other receiving concrete surfaces, and shall be sealed to prevent loss of water or paste.

Temporary openings shall be provided at the base of wall forms, beam forms and column forms to facilitate cleaning. All forms shall be thoroughly cleaned and washed immediately before beginning a pour, and all temporary openings shall be closed. In case of wall pours starting at the base slab or other levels below ground affected by the water tables, the Contractor shall provide pump sumps and pumps to completely remove all wash down water and any water containing silt or debris.

When forms have been erected for some time prior to a pour or have been exposed to changes in weather, the Contractor shall re-check all forms immediately before the pour, and shall make any adjustments necessary to bring the contact surfaces to true horizontal, vertical, or circular lines.

The Contractor shall provide special forms where required for openings in walls and floors for the installation of pipes, gates, flanges, and similar items. Where pipes are already in place, all pipe openings shall be securely blocked or bulkheaded to prevent entrance of concrete, paste, or laitance into the pipes. Where gates, such as flat frame sluice gates or other flat frame gates are to be installed, the wall plate in the area to be occupied by the gate shall be true and even, both horizontally and vertically in order that the gate may be installed watertight and not be warped by uneven drawdown on the gate anchor bolts.

The removal of forms shall not be started until the concrete has attained sufficient strength to withstand any live loads that may be imposed by succeeding steps in the construction process. The length of time required between placement of concrete and removal of forms may vary with weather conditions, loading conditions and particular construction activity in the vicinity of the recently poured concrete elements. In no case, however, shall forms be removed earlier than five (5) days after the concrete pour unless the concurrence of the Engineer is first secured. Consideration will be given to then prevailing weather conditions such as may be favorable for early curing of concrete but, on the other hand, the Engineer may require that the Contractor keep the forms in place for a longer period when weather conditions unfavorable for proper curing of concrete should exist.

03200 CONCRETE REINFORCEMENT - STEEL

The Contractor shall furnish and install all reinforcing steel, as shown on the Drawing or as otherwise directed, and in accordance with these Specifications.

Reinforcing steel, except No. 2 bars, shall be billet-steel bars of deformed shape conforming to ASTM Specification Serial Designation A 615-85, latest revision, Grade 60. All welded steel wire fabric shall conform to ASTM Specification A496 and ASTM Specification A497, latest revision. Plain round bars for sleeve bars (dowels for insertion in sleeves crossing expansion or contraction joints) shall conform to ASTM Specification Serial Designation A675, latest revision, Grade 80.

The Contractor shall furnish to the Engineers, independent laboratory certificates showing the

heat numbers, chemical and physical properties and the results of tests made in accordance with the above ASTM Specification.

The Contractor shall furnish reinforcing bar details and marking or erection diagrams to the Engineer for review. These shall be on the same size drawings as the Engineers' plans, and shall be clear and legible.

The reinforcing steel shall occupy the position in the finished work as indicated on the reviewed detail Drawings. Bars in slabs and beams shall be supported on metal chairs of an approved type and wired together about 4 feet on centers. The use of stakes, stones, or bricks to support reinforcing steel will not be acceptable.

Reinforcement shall be accurately formed to the dimensions indicated on the Drawings. Bends shall be made around a pin having a diameter not less than six (6) times the bar diameter except for bars larger than one (1) inch, in which case the bends shall be made around a pin of eight (8) bar diameters. All bars shall be bent cold.

In general, bars shall be rolled to radius according to CRSI recommendations and where specifically called for on the Drawings. Bars shall also be rolled if located in critical areas with tight placing tolerances where straight bars sprung in place to fit would not be satisfactory.

Metal reinforcement shall not be straightened nor rebent in a manner that will injure the material. Bars with bends or kinks not shown on the Drawings shall not be used. Heating of reinforcement will be permitted only when the entire operation is conducted in a manner acceptable to the Engineers.

All reinforcement shall be stored above the surface of the ground on skids or other supports, and shall be protected at all times from injury or surface deterioration.

All reinforcing steel shall be thoroughly cleaned before placement; and shall be free from mill scale, surface rust, coatings, mortar dropping, oil, grease, ice, dust, or any other surface coating that would affect bonding. Should concrete not be poured immediately after steel has been cleaned and inspected or should a delay occur between scheduled pourings, the steel shall be re-inspected, and if found to be required, any surface conditions mentioned hereinabove shall be corrected.

Reinforcing steel shall be accurately positioned as shown on the Drawings and Shop Drawings, and shall be secured against displacement by using annealed iron wire ties or approved clips at bar crossings and intersections. Reinforcing steel shall be supported by metal hangers, chairs, clips, spacers, or other devices and accessories detailed and reviewed through the submittal process. Metal clips or supports, unless otherwise indicated or specified shall not be placed in contact with forms. All steel shall be so braced, tied, and supported that it will remain in the proper position in all concrete structures, elements or sections. Unless specifically noted otherwise on the Drawings, reinforcement shall be placed so as to provide the following minimum concrete cover:

	MINIMUM COVER, IN.
Concrete Cast against and Permanently Exposed to Earth	3
Concrete Exposed to Earth or Weather, or in vessels containing water	2
Concrete not exposed to earth or weather:	
Slabs & Walls	1
Beams & Columns	1 ½

When it is necessary to splice reinforcement at points other than shown on the Drawings, the character and location of the splices shall be detailed through the submittal process for review by the Engineers. In such places the bars shall be placed in contact and securely wired. Wherever possible, splices in adjacent bars shall be staggered. Lengths of splices or laps shall be as indicated on the Drawings, but in no case shall length of lap be less than that required by ACI 318, latest revision.

03305 CONCRETE

Concrete shall be comprised of cement, fine aggregates, coarse aggregate and water, and shall be so proportioned and mixed as to produce a plastic, workable mixture. The relative stiffness of the mix may be varied within the limits hereinafter specified so as to secure the mix most suitable for the particular location and/or condition of placement. The required strengths of concrete produced by use of the design mixes shall be as hereinafter specified.

03307 CEMENT

Cement shall be Portland cement meeting the requirements of the Standard Specification for Portland Cement ANSI/ASTM C15-85a, or latest revision thereof, and Applicable Documents, and shall be Type I. Sacks of ninety-four (94) pounds shall be one (1) cubic foot in volume. In order to ensure uniformity of color and appearance, the same brand of cement shall be used in the mixes for all concrete to be exposed on the project. Portland cement shall be of color acceptable to the Engineer.

03309 FINE AGGREGATE

All fine aggregate shall be comprised of clean, hard, durable, uncoated particles of natural sand; and the amounts of deleterious substances contained in the sand shall not exceed the limits prescribed under ASTM Specification Serial Designation C33, latest revision thereof, and Applicable Documents. The sand shall be well graded from coarse to fine and, when tested by laboratory sieves, shall conform to the following requirements:

	Percent by Weight
Passing 3/8” Standard Square Sieve	100
Passing #4 Standard Square Sieve	95 - 100
Passing #S Standard Square Sieve	80 - 100

Passing #16 Standard Square Sieve	50 - 85
Passing #30 Standard Square Sieve	25 - 60
Passing #50 Standard Square Sieve	10 - 30
Passing #100 Standard Square Sieve	2 - 10

Fine aggregate shall be natural silica sand, and shall be proven by satisfactory test reports to be from an acceptable source. Sand manufactured by crushing stone will not be accepted.

All sand shipments shall be tested in accordance with ASTM Designation C33, latest revision thereof, and Applicable Documents; and the testing shall be performed by a laboratory acceptable to the Owner. The Engineer shall be furnished with satisfactory laboratory test reports in triplicate before the sand to be used on the project is stored at the concrete plant or before the sand is shipped to the project site. The furnishing of such reports, however often repeated before an aggregate is determined to be satisfactory for use on the project, shall be the responsibility of the Contractor and shall be at the expense of the Contractor.

03311 COARSE AGGREGATE

All coarse aggregate shall be comprised of hard, durable dense particles of stone or gravel free from adhering coatings; and the amounts of deleterious substances contained in the aggregate shall not exceed the limits prescribed under ASTM Serial Designation C33, latest revision thereof, and Applicable Documents. The aggregate shall be well graded and, when tested by laboratory sieves, shall conform to the following requirements:

	Percent by Weight
Passing 1 ½" Standard Square Sieve	100
Passing 1" Standard Square Sieve	95-100
Passing ½" Standard Square Sieve	26-60
Passing #4 Standard Square Sieve	0-10
Passing #8 Standard Square Sieve	0-5

All coarse aggregate shall be tested in accordance with ASTM Designation C33, latest revision thereof, and Applicable Documents; and the testing shall be performed by a laboratory acceptable to the Owner. The Engineer shall be furnished with satisfactory laboratory test reports in triplicate before the aggregate to be used on the project is stored at the concrete plant or before the aggregate is shipped to the project site. The furnishing of such reports, however often repeated before an aggregate is determined to be satisfactory for use on the project, shall be the responsibility of the Contractor and shall be at the expense of the Contractor.

03313 WATER

Water used in concrete mixes shall be clean and clear, and shall be free from oil, acids, salts, alkalizes, organic matter or other deleterious substances. Water used in concrete mixes shall be secured from an approved public potable water supply system. When requested by the Engineer, a complete chemical analysis of the water proposed to be used in concrete mixes shall be furnished by the Contractor to the Engineer; and the water shall not be used in concrete mixes on the project until the quality of the water has been reviewed by the Engineer and determined to be suitable to be used in concrete mixes on the project.

03316 CLASS OF CONCRETE

Concrete shall be classified as either Class A or Class B. Class A concrete shall be used throughout the entire project except where Class "B" is specifically called for. In general, the use of Class B concrete shall be limited to plain unreinforced concrete for pipe bracing, skin coats, concrete fill and foundation pads for underground pipe and fittings. The Contractor shall submit to the Engineer proposed design mixes for each class of concrete, including test reports showing that the design mixes will produce concrete meeting the requirements as hereinafter specified. Concrete mixes shall be designed and proportioned in accordance with ACI 211.1 and ACI 301. Additives, when proposed to be used in the design mix, shall meet the requirements of ASTM Specification C494 for water-reducing, retarding and accelerating admixtures; ASTM Specification C260 for air-entraining admixtures, and ASTM Specification C618 for pozzolans. The additives shall be as approved by the Engineer, shall be used in accordance with the manufacturer's recommendations and shall be introduced in such amount that the concrete mix will have the plasticity desired to obtain maximum workability and homogeneity, and that the concrete produced will have the strength specified herein. The method of introducing the admixture and the equipment used shall be as recommended and/or manufactured by the supplier of the admixture. The supplier of the admixture shall furnish the services of a qualified technical representative at such times and for such periods as are required for setting up the equipment and ensuring the proper control of the mix.

Each cubic yard of Class A concrete shall contain not less than six (6) sacks of Portland cement (564 lbs) and shall have a water to cement ratio not exceeding 0.45. The Portland cement content in Class A concrete may be adjusted in accordance with ACI 211.1 if pozzolans are incorporated in the mix. Class A concrete shall contain 6 percent entrained air, $\pm$1 percent. The amount of entrained air shall be determined in accordance with ASTM C231 or ASTM C173. At the request of the Engineer, the concrete supplier shall furnish the services of a technical representative for the purpose of verifying the amount of entrained air at the site. The minimum compressive strength of Class A concrete used on the project shall not be less than 4,000 psi at twenty-eight (28) days. Should the laboratory test report on the 28-day break of any cylinder made from a pour of Class A concrete indicate that the compressive strength (at 28-days) of the concrete in that particular pour is less than 4,000 psi, the Contractor shall, at his own expense, prove to the satisfaction of the Engineer that the concrete in that particular pour does have a compressive strength (at 28-days) equal to or exceeding 4,000 psi. Should the Contractor fail to prove to the satisfaction of the Engineer that the concrete in the particular pour in question does have a compressive strength lat 28-days) equal to or exceeding 4,000 psi, he shall, at his own expense, remove the concrete in that particular pour or section of the work, make any adjustment of reinforcing steel required, and pour in its place concrete having the compressive strength (at 28-days) specified. The slump of Class A concrete used in the work shall not exceed the slump shown in the test report submitted with the design mix.

Each cubic yard of Class B concrete shall contain not less than five (5) sacks of Portland cement, and shall have a total water content not exceeding thirty-five (35) gallons. The design compressive strength of the Class B concrete shall not be less that 2,500 psi For a number of ten (10) or more test breaks of cylinders the strengths of 80 percent of the test specimens shall be above the design strength, and the coefficient of variation from the average of the strengths of the specimens from the strength of anyone specimen below the average shall not be greater than 10 percent. Should the test results not be within the limits specified, the design mix and the

control shall be re-evaluated, and the design mix shall be adjusted if required. The slump of Class B concrete used in the work shall not exceed the slump shown in the test report submitted with the design mix.

Concrete used for reinforced masonry walls shall have a 28 day compressive strength of not less than 3000 psi. Coarse aggregate shall be pea gravel, 1/2" maximum size. Air entrainment shall be 5 percent, ±1 percent. Slump shall be 8", maximum. The Contractor shall submit to the Engineer a proposed design mix for review.

03317 STORAGE OF MATERIALS

Materials stored on the site shall be adequately protected against contamination from surface run-off, trash, debris, dust, dirt, site materials, oils, greases, etc.

Coarse aggregate shall be handled and stored so as to prevent segregation.

Fine aggregate shall be separately stored in bins or compartments and shall be protected as stated hereinabove.

Cement shall be stored in dry, weather tight, well ventilated storage sheds or in bins similarly protected.

03319 BATCHING AND MIXING

Should the Contractor elect to store materials and mix concrete at the job site he shall provide a semi-automatic batching plant and concrete mixing equipment capable of producing not less than 200 cubic yards of concrete in an eight (8) hour period. A semiautomatic plant is defined herein as one in which batching weights are manually set, mixes are manually set, and materials are automatically batched. The plant shall be equipped with devices for recording weighs of cement, aggregates, and water. Where admixtures are specified, the plant shall be equipped with automatic dispensers for such admixtures.

Batching Plant: The batching plant shall have separate bins for each different size of coarse and fine aggregate and separate bins for bulk cement. In the semi-automatic plant aggregates may be weighed cumulatively in one weighing batcher on one scale, or in separate batchers with individual scales. The bulk cement shall be weighed in a separate scale in a separated batcher. The batcher controls should be interlocked so that a batching cycle cannot be started until all batchers are completely empty.

The batching scales shall deliver the specified weight of each ingredient within the following limits of accuracy: cement, 1% by weight: water, 1%: fine aggregate, 2%: coarse aggregate, 2%: admixtures, 1%.

Standard test weights should be provided by the Contractor to verify the accuracy of the batching scales. Periodic tests shall be made in the presence of the representative of the Engineer to verify this accuracy. The weighing equipment should be arranged so that the plant operator and plant inspector can observe all batching loads during the plant operation.

Automatic recorders shall be provided for the batching plant. The recorder shall be placed in a convenient position for observation by the Engineer's field representative. Further, the recorder shall produce a printed record on a chart or tape of the weights of all the aggregates as batches, and after the batch is discharged, return to zero. The chart or tapes shall clearly indicate the different types of mixes used, and shall be so marked that variations in batch weights of each type of mix can be readily observed.

The requirement for complete recordation and automatic control shall not apply in the case where the Contractor secures his concrete from an established ready-mix plant.

Water and Admixture Control: The equipment for batching water admixture shall be provided at the batching plant or included with the mixer. A suitable water measuring device capable of measuring mixing water within the specified requirements shall be provided. The filling and discharge valves for the water batchers shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. Admixtures may be added at the mixer, provided a suitable device for measuring and dispensing the admixture is provided. The admixture device shall be capable of adjustment to permit varying the quantity of material to the mix.

The plant shall be capable of ready adjustment of the weights of the materials being batched so as to compensate for the varying moisture content of the aggregates.

Mixers: Concrete mixers may be either stationary mixers or truck mixers of an approved design. Stationary mixers may consist of either single drum tilt-type or dual drum or single drum paving type mixers. The mixers shall have a rated capacity of at least 1 CY of mixed concrete and shall not be charged in excess of the capacity recommended by the manufacturer. Mixers shall be capable of combining the materials into a uniform mixture and of discharging without segregation. The following mixture capacity and mixing times are recommended: 1 ½ CY or less, 1 ½ min.; 2 CY, 2 min. Device shall be provided to lock the mixer discharge mechanism until the required mixing time has elapsed. Truck mixers shall be equipped with accurate revolution counters to ensure that the proper mixing is attained. The mixing plant shall also include a device for automatically counting the total number of batches of concrete mixed. The mixers shall be operated at the manufacturers recommended drum speed and mixing periods. Mixing water should be introduced into the dry mix before 25 percent of the mixing time has elapsed.

03321 READY-MIX CONCRETE

Where concrete for the project is to be supplied from a ready-mix concrete plant, the Contractor shall furnish to the Engineer an affidavit or statement of record from the ready-mix concrete supplier from whom he proposes to secure concrete for the project; and the affidavit or record shall show that such supplier has satisfactorily furnished concrete of quality specified herein and in quantity desired to projects of similar size and nature or to the Alabama Department of Transportation. The Contractor shall also furnish to the Engineers an inspection report from an approved Testing Laboratory, which report shall state that the ready-mix concrete plant from which the Contractor proposed to secure concrete for the project is currently capable of producing concrete of quality specified herein and in quantities required for satisfactory prosecution of the project; and that the plant is equipped with all controls, devices, recorders, dispensers for introduction of admixtures, etc., as specified herein.

Truck mixers for transportation of ready-mix concrete shall be equipped with accurate water meters and revolution counters as described in portions of these Specifications concerning batching and mixing of concrete.

03323 MATERIALS TESTING

All sampling and testing of materials shall be performed in accordance with applicable standards (latest revisions) of the American Society for Testing Material. All sampling and testing work shall be performed by a reputable independent testing laboratory selected by the Owner.

The sources from which concrete aggregates are to be obtained shall be selected by the Contractor well in advance of the time when concrete will be required at the site of the work. The Contractor shall submit to the Owner: sieve analyses of the aggregates (fine and coarse); test reports on the aggregates indicating that they have been found to conform to ASTM requirements for concrete materials; and certificates of compliance (affidavit form) stating that all of the concrete materials furnished for the project shall be in accordance with the approved analyses. The Contractor shall also submit to the Owner a Design of Concrete Mixes, for the project. Aggregates used in the design mixes shall be those selected, tested, and proven by laboratory test reports to have met the requirements for the project. Test cylinders shall be prepared from the design mix and the concrete specimens shall be tested in accordance with ASTM Standard Methods. Test reports on specimens broken at 7 days and at 28 days shall demonstrate that the aggregates are suitable components for concrete mixes of the quality desired and that the design mix will produce concrete meeting the requirements of these Specifications. All sampling, testing, reporting, and preparation of design mix, all as described hereinabove shall be at the expense of the Contractor.

During the progress of the work standard concrete specimens shall be made from the concrete mix placed in the permanent work. From each sampling of the concrete mix there shall be prepared three (3) standard test specimen which shall constitute a laboratory test series. The number of samples to be taken shall be based upon the following conditions:

1. There shall be no concrete poured at any location on the project site that is not represented by a sample (cylinder specimens).

2. When several intermittent pours are made in separate locations during a single day one (1) sample shall be taken for each eight (8) cubic yards of concrete placed.

3. When a continuous pour of concrete in volume less than twenty-five (25) cubic yards is made in a single location one sample shall be taken for each sixteen (16) cubic yards of concrete placed or fraction thereof.

4. When a continuous pour of concrete in volume equal to or exceeding twenty-five (25) cubic yards is made in a single location, and the production of the concrete batching unit is devoted exclusively to that pour, two samples shall be taken for the first twenty-five (25) cubic yards of the pour, and for each succeeding fifty (50) cubic yards of concrete placed, or fraction thereof, one sample shall be taken.

The specimens (cylinders) shall be carefully prepared, stored and protected at the project site in a manner satisfactory to the Engineer until they are ready for transportation to the Testing Laboratory. The cylinders shall be stored on a level bed in a moist environment, and shall be protected against movement, surface water, ground water, rainfall and cold weather. The furnishing of slump cones, screeds (knife edges) and containers for the specimens shall be the responsibility of the Contractor; and it shall also be the responsibility of the Contractor to sample the concrete mix, prepare the specimens, store the specimens protect the specimens and transport the specimens to the Testing Laboratory. All of the work outlined in this paragraph shall be at the expense of the Contractor.

The cost of testing the specimens and the cost of reporting the results of such tests will be borne by the Owner.

03325 CONSISTENCY

The amount of water added at the batching plant shall be that as determined from the results of the trial design mixes and test specimens to be the amount required to produce a mix having the desired plasticity, workability and consistency. No other amount of water shall be added without the consent of the representative of the Engineer.

The consistency of concrete shall be such that: (1) the paste adheres to the aggregate; (2) the concrete flows readily in metal chutes at a thirty degree angle with the horizontal without segregation; (3) no segregation shall be apparent during the pouring or after the concrete has been placed; (4) no free water will stand on the concrete after being placed; (5), with proper vibration (not excessive) the concrete will flow against the walls of the forms so that a smooth and uniform appearance of the walls is secured; and (6) the surface of the set concrete shall have only a thin film of laitance.

03327 BONDING

Rock surfaces on which concrete is to be placed shall be rough and free from loose materials, clay, mud or other foreign matter that will prevent a proper bond. Immediately before concrete is placed on rock, the surface shall be given a coating of grout of the same proportions as is contained in the concrete mortar, and the grout shall be worked thoroughly with brooms into all surface irregularities. Concrete shall be placed on this surface while grout is still fresh.

In joining fresh concrete to concrete that has already set, the surface of the concrete in place shall be cut over thoroughly with a suitable tool to remove all laitance, loose material and foreign material. The surface of the set concrete shall be so worked and cleaned that the firmly embedded coarse aggregate is exposed, and that the exposed surfaces of the coarse aggregate are free from any adhering cement and fine aggregate. The surface of the set concrete shall then be wire broomed and washed. Before concrete is placed, all forms shall be tightened against concrete already in place and the surface shall be thoroughly 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 the vertical and inclined surfaces, shall first be thoroughly covered with a coating of grout against which the new concrete shall be placed before the grout has attained initial set. This specification does not apply to surfaces forming expansion and contraction joints.

Where new concrete structures connect with existing concrete structures, a construction joint shall be cut in the existing concrete. Immediately before placing new concrete, the surface of the existing concrete against which the new concrete is to be placed shall be thoroughly cleaned and coated with a concrete bonding agent acceptable to the Engineer.

03329 PLACING CONCRETE

Before beginning to place concrete, hardened concrete and foreign material shall be removed from inner surface of the mixing and conveying equipment.

Before placement of concrete begins, the conditions as outlined herein below shall be satisfied.

The sub-grade shall be prepared for placement of concrete as follows:

a. Where concrete slabs, footings, and foundations for buildings or water containing structures are to be poured on soil, the foundation area shall be covered with skin coat of Class B concrete, 1 inch thickness.

b. Where such slabs, footings, and foundations are to be poured on rock, the foundation area shall be thoroughly cleaned and kept free from mud and silt; and in such case the 1" skin coat of Class B concrete will not be required.

c. Where the foundation area has been covered with crushed stone of such depth that no mud or silt has been worked up to the surface, the 1 inch skin coat of Class B concrete will not be required.

d. All depressions in the foundation area, whether in soil or in rock, shall be filled with crushed stone to top of sub-grade (underside of slab or footing), but minus 1” where skin coat is required.

e. Where the elevation of the surface of the foundation should be found to vary so that the structure or slab would bear partly on rock and partly on soil, the rock area shall be excavated to a depth of approximately 6" and the entire foundation area shall be backfilled with crushed stone compacted to a depth of approximately 6" below the elevation of underside of slab or footing.

The formwork shall be in true alignment, correctly spaced throughout, tightly sealed, and securely braced.

All debris, mud, and water shall be entirely removed from the forms. The foundation shall be cleaned so that no foreign material can be worked into the concrete. Any concrete surface against which the pour is to be made shall be cleaned and washed so that maximum bonding of similar surfaces can be secured. Any flow of water into the forms shall be prevented by diversion to a sump and removed by pumping. Provisions shall be made in advance for maintaining the water level below the pour until the concrete has taken its initial set and until the discontinuance of pumping has been concurred with the Engineer.

All reinforcement shall be in correct location, shall be securely tied, and shall be clean and free

from mortar splatter and scale.

Concrete shall be handled from the mixer to the place of final deposit as rapidly as possible by methods which will prevent the segregation or loss of the concrete. Under no circumstances shall partially hardened concrete be placed in the work. Concrete shall be placed in the forms as nearly as practicable in its final position to avoid re-handling or flowing along forms. It shall be so placed as to maintain, until completion of the pour, a plastic surface approximately horizontal. The concrete shall be placed in continuous horizontal layers of such depth that not more than thirty (30) minutes shall elapse between placing of successive layers; and the depth of any layer shall not exceed twelve inches.

When placing concrete in walls the concrete shall be deposited in tremies or by other approved methods to prevent segregation and to minimize splatter. The accumulation of hardened concrete on the forms or on reinforcement above the level of the concrete will not be permitted. The lower end of the tremie or spout shall be not more than five feet above the surface of the concrete.

When conveying concrete by chutes, the equipment shall be of such size and design as to insure a continuous flow in the chute. The chute shall be metal or metal lined, and the different runs shall have approximately the same slope. The slope shall not be less than one vertical to two horizontal and shall be such that will prevent the segregation of the materials. The discharge end of the chute shall be not more than five feet above the surface of the concrete.

In the event of any emergency preventing the completion of a pour in a wall, the surface of the concrete already poured shall be fitted with a keyway and, for walls of water-containing structures, a waterstop will also be required. Before pouring of concrete is resumed the surface of the uncompleted pour shall be 'greencut' and coated with a bonding agent as specified in these Specifications. Where mass pours are terminated by an emergency the unfinished work may, according to the judgment of the Engineer, be prepared for resumption of concrete placement by installation of multiple keyways, by 'greencutting', and by use of a concrete bonding agent all as specified in these Specifications; and by installation of a waterstop when required. In the case where concrete pours in beams and columns are terminated by an emergency, the pours shall not be re-started until all concrete placed in the incomplete pour has been removed, and until all the reinforcement affected has been cleaned and adjusted to correct location.

03331 COMPACTION

Concrete shall be compacted in the forms by spading, puddling, tamping or vibration, or by combination thereof, in such a manner that the concrete mix will be thoroughly worked around the reinforcement, around embedded fixtures, piping, conduit, anchor bolts or other items set in the pour, and into all corners of the forms. The number and types of the tools or equipment utilized in the compaction process shall be such that compaction can keep pace with the pouring and that compaction can be completed while the concrete is still fresh and plastic. Before beginning any pour the Contractor shall have on hand, and readily available at the location of the pour, spare tools and equipment, in good working condition that can be immediately utilized in case of malfunction of any tools or equipment being used.

The Contractor shall make certain that he is securing good penetration into the layer of concrete previously placed, but excessive vibration against reinforcing steel or forms shall be avoided so as to prevent disturbance of partially set concrete by the transferred vibrations.

The concrete mix shall be so placed (without segregation) and compacted (without excessive vibration) that there will be no water on the surface of the finished layer or on the surface of the finished pour. Should water appear on the surface of any layer the pour shall be stopped, the water shall be removed, and the pour shall not be continued until corrective measures satisfactory to the Engineer are employed.

DIVSION 5 - METALS

05547 MANHOLE CASTINGS

Manhole frames and covers shall be cast from gray iron meeting the requirements of ANSI/ASTM A 48-76, not less than Class 30. All castings shall be free from scale, lumps, blisters, sand holes and other defects that would render them unfit for the service for which they are intended.

Manhole covers shall be of the solid indented pattern, and shall be lettered as shown on the Drawings. Bearing surfaces of frames and covers shall be machined to secure a solid bearing and to prevent rocking, and the fit of the cover in the frame shall be tight (close) so as to prevent flipping. Castings having uneven bearing between cover and frame or loose-fitting covers will be rejected. The Contractor shall submit for review by the Engineers, pattern drawings of manhole castings similar to those shown on the Drawings. Frames and covers installed on manholes located in open areas shall weigh not less than 290#, and frames and covers installed on manholes in locations subject to traffic shall weigh not less than 375#. All manhole covers (lids) shall be self-sealing type and shall have no through pick-holes.

Manholes frames and covers shall be equivalent in quality to manufacturer of Neenah Foundry Company or Barry Pattern & Foundry Company.

Waterproof (watertight) manhole frames and covers shall be furnished and installed in particular locations where called for or indicated on the Drawings. Waterproof manhole frames and covers shall have bolted-on covers with round rubber gaskets for watertight sealing under sub-aqueous service. Waterproof manhole frames and covers shall be similar and equivalent to Neenah Catalog No. R-1916-E, or similar product of Barry Pattern & Foundry Company or equivalent.

Bottom flanges of manhole frames shall have three (3) ¾" diameter holes bored and spaced at 120º around flange for anchor bolts when manholes are set in such locations requiring anchorage of covers as specified in the preceding paragraph.

06649 MANHOLE STEPS

Manhole steps shall be of cast iron ANSI/ASTM A 48-76 (not less than Class 35), of ductile iron, or copolymer polypropylene reinforced with structural bar. All steps shall meet the requirements of the Occupational Safety and Health Standards, U.S. Department of Labor. All types of steps shall be specially designed and suitable for use in precast concrete manholes. Types of steps shall be as follows:

1. Gray iron or ductile iron integrally cast in barrels of manholes.

2. Gray iron or ductile iron, equipped with inserts integrally cast in barrels of manholes and having steps bolted on.

3. Copolymer polypropylene plastic meeting the requirements of ASTM D 2146, reinforced with ½"diameter deformed bar meeting the requirements of ASTM A 615, with inserted ends corrugated for bond, and integrally cast in barrels of

manholes.

DIVISION 15 - MECHANICAL

15112 PIPING MATERIALS

The contractor shall carefully examine all pipe and piping materials before placing them in the work. If any such pipe or materials should be found to be defective, the Contractor shall promptly notify the Engineers and discard such pipe and materials.

The interior of all pipe, fittings, valves and accessories shall be kept free from dirt and foreign material. Suitable bulkheads shall be used to block or plug ends of piping at the close of each work day and when work on a particular section of piping is temporarily discontinued. Should dirt, mud, concrete, laitance, paint or other foreign materials be allowed to enter the piping or any section of piping, such piping or section of piping shall immediately be cleaned.

Piping materials shall be of the types, classes and sizes shown on the Drawings or as specified in the piping schedule.

15114 HANDLING AND STORING PIPE AND ACCESSORIES

The Contractor shall provide the proper equipment, tools and facilities necessary for the efficient prosecution of the work. Materials damaged in unloading, handling or installation shall be promptly discarded and removed from the area of the work. No pipe shall be unloaded or moved by allowing the pipe to roll, slide or fall to the ground or to cushions placed on the ground. No pipe, fittings, valves, etc., shall be unloaded by inserting loader blades, teeth, etc., into the pipe interior.

Pipe shall be stored on racks or timbers in such a manner that pipe ends are above the ground surface. When pipe is to be moved it shall not be dragged or rolled but shall be lifted by use of a sling designed to prevent damage to the pipe coatings. Should an intermediate placement of the pipe along the side of the trench be required, the pipe shall be placed on racks or timbers along the side of the trench in manner as specified hereinabove.

Each length or section of pipe shall be cleaned immediately before being placed in the trench and joined. Cleaning shall be accomplished by use of a tight swab or other suitable cleaning device. If necessary a brush pig shall be run through the section of pipe prior to final swabbing. Pipe ends shall be wiped clean before the pipe is joined.

15116 DUCTILE IRON PIPE AND FITTINGS

Ductile Iron pipe shall be manufactured in accordance with requirements of ANSI A21.51 / AWWA C151.

Where ductile iron pipe and fittings are equipped with push-on joints, such joints shall conform to the requirements of ANSI A21.11 / AWWA C111 latest revision.

Where ductile iron pipe and fittings are equipped with mechanical joints, such joints shall conform to the requirements of ANSI A21.11 / AWWA C111 latest revision.

All pipe and fittings shall be furnished new from the manufacturer. No recoated or reconditioned

pipe will be acceptable.

A. Gaskets

Gaskets for flanged, mechanical joint restrained joint and push-on ductile iron pipe shall meet the requirements of ANSI/AWWA Specification ANSI A21.11 / AWWA C111 latest revision. Gasket materials for various service conditions shall be as follows:

1. Air and Water service (up to 120°F) - Synthetic Rubber
2. Air and Water service (120°F to 200°F) - Neoprene
3. Wastewater Service - Styrene Butadiene Copolymer (SBR)

B. Pipe

In general, ductile iron pipe shall be furnished with push-on joints for buried applications and flanged joints for exposed, above grade applications, unless shown otherwise on the Drawings.

Ductile iron flanged pipe shall be manufactured in accordance with the requirements of ANSI A21.15 AWWA C115 latest revision. Barrels of flanged pipe shall be ductile iron ANSI A21.51/AWWA C151. Flanges shall be in accordance with ANSI A21.15/AWWA C115 latest revision, and shall have chemical and physical properties specified for ductile-iron fittings under ANSI A21.10/AWWA C110 latest revision. Pipe and threaded flanges shall meet the requirements of ANSI A21.15/ AWWA C150 latest revision. Where flanges are cast on ductile-iron pipe they shall conform to ANSI A21.10/ AWWA C110 latest revision and shall be ductile-iron as specified for threaded flanges. All flanges shall be rated for 250 psi working pressure; and the bolt circle and bolt holes shall match those of ANSI B16.1 Class 125 flanges and ANSI B16.5 Class 150 flanges. Flanged piping connecting to equipment shall have flanges that are compatible with the particular items of equipment to which they are attached.

C. Fittings

In general, fittings for use with push-on joint pipe shall be push-on joint or mechanical joint. Flanged fittings shall have flanges suitable for use with the type of flanged pipe and equipment to which they are connected and flanges shall meet the requirements stated hereinabove for ductile Iron pipe flanges.

Fittings for use with flanged pipe shall conform to the requirements of ANSI A21.10 / AWWA C110 and shall have chemical and physical properties specified for ductile iron under ANSI A21.10 / AWWA C110. All flanges shall be rated for 250 psi working pressures; and the bolt circle and bolt holes shall match those of ANSI B16.1 Class 125 flanges and ANSI B16.5 Class 150 flanges. All fittings shall be new. No reconditioned or recoated fittings shall be acceptable.

Gaskets for flanged joints shall be of materials as specified herein for various service conditions. Gaskets shall be ⅛" thick, unless otherwise specified and/or indicated for special conditions, and shall conform to dimensions as given In Table A.1 of Appendix A to ANSI A21.15/ AWWA C115 or Table A.1 of Appendix A to ANSI A21.10 *I* AWWA C110 latest revision or as applicable. Gaskets shall be flat ring type and flat full-face type according to service conditions. Flat ring type shall not be used where working pressures exceed 50 psi.

Fittings for use with push-on pipe and/or mechanical joint pipe shall conform to the requirements of ANSI A21.10/AWWA C110 or ANSI A21.53/AWWA C163, latest revision. Fittings shall be of ductile iron construction.

The Contractor may elect to use grooved end joints conforming to ANSI A21.10/AWWA C606 in lieu of flanged joints. If this option is selected, the Contractor shall be responsible for making all revisions necessary for a complete installation which is similar in function to a flanged piping system.

Couplings for use with grooved end joints shall be ductile iron in accordance with ASTM 536, Grade 65-45-12. Gaskets shall be the center leg design manufactured of a nitrile compound. Bolts shall be track head design and manufactured in accordance with ASTM A-183, minimum tensile 110,000 psi. Couplings shall be Victaulic, or equivalent.

Bolting shall conform to Table 10.14 of ANSI A21.10 / AWWA C110 or ANSI A21.15 / AWWA C115 as applicable. Bolts for use with flat ring type gaskets between gray iron flanges shall conform to the requirements of ASTM A 307-84, Grade B, hex head; and nuts shall be hex type of same grade and finish as the bolts. Bolts for use with flat full-face type gaskets between either gray iron flanges or ductile iron flanges shall conform to the requirements of ASTM A449-84a, Type 1 hex head; and nuts shall be hex type of same grade and finish as the bolts. Bolts shall conform to the requirements of ANSI B18.2.1, and nuts shall conform to the requirements of ANSI B18.2.2.

Wall pipes shall either be statically cast or fabricated from centrifugally cast ductile iron pipe. Flanges shall be provided in between the ends of the wall pipe to serve as a thrust collar and/or waterstop, as required. For fabricated wall pipes, the space between the thrust collar or waterstop shall be sealed by full welding on each side.

D. <u>Coatings</u>

All ductile iron pipe and fittings shall be furnished with interior lining. The types of lining required for the various conditions of service are listed herein below.

1. Water service (up to 140°F) - Cement lining in accordance with ANSI A21.4 / AWWA C104 1atest revision; with asphaltic seal coat.

2. Water service (140ºF - 225°F) - High-heat resisting epoxy enamel, (without cement undercoat), T&O free and FDA approved, specially formulated for hot water service, and applied to total dry film thickness of not less than 15 mils.

3. Wastewater service - Cement lining in accordance with ANSI A21.4 / AWWA C104 latest revision; with asphaltic seal coat.

4. Air Service - Unlined, or approved lining recommended by manufacturer.

Cement lining for pipe intended for water service shall be certified for use with potable water. Cement lining applied to ductile iron pipe intended for hot water service (above 150°F) shall have enamel overcoat of epoxy approved for hot water service at the particular application. Ductile iron pipe for air service shall be furnished with coal tar epoxy lining (16 mils dry film

thickness) suitable for temperatures up to 250°F, or other equivalent lining as recommended by pipe manufacturer.

All ductile iron pipe and fittings, including pipe and fittings to be submerged in liquids, shall be tar-coated outside except when installed in particular locations as hereinafter specified: (1), ductile iron pipe installed in buildings, galleries, vaults or other similar structures or locations where the piping is to be permanently exposed and specified to be painted, shall be furnished with exterior coat of rust-inhibitive primer suitable for application of finish coating as specified in these Specifications; (2), ductile iron or gray iron wall-pipes, wall-sleeves or other wall-fittings, and fittings to be encased in concrete, shall be furnished 'bare' (without tar-coat); and (3), ductile iron pipe, where passing through concrete walls, shall have exterior tar-coat removed from that length of the pipe to be encased in the wall. Ductile iron pipe to be installed underground shall be furnished with outside asphaltic coating of 1 mil thickness per ANSI A21.51 / AWWA C151.

E. Restrained Joint Pipe

Where ductile iron pipe is indicated on the Drawings to be restrained joint pipe, such pipe shall be flexible restrained push-on type, unless otherwise indicated. Joints shall incorporate ductile iron locking segments, inserted through slots in the bell face, providing a positive axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe. Maximum allowable deflections shall be per manufacturer's publish recommendation.

Restrained push-on joint pipe and fittings where called for on the drawings shall be American 'Flex-Ring', "Field Flex Ring", "Lok-Ring", or U.S. Pipe 'TR Flex'. Use of set screws bearing on the pipe wall will not be acceptable except where retainer glands are to be used.

Where gripper glands are indicated for use with mechanical joint fittings, joint restraint shall be provided by a follower gland with mechanism that grips pipe with teeth which are wedged tighter as pressure is applied to the pipeline. Gripper glands shall have a working pressure rating of at least 350 psi up to 16" size and at least 250 psi up to 48" size. Gland shall conform to mechanical joint (ANSI/AWWA A21.11) and be suitable for use with tee-head bolts ANSI/AWWA C153/A21.5) Gripper Gland shall be "MJ Gripper Gland" manufactured by U.S. Pipe and Foundry Company; "Mega Lug" manufactured by EBAA Iron, Inc.; or equivalent.

F. Markings

Each length or piece of pipe shall be bar coded and clearly marked as to type and class with different colors being used to distinguish between classes. Where the drawings indicate that between specified stations a particular class of pipe will be required, the Contractor will not be permitted to store or string pipe of other classes than that specified for the particular section of the transmission mains.

G. Installation

The Contractor will not be permitted to cut nipples ungaged pipe in order to make connections. If the Contractor desires to cut lengths in the field to make up the line, he shall make such cuts from lengths of pipe having exterior of barrel fully gauged to fit bell of pipe of that class. If cut length is to connect to mechanical joint fitting, use of fully gauged pipe will not be required.

The permissible depth of cover over a pipe of particular size and class is based upon the trench excavation work being performed by the Contractor in accordance with the requirements of these Specifications, the bedding and backfill materials being furnished by the Contractor in accordance with the requirements of these Specifications, and the placement of bedding and backfill material being performed by the Contractor in accordance with the requirements of these Specifications. Should the Contractor fail to perform the trench excavation work, or the furnishing and placement of bedding and backfill, or the pipe laying work in accordance with the requirements of these Specifications, he will be required to remedy the work by furnishing and placing or installing other materials as may be determined by the Engineer as being necessary to remedy that work not performed in accordance with these Specifications and thereby secure work of the quality specified.

Ductile iron pipe for water line and pressure piping installations shall be furnished and installed in trenches in various locations as indicated on the Drawings and as described herein. Should the type and class (or wall thickness) of type in particular location not be indicated on the Drawings, the following schedule shall be applicable to ductile iron pipe of various types, sizes and classes, installed under varying cover conditions when bedding and backfill work are in accordance with these Specifications:

SCHEDULE OF REQUIRED WALL THICKNESSES
FOR WATERLNES AND PRESSURE PIPING
DUCTILE IRON PIPE ANSI A21.51, GRADE 60-42-10

Pipe Size Inches	Cover not Exceeding 8' Wall Thickness	Cover not Exceeding 12' Wall Thickness	Cover not Exceeding 16' Wall Thickness
4	0.26”	0.26”	0.26”
6	0.25”	0.25”	0.25”
8	0.27”	0.27”	0.27”
10	0.29”	0.29”	0.29”
12	0.31”	0.31”	0.31”
14	0.33”	0.33”	0.33”
16	0.34”	0.34”	0.34”
18	0.35”	0.35”	0.35”
20	0.36”	0.36”	0.36”
24	0.38”	0.38”	0.38”
30	0.39”	0.39”	0.39”
36	0.43”	0.43”	0.43”
42	0.47”	0.47”	0.47”
48	0.51”	0.51”	0.58”
54	0.57”	0.57”	0.65”

Ductile iron pipe for gravity sewer and plant drainage piping shall be furnished and installed in trenches in various locations along the pipelines as indicated on the Drawings and described herein. The permissible depths of cover over pipe of various sizes and classes are given in the SCHEDULE OF PERMISSIBLE COVER and are based upon pipe being installed on Type 3 bedding. The SCHEDULE may be used only when classes of pipe and depths of cut are not indicated on the Drawings or not called for in the Proposal Form.

SCHEDULE OF PERMISSIBLE COVER OVER GRAVITY DUCTILE IRON PIPE SEWER PIPES ANSI/AWWA C151/A21.51

DEPTHS OF COVER IN FEET OF CLASSES OF PIPE OF GIVEN SIZE

Pipe Size Inches	Press. CL 150	Press. CL 200	Press. CL 250	Press. CL 300	Press CL 350
8	+	+	+	+	26
10	+	+	+	+	19
12	+	+	+	+	19
14	+	+	16	17	19
16	+	+	16	17	20
18	+	+	14	17	19
20	+	+	14	17	19
24	+	12	16	17	19
30	9	12	16	16	19
36	9	12	14	16	19
42	9	12	14	16	19
48	9	11	13	16	18
54	9	11	13	16	18

+ NOT AVAILABLE

H. <u>Quality Control</u>

All testing work specified in this section shall be performed by the supplier. The manufacturer shall perform all tests in house as part of their quality assurance/quality control. Test results shall be submitted to the Engineer in accordance with requirements of this section.

All pipe shall receive a hydrostatic proof test of 500 psi for a minimum duration of 10 seconds. Each test cycle shall be recorded on a strip chart. Each test cycle for pipe 18 inches and greater shall be marked by pipe number. Each pipe shall be inspected for leaks and pipes which contain evidence of hydrostatic leak shall be scrapped. Repair welding of hydrostatic leaks is not permitted.

Tensile test specimens shall be cut from the midsection of the pipe wall. These specimens shall be machined and tested at least every three hours in accordance with ASTM E-8, and ASTM A-370 where applicable using the halt of pointer or 0.2% offset method. Pipe failing to meet the minimum requirements of these standards shall be rejected. Adjacent test samples shall be made available to the Owner's independent testing laboratory upon the Owner's request.

Charpy impact samples shall be taken during each hour of production. Samples shall be selected to properly represent extremes of pipe diameters and wall thickness. Impact tests shall be conducted in accordance with ASTM E-23. Impact strengths on samples shall be 7 ft-lb minimum for tests conducted at 70°±10. In addition, adjacent specimens shell be taken and made available to the Owner's laboratory for independent testing upon the Owner's request.

Each end of each pipe (each pipe socket and pipe spigot) shall be measured and shall conform to the standard dimensions of ANSI A-21.61 (AWWA C-151). In addition, each socket and spigot shall be inspected in a well lighted area for injurious defects which could affect joint performance. Such defects may be removed by cutting off pipe ends. Pipe with injurious defects in the bell must be scrapped.

The Owner or his designated inspection agency shall have access to all areas of the pipe manufacturer's plant during production, inspection, and shipping and shall have the opportunity to witness all tests associated with production and inspection of pipe and fittings for any given pipe order. Reasonable facilities shall be provided for this purpose.

The Contractor shall provide manufacturers' certifications that all ductile iron pipe and fittings meet provisions of this section and meet requirements of ANSI A21.51 / (AWWA C-151). Product certification shall include tensile and Charpy test results which shall be traceable to pipe numbers and testing periods. For pipe sizes 18 inches and greater, hydrostatic test charts including pipe numbers for each test cycle shall be furnished as part of the certification test reports. Chemical analysis shall be furnished for each ladle of iron which will cover each pipe cast and must correlate with the mechanical test results. For pipe sizes 18 inches and greater, complete traceability is required throughout the certification process and must be clearly legible on each pipe at the point of installation.

The Contractor shall provide certifications that all pipe joints have been tested and meet requirements of ANSI A21.11 / (AWWA C-151).

Payment for pipe and fittings shall be made on the basis of unit price bid for the particular size and type of pipe and fittings and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15122 COPPER PIPE

Copper pipe shall be seamless copper water tube meeting the requirements of AWWA Specification 7S-CR, latest revision Type K for copper water tube, or of ASTM Specification ANSI/ASTM B88, latest revision Type K for copper water tube. Water tube may be furnished in drawn temper (H) or annealed (O), according to location, service conditions and sizes as hereinafter described.

Class O tube may be used underground in sizes through 1 ¼". Class O tube is suitable for use with flared or compression fittings, and with solder-type fittings, provided that rounding, sizing, and preparation of tube ends is performed with the proper tools. Fittings for copper water tube, Class O, installed underground, shall be similar and equal to Mueller, Hays, Ford Meter Box Company or Swagelok (up through 1" size).

Copper water tube installed underground in sizes 1 ½” and larger shall be Class H, furnished in

straight lengths. Fittings shall be solder-type as manufactured by Mueller, Hays or Crane. All branches from underground tube (1 ½" and larger) shall be made by use of brass unions and copper to L.P.S. adapters. All valves installed at tees and/or crosses in piping runs shall be similarly equipped.

Copper water tube installed in buildings, vaults, galleries, etc., shall be Class H, furnished in straight lengths, and shall be installed in straight runs. An exception to the specification relative to installation of copper water tube in straight runs may be made when short lengths (not greater than 4') of tubing requiring bends and/or offsets are necessary for connection of items of equipment to water supply lines. This exception would apply only to tubing sizes ⅜" and smaller.

Fittings for tube of sizes 1 ¼" and larger shall be solder-joint type as manufactured by Mueller, Hays or Crane, except that all branches from the main run (whether from tees or crosses) shall be equipped with brass unions and copper to I.P.S. adapters. Valves are required on all branches, and all valves are required to be equipped with brass unions and copper to I.P.S. adapters. Fittings for tube of sizes 1" and smaller shall be as manufactured by Swagelok or Imperial.

Payment for copper pipe shall be made on the basis of unit price bid for the particular size and type copper pipe and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15137 GATE VALVES - WATER SERVICE

Gate valves, 16” diameter and smaller, shall be of iron body construction; shall be bronze mounted, full opening, non-rising stem, resilient seated wedge; and shall meet AWWA Specification C509, latest revision.

The sealing mechanism shall provide zero leakage with flow in either direction at pressures up to 250 psi, which shall be the working water pressure rating of the valve. The valve is to be suitable for throttling if required. When fully opened, valves shall have a smooth, unobstructed waterway that is free of cavities or projections that could permit accumulation of solids.

Valves shall have two O-Ring stem seals. The stem shall have the thrust collar and bearing surfaces isolated from the waterway and provided with continuous lubrication, or it shall be provided with non-corrosive thrust bearings above and below the thrust collar. They shall be capable of being repacked in the fully open position, under pressure as stipulated in AWWA C509 Standard.

All internal and external ferrous metal surfaces shall have an approved epoxy coating to provide a corrosion resistant barrier between the base metal and the surroundings.

The epoxy coating shall be applied holiday free to a thickness of not less than 4 mils, shall be non-toxic after application and impart no taste to water. Epoxy coating shall be FDA approved and shall be taste and odor free and shall meet or exceed all requirements of AWWA Specification C-550, latest revision.

Valves shall be equipped with flanged, mechanical joint, or push-on ends as required or

indicated; and shall be furnished with hand wheels or operating nuts as required or indicated.

Valves shall be as manufactured by Mueller Company, M & H Valves and Fittings, Company, American-Row Control, Clow, or equivalent.

Gate valves, 18" diameter and larger, shall be of iron body construction; shall be bronze mounted, full opening, non-rising stem, O-ring seal type; and shall meet AWWA Specification C500, latest revision.

Gate valves, 16" diameter and larger, designed to lie horizontally, shall be equipped with solid bronze or stainless steel tracks, solid bronze rollers and solid bronze scrapers lay-down valves, 16" diameter and larger, shall be bevel gear type, outside packed, with gear enclosures, and such valves shall be equipped with by-pass valves meeting the requirements of the above referenced AWWA standard. By-pass valves shall be provided in accordance with the following schedule:

Size of Valve	Size of By-Pass
14", 16", 18", & 20"	3”
24" & 30"	4”
36"	6”

By-pass valves shall meet the same specifications as for main-line valves.

Valves 12" in size and smaller shall be installed in vertical position with valve stems extending to within 24" of the surface of the finished ground; and valves larger than 12" shall be installed in horizontal position with valve stems extending to within 24" of the surface of finished ground. Top of operating nut on valve stem shall not, however, be closer than 20" to surface of finished ground.

It shall be the responsibility of the Contractor to make such variations in depths of trench as necessary to secure proper bury for the valves. The Contractor will not be permitted to make a sudden or local dip in the trench that would deviate from a constant downgrade or constant upgrade to an air release valve. Where depth of bury is such that the operating nut is not at the specified depth below ground surface, extension stems shall be furnished and installed by the Contractor.

All underground valves, mainline and by-pass, shall be equipped with valve boxes of proper size and height, complete with covers.

The Contractor shall be responsible for filling of the gear case with lubricants as recommended by the manufacturer; and lubricant level shall be checked and the valve operated in the presence of the Engineers before the trench is backfilled.

All bronze body gate valves shall be pressure rated as shown in the piping schedules and/or as indicated on the Drawings but, if pressure ratings should not be given, the valves shall be rated at not less than 250 psi WOG. In order to ensure an adequate safety factor valve shells shall by hydrostatically tested at not less than 350 psi. Valves shall be union bonnet type, with solid wedge gate and rising stem. Valves shall be all-bronze construction with exceptions of hand wheel and hand wheel nut. Hand wheel shall be malleable iron, and hand wheel nut (stem nut)

shall be either brass or bronze. All valves shall be provided with backseating to permit repacking the valve under full pressure when it is wide open. Valves shall be similar and equal to manufacture of Powell or Jenkins. Valves shall have ends as required for connections to threaded galvanized steel pipe, threaded alloy steel pipe (black or galvanized) or copper water tube. Where flanged connections are required, valves may be either screw-in-bonnet type or union bonnet type, according to the manufacturer's standard. In general, bronze body gate valves (in size up to 3") shall be installed in galvanized steel piping, alloy steel piping or copper piping located in building vaults or galleries; and bronze body gate valves shall also be installed in copper piping located underground.

Payment for gate valves shall be made on the basis of unit price bid for the particular size and type gate valve and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15140 BUTTERFLY VALVES – GENERAL SERVICE

Butterfly valves shall be designed, manufactured and tested in accordance with the provisions and requirements of ANSI/AWWA C504, Class 250B latest revision, and in accordance with the requirements of these Specifications. All valves shall be droptight when subjected to the specified working pressure (differential pressure), and all valves shall be capable of droptight seating under bidirectional flow conditions (maximum working pressure applied as differential pressure from either direction).

Valve bodies shall be constructed of cast (gray) iron ASTM A126-73 Class B, ductile iron ANSI/ASTM A536 Grade 65-45-12, or alloy cast iron ANSI/ASTM A436 Type 1 or 2, or ANSI/ASTM A439 Type D2. Two external hubs for housing shaft bearings shall be integrally cast with the bodies, and the bodies shall be equipped with mechanical ends, flanged ends, or Victaulic ends as required.

Valve discs shall be solid construction, and shall be ductile iron as specified under the above referenced AWWA Standard or alloy cast iron ANSI/ASTM A436 Type 2. Edges of discs for valves with rubber seats in the body shall be shaped, machined and polished to such configuration as will ensure smooth and even mating with the rubber seat over an acceptable angle of interference ($\pm$ 2 ½º). The disc shall rotate 90º from full open position to tightly closed position, and shall be of such design as to sustain maximum differential pressure across the closed disc without exceeding a working stress of one fifth of the tensile strength of the material used in the manufacture of the disc.

Valve seats shall be designed so as to provide tight shut-off (droptight) at the maximum pressure differentials resulting from the working pressures specified. Seating materials shall be new natural rubber or new synthetic rubber conforming to the requirements of ANSI/AWWA C504, latest revision. Rubber seats shall be bonded or mechanically fastened in the valve body. All clamps, retaining rings and fasteners shall be stainless steel specified in the above referenced AWWA Standards.

Valve shafting shall be stainless steel in accordance with the above referenced AWWA Standard, and may be either one-piece through-body-and-disc construction, or may be stub-shaft construction. If of stub-shaft construction, each stub shaft shall be inserted into hubs integral

with the valve disc for a distance of at least 1 ½ times the diameter of the shaft. Lengths of hubs extending from the disc shall be such that the full required insertion can be obtained. The connection between the shaft and the disc shall be designed to transmit shaft torque equivalent to at least 75% of the torsional strength of the minimum shaft diameters. Dowel and taper pins, if used, shall be mechanically secured. Any penetrations in the shaft shall be compensated for by increase in shaft diameter so that the relationship of transmitted torque to shaft torsional strength will be maintained.

Valve bearings shall be sleeve type, non-corrosive, and of "self-lubricated" materials. Thrust rings and/or bearings shall maintain the disc in design centered position. Valves shafts shall be designed for connections to operators as required, and shaft seals shall be provided at capped ends and projecting ends.

All valves shall fully meet or exceed the requirements of ANSI/AWWA C504, latest revision, and shall fully meet or exceed the requirements of these Specifications. The valves shall be furnished complete in accordance with the requirements of Section 5 of ANSI/AWWA C504, latest revision, and certified copies of reports relating to materials, hydrostatic test and proof of design test shall be furnished to the Engineer.

Valve operators shall be traveling-nut type or geared type designed to withstand 300 ft-lbs of input torque at fully open or fully closed positions without damage to valve or operator. Operator case shall be grease-packed. Stop-limiting devises shall be provided in the operators for open and closed positions. Travel of the valve shall be indicated on quadrant bolted to the body (exposed valves). Micro-switches shall be provided for transmission of signal indicating that the valve is in "open" or "closed" position when such requirement is specified and/or indicated on the Drawings.

Valves installed in locations accessible from the floor or ground shall be equipped with handwheels; and valves installed in locations higher than 6'6" above finish floor or ground shall be equipped with chainwheels and chain. The last stated provisions shall apply except when valves are indicated to be operated through floorstands or benchstands located above the valves, and in such cases valves shall be equipped with enclosed operators, extension stems, floorstands (or benchstands), and indicators.

Valves installed underground shall be equipped with grease packed operators having gasketted covers to prevent entrance of moisture into case when subjected to external hydrostatic pressure of 10 psi; and valves shall be operated through AWWA valve nut mounted on vertical operating shaft extending through top of gear case. Operator extension, valve box, position indicator, and cover shall be provided for each valve. Extensions and valve boxes shall be of correct length and height to suit elevation of ground surface.

All valves shall be open "Left". Valve shall be Pratt, DeZurik, M&H, or equivalent.

Valves shall be of size and pressure ratings as shown in the piping schedules and/or as indicated on the Drawings. The valve shall function leak-proof (droptight) within the pressure rating given, but all valve components shall be capable of withstanding water hammer shock equal to not less than 150% of pressure rating. Although the valve may leak under water hammer shock condition, after shock condition has passed the valve shall return to droptight functioning without the need for any adjustment.

All valves shall be cycled at the factory as required by AWWA Standard. After valves have been received on the job and immediately before they are to be installed, they shall be cycled not less than five times to determine whether proper closure will be obtained. Any adjustment required to secure proper closure shall be performed by a qualified representative of the manufacturer of the valve.

Valves shall be equipped with cast iron pipe or cast iron soil pipe extension columns to accommodate valve wrenches, or may be equipped with valve boxes as specified herein. Extension columns and valve boxes shall be fitted with cast iron covers marked "WATER".

All internal ferrous metal surfaces of the valve shall have a factory applied 2-part thermo setting epoxy coating in conformance with AWWA C550-81, or latest revision. The epoxy coating shall be FDA approved non-toxic, taste and odor free. Surfaces shall be painted in accordance with the following Schedule:

Interior Unfinished Surfaces	Epoxy
Exterior Unfinished Surfaces of Valves to be Buried, Submerged Located in Manholes of Valve Vaults	Coal Tar
Exterior Surfaces of All other valves	Rust-inhibitive primer
Polished or Machined Surfaces	Rust-preventive compound

Interior coatings shall comply with AWWA C550 and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Coal Tar	6 mils
Epoxy	10 mils
Rust-Inhibitive Primer	3 mils

Payment for butterfly valves shall be made on the basis of unit price bid for the particular size and type butterfly valve and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15163 VALVE BOXES

All buried valves, including by-pass valves on geared valves, shall be equipped with valve boxes. Valve boxes shall be cast iron, slip type, with cast iron extension pieces as required to make up length of box from surface of ground to top of valve body. Covers shall be marked "WATER". Valve boxes shall be manufactured of cast Iron in accordance with the requirements

of ASTM A48, Class 35.

Valve boxes for 2 ¼" and smaller valves shall be similar and equal to Alabama Pipe Company E-2602, M&H E-2602, Mueller Roadway type, Opelika Foundry Company, Roadway type, or equivalent. Valve boxes for valves larger than 2 ¼" shall be similar and equal to Mueller Buffalo type, Alabama Pipe Company E-3002, M&H E-3002, Opelika Foundry Company, or equivalent.

Valve boxes shall be installed plumb, centered over operating nut, and securely positioned while backfill is placed and tamped in such a manner that plumb and concentric position will be maintained.

All parts of valve boxes, bases, and covers shall be shop coated by dipping in asphalt varnish.

Payment for valve boxes shall be made on the basis of unit price bid for the particular size and type valve box and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15178 MECHANICAL COUPLINGS

Pipe couplings shall be threaded, push-on mechanical joint, or bolted as specified herein or as indicated on the Drawings. Special couplings for expansion or flexibility shall be Smith Blair 411; Dresser Style 38; or equivalent. Harness bolts, where required on lines under pressure where shown on the Drawings shall be joint restraint system as manufactured by Star National Products, or may be standard systems of the pipe manufacturers, or equivalent.

Mechanical couplings shall be carefully installed in accordance with the manufacturer's recommendations. A space of at least 1/4 inch and not more than one inch shall be left between the pipe ends. Pipe and coupling surfaces which contact gaskets shall be clean and free from dirt and other foreign matter during assembly. All assembly bolts shall be uniformly tightened so that the coupling is free from leaks and all parts of the coupling are square and symmetrical with the pipe. Following installation of the coupling, damage areas of shop coatings on the pipe and coupling shall be repaired to the satisfaction of the Engineer.

The interior surfaces of the middle rings shall be prepared for painting in accordance with instructions of the paint manufacturer and shall then be coated with liquid epoxy in accordance with AWWA C210. The remaining components shall be cleaned and shop primed with the manufacturer's standard rust-inhibitive primer.

Payment for mechanical couplings shall be made on the basis of unit price bid for the particular size and type mechanical coupling and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15179 GRIPPER GLANDS

Where gripper glands are indicated for use with mechanical joint fittings, joint restraint shall be provided by a follower gland with a mechanism that grips the pipe with teeth which are wedged

tighter as pressure is applied to the pipeline. Gripper glands shall have a working pressure rating of at least 350 psi up to 16" size and at least 250 psi up to size 48" size. Gland shall conform to mechanical joint (ANSI/AWWA A21.11) and be suitable for use with tee-head bolts (ANSI/AWWA C153/A21.53). Gripper gland shall be "MJ Gripper Gland" manufactured by U. S. Pipe and Foundry Company; "Mega Lug" manufactured by EBAA Iron. Inc.; or equivalent.

Payment for gripper (retainer) glands shall be made on the basis of unit price bid for the particular size and type gripper gland and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15180 RESTRAINING GASKETS

Where restraining gaskets are indicated for use with push on joint fittings and pipe, joint restraint shall be provided by stainless steel locking segments vulcanized into the gasket itself. The gaskets shall have a working pressure rating of at least 250 psi up to 16" size and at least 250 psi up to size 36" size. Gasket shall conform to standard for rubber gasket joints for ductile iron pressure pipe and fittings (ANSI/AWWA C111/A21.11). Restraining gaskets shall be "Field Lok" manufactured by U. S. Pipe and Foundry Company; or equivalent.

Payment for restraining gaskets shall be made on the basis of unit price bid for the particular size and type restraining gasket and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15181 FLEXIBLE JOINTS FOR MANHOLE – SEWER CONNECTIONS

Flexible joints or flexible connectors, for connection of sewers smaller than 24 inches in diameter to manholes shall be either of the two following types:

1. Complete joint with insert piece pre-cast in wall of manhole and comprised of the following components: cast iron insert ring, ASTM A48, Class 20, tapped ½ inch to receive draw bolts; cast iron compression flange, ASTM A48, Class 20; Corten draw bolts with washers and nuts; rubber "O" ring gasket, ASTM C443.

2. Complete joint with seal assembly inserted in hole cored in manhole wall and comprised of the following components: rubber or neoprene boot; stainless steel seal band; stainless steel pipe clamp.

15184 EXTENSION STEMS

Extension stems and stem guides shall be furnished and installed where specified, indicated on the drawings, or otherwise required for proper valve operation. Extension stems shall be of solid steel and shall be not smaller in diameter than the stem of the valve actuator shaft. All stem connections shall be pinned.

At least two stem guides shall be furnished with each valve requiring stem guides. Stem guides shall be of cast iron construction, bronze bushed and adjustable in two directions. Stem guide

spacing shall not exceed 100 times the stem diameter or 10 feet, whichever is smaller. The top stem guide shall be designed to carry the weight of the extension stem. The extension stem shall have a collar; the collar shall be pinned to the stem and shall bear against the stem thrust guide.

15187 JOINING OF PIPE

Pipe joining procedure shall be in accordance with these Specifications and in accordance with the recommendations of the manufacturer of the particular type of joint.

A. Mechanical Joint Pipe

The joining of mechanical joint pipe shall be performed in accordance with AWWA standard for installation of Cast Iron Water Mains C600.

The ends of the two pieces of pipe to be joined shall first be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter, and then lubricated prior to joining. Glands shall be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket end. The rubber gasket shall be lubricated and placed on the spigot end with the thick edge toward the gland.

The entire section of the pipe shall be pushed forward to seat the spigot end in the bell. The gasket shall then be pressed in place within the bell, care being taken to locate the gasket evenly around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting; all the bolts shall be inserted, and hard tightened. All nuts shall then be tightened with a suitable torque-limiting wrench. The torque for various sizes of bolts shall be per the manufacturer's recommendations.

Nuts spaced 100 to 180 degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.

B. Push-On Joint Pipe

The joining of Push-On Joint pipe shall be performed in accordance with the AWWA Standard for Installation of Cast Iron Water Mains C600 and in accordance with the manufacturer's instructions and/or recommendations for the particular joint furnished.

The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter. The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the socket. A thin coat of gasket lubricant shall be applied to either the inside surface of the gasket or outside surface of the spigot, or both. Gasket lubricant shall be as supplied by the particular manufacturer and reviewed by the Engineer.

The spigot end of the pipe shall be carefully inserted in the socket so that the joining surfaces will not come in contact with the ground, trench bed or trench sides. The joint shall then be completed by forcing the spigot end to the bottom of socket by methods as recommended by the particular manufacturer and concurred with by the Engineer. All pipe shall be furnished with a depth mark to indicate a “full-home” assembly.

The Contractor shall provide special transition sleeves or transition pieces of pipe for connecting

pipe of different classes; and those special pieces shall be clearly identified with suitable marking.

The Contractor will not be permitted to cut nipples from stock classes of pipe in order to make connections or closures. If the Contractor desires to cut lengths in the field to make closures, he shall have on hand an adequate number of lengths of pipe of the various classes having the interior of the barrel gauged to fit the socket of pipe.

C. Restrained Joint Pipe

Joints and pipe ends for restrained joint pipe shall be prepared and installed in accordance with the pipe manufacturer's recommendations.

D. Flanged Pipe

The joining of flanged ductile iron pipe shall be in accordance with the requirements of ANSI B31.1.0. All bolt holes shall so match as to permit free insertion of bolts without binding. Faces of flanges shall match fully and shall be true both horizontally and vertically before the bolts are tightened. Any misalignment or vertical deviation from a true match shall not be corrected by tightening the bolts but shall be remedied by adjustment of the piping. The same requirements shall apply for connection of flanged pipe to flanged equipment. Gaskets shall be suitable for the particular class of flanges with which the pipe is equipped, and the entire piping system shall be leak-proof.

E. Copper Pipe (Copper Water Tube)

Refer to Copper Pipe Section

F. Steel Pipe

Refer to Steel Pipe Section

15188 PIPELAYING

Minimum depth of cover for all pipe shall be 40" unless otherwise shown on the Drawings. The Contractor shall excavate the trenches to such depths so as to obtain the cover specified hereinabove or as indicated on the Drawings.

A. Ductile Iron Pipe

Installation and joining of ductile iron pipe shall be performed in accordance with the requirements of ANSI/AWWA C600, latest revision, and with the requirements of these Specifications. Ductile iron pipe shall be installed so as to conform to the alignment and grade shown on the Drawings. If other utilities, pipe, cables, conduits. etc., are encountered they shall be handled as described in these Specifications.

Ductile iron pipe shall be laid so that the invert elevations will correspond to those shown on the Drawings for the particular stations along the pipe line; and the difference in elevation between any two consecutive grade points (elevation control points or stations) shall be uniformly and

proportionately distributed between the pipe lengths comprising the section of pipe line between such control points. The maximum deflection for a particular size and length of pipe shall be in accordance with the manufacturer's recommendations.

Proper and suitable tools and appliances for handling of the pipe shall be used. The bottom of the trench shall be prepared as described in these Specifications. Each piece of pipe or fitting shall be cleaned and carefully examined for defect. No defective pipe or fittings shall be used. If a defective piece should be discovered after having been used it shall be removed and replaced with a non-detective piece by the Contractor at the Contractor's expense. The pipe shall be accurately installed to the lines and grades shown on the Drawings.

Whenever a length of pipe requires cutting to fit the lines, it shall be done as to leave a smooth end at right angles to the axis of the line; and the Contractor shall not receive extra compensation for this work. Open ends of the unfinished pipe line shall be securely closed when the work is stopped temporarily at night or other times.

15190 UTILITIES AND UNDERGROUND OBSTRUCTIONS

The locations of existing utilities, as shown on the Drawings, are based upon information acquired during the performance of field surveys, upon physical reconnaissance of the project area with representatives of local city and/or utility Boards, upon drawings showing locations of existing facilities, upon a physical search of the project area for facilities in the vicinity of the proposed facilities and upon information secured from other utilities as may be involved. Although reasonable care has been taken in the presentation of all available data, the Owner and Engineer cannot guarantee the accuracy of the locations shown on the Drawings with respect to overhead, grade level, and underground facilities. Such presentation is made for the bidder's information. The bidder shall make such additional investigations as he may desire or as may be required to complete the work. By signing the Proposal the bidder has stated that he is familiar with the project area, that he is aware of the existing conditions, and that he has taken such conditions into consideration in the preparation of his bid.

During the work all existing utilities including but not limited to water mains, sanitary sewers, gas mains, storm sewers, electric power transmission lines and conduits, telephone lines and cables, power poles and telephone poles, shall be protected, supported, maintained in service and restored to the condition in which they were found. Where it becomes necessary to excavate by hand in the vicinity of pipelines, telephone cables, power cables, telephone or power poles, services from utilities or other obstructions either under ground or above ground, the required handwork shall be performed by the Contractor. All work as described hereinabove shall be performed by the Contractor at no extra cost to the Owner.

The Contractor is reminded that regular contact with all affected utilities or private companies is necessary in order that all such utilities and/or companies are kept advised of the progress of the construction work and may at the proper time be able to take whatever steps they may deem necessary to protect their facilities.

Where utilities that are to remain permanently in service should be encountered, and where such utilities, because of alignment or grade, cannot be temporarily relocated, changes in grade or alignment of the Contract work may be made provided that such revisions do not adversely affect the new work and that the concurrence of the Engineer with respect to such revision is first

secured. In the event, however, that revision of the new work is not deemed by the Engineer to be a practical solution to the problem, the locations of the existing utilities obstructing the new work shall be changed, by relocation either in plan or elevation as the circumstances require, so as to accomplish their original purpose with the same effectiveness. In the latter case, payment for relocation of the existing facilities will be made in accordance with the provisions of the General Conditions relating to Extra Work, but only when such facilities are not shown on the Drawings.

15192 BRACING OF PIPE AND FITTINGS

All piping shall be braced against internal thrust by means of restrained joints and/or poured-in-placed concrete bracing where changes in direction occur or where branches from the line are located.

Braced underground piping shall be securely braced against movement with concrete thrust blocks and bearing against solid undisturbed ground. Where solid or undisturbed ground cannot be obtained for bracing or where indicated on the Drawings restrained joint pipe and/or fitting shall be required. Concrete braces shall be constructed in accordance with details shown on the Drawings; and shall be plain or reinforced as indicated or required. All reinforced concrete used in underground bracing shall be Class A concrete in accordance with the requirements of these Specifications.

Special bracing for particular locations identified on the Drawings and/or described herein shall be in accordance with details shown on the Drawings for the particular special brace and shall be complete with reinforcing steel and miscellaneous metal work.

Piping installed above ground in buildings, galleries, tunnels, piping trenches and chases shall be supported and braced as indicated on the Drawings and specified herein. Where pipes are braced or supported above ground piping by means of concrete piers or thrust blocks, the concrete used for construction of such piers or thrust blocks shall be Class A as specified in these Specifications; shall be reinforced; shall be anchored to slabs and/or walls by dowels; and shall be finished to match adjacent concrete surfaces or finished surfaces of adjacent walls or floors whichever is applicable.

15194 PIPELINE TESTING

The Contractor shall furnish all equipment, labor, materials, and supervision necessary to perform the tests required. The Contractor shall bear the cost of testing, retesting, and any replacement work required (including all materials required). The Contractor is reminded that he is solely responsible for observance of all safety regulations and for the maintenance of safe conditions during all testing work. Should any pipe line, or any section of the line fail to meet the criteria established herein below, all deficiencies shall be corrected and the testing repeated until the specified test results have been achieved.

All pipelines shall be tested in accordance with procedures and practices applicable to the various types and kinds of pipe and to the various sizes of pipe. The Contractor is reminded that personnel not experienced in testing procedures and practices, and particularly in air-testing of pipelines, should neither be allowed to conduct the test nor assist in the test procedures.

A. <u>Gravity Sewers</u>

As heretofore stated in these Specifications, the Contractor shall prosecute the sewer construction work so as to secure the following:

1. Sewers uniformly and safely bedded and backfilled,
2. Sewers having tight joints with gaskets fully compressed and joint openings (exceeding 1/4 inch) completely filled.
3. Sewers having smooth and uniform interior sections with respect to surfaces, grade, and alignment.
4. Sewer shall be watertight within the allowable limits.

The total quantity of infiltration into the sewer (including manholes) shall not exceed 50 gallons per mile of sewer per inch of inside diameter per 24 hours and in no case shall it exceed 2500 gallons per mile per 24 hours. Regardless of the amount of infiltration leakage which occurs the Contractor shall repair and correct any and all visible or audible leaks in any section of the sewer, manholes, or appurtenances.

In order that final testing of the sewers not be deferred until the sewers are operating under 'wet weather' and high water table conditions, and that surface restoration work can closely follow construction work, the Contractor shall employ the "low-pressure air testing procedure" in order to determine the probable acceptability of the sewers as reasonably watertight conduits (within the limits specified) when operating under 'wet weather' and high water table conditions.

Sewers of sizes up to and including 24" in diameter shall be tested by use of: (1) Low-Pressure Air Test of Vitrified Clay Pipe Lines, ASTM C828-80, latest revision; (2), Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method, ASTM C 924085, latest revision; or (3), Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines. ASTM D969-82, latest revision. The use of Test Practices (1) or (2) shall not preclude acceptance by appropriate water infiltration or exfiltration testing such as Test Practice (3) hereinabove. The Infiltration test shall not be used when the elevation of the groundwater table is less than two (2) feet above the top of the pipe throughout the entire length of the test section of the pipeline during the performance of the test.

Sewers of sizes 30" and larger will be examined for leaks and/or other interior deficiencies by making a complete interior examination of the pipelines. All visible leaks and deficiencies shall be repaired and any and all leaks and other deficiencies appearing after all other leaks and other deficiencies have been repaired shall also be repaired. If the elevation of the ground water table, at the time of the last visual examination and measurement of leakage should have been less than two (2) feet over the top of the pipe throughout the entire length of the test section, the section shall then be tested for exfiltration by use of the testing practice as set forth in ASTM D 969-82, latest revision.

The “low-pressure air test” shall generally conform to the hereinafter outlined procedure, recommended by the National Clay Pipe Institute for testing sanitary sewers.

1. Clean pipe to be tested. For small diameter sewers this may be done by “balling” the line, that is, utilizing water pressure for propelling a rubber ball through the sewer; and, in the case of larger diameter sewers, the Contractor

may elect to employ interior cleaning crews. A wetted interior pipe surface will be advantageous in securing more consistent results.

2. Plug all open ends end pipe outlets with suitable test plugs, end brace each plug securely. Brace all plugged fittings and plugged service lines to prevent blowout of plug.
3. If the pipe to be tested is subject to external pressure exerted by elevation of ground water table, the elevation of ground water table (with reference to invert of sewer) shall be determined. This may be done by either of the following methods: (1) Insert a pipe probe through backfill to elevation of invert by boring or jetting. Equip top end of probe with a bubbler head. Slowly pass air through bubbler head and probe. Read pressure from air gauge mounted on bubbler head. All base gage pressures specified for the test shall be increased by gage reading. Gage shall be low-pressure, wide range. (2) Install 1/2 inch diameter pipe through manhole well at level approximately at top of sewer; turn down pipe outside of manhole to run to elevation of invert; end cap pipe inside of manhole. This should be done at the time when the manhole is constructed. When the line is to be tested remove cap, clear test pipe with compressed air, end connect clear plastic tube to test pipe. Start flow of water through pipe end tube, and read elevation of water in tube (with reference to invert of pipe). Divide reading by 2.31 and add resulting to invert of pipe). Divide reading by 2.31 and add resulting pressure (in psi) to add base gage pressures specified for the test. After all testing has been completed cap or plug test pipe at manhole wall.
4. Add air slowly to the plugged section of the sewer under test until the internal air pressure has been raised to 4.0 psig base plus any pressure allowance representing external head as determined under 3, hereinabove.
5. After the pre-set pressure (4.0 psig base + allowance) has been obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain the pre-set pressure, then close air supply valve.
6. When the pressure decreased to a gage reading equal to 3.5 psig base + allowance (such gage reading being termed stabilized pressure), start stop-watch. Determine time in seconds marking drop of 1.0 psig of internal air pressure.
7. Refer to the AIR TEST TABLE following this Section to determine minimum permissible pressure holding time in seconds for particular section of sewer being tested.

The Contractor shall, at his own expense, furnish all labor, supervision, materials and equipment required for air testing of sewers.

As stated hereinabove, surface restoration shall closely follow construction work. It follows; therefore, that air testing of completed sections of sewer shall closely follow installation of the sewers in order that surface restoration work might be undertaken.

The Contractor shall be responsible for observance of all safety precautions and maintenance of safe conditions during air testing. These precautions shall include but not be limited to ensuring that personnel not experienced in air testing procedure not be allowed to conduct the air tests and that personnel are not allowed in the manholes at ends of test sections during tests. Pneumatic plugs shall be seal tested in pipe sections outside of trench before being used to plug sewers; and

such test sections shall be internally pressurized to levels adequate to determine sealing efficiency of plugs. Air supply lines to pneumatic plugs and to sealed section shall be equipped with pressure regulating sets. Return line from sealed section shall be equipped with pressure gage to monitor pressure rise in sealed section.

B. Water Supply Mains

All water mains shall be tested in accordance with the procedures outlined herein below. The Contractor shall furnish all meters, gauges, pressure recorders, test plugs, valves, couplings, pitot gauges, test piping and fittings, pumps, compressors, receivers, motors, engines, electric power, fuel, water, supplies, labor tools, materials, equipment and supervision necessary to perform the tests required and shall make all connections necessary to perform the tests required. Should any pipe line, or any section of the line, fail to meet the criteria established herein below, any deficiencies shall be corrected and the testing repeated until the specified test results have been achieved.

All water supply mains and other water lines underground shall be tested in accordance with the requirements of ANSI / AWWA C600 and in accordance with the requirements of these Specifications. Test pressure shall not be applied to instruments, controls, regulators or equipment.

Sections of mains placed under test shall be 1200 feet or less in length unless the concurrence of the Engineer is first secured. Test sections may not exceed 3000 feet in length. Sections of mains to be placed under test shall be isolated by means of valves or test plugs. The duration of the test shall be 24 hours, and the test pressure shall be 150 psi or 1 ½ times the normal working pressure, whichever is greater. Pressure shall be recorded on a 24 hour pressure recorder satisfactory to the Engineers and test charts shall be provided to the Engineers prior to acceptance of testing. No pipe line, or section of pipe line, will be accepted if the leakage is greater than that as determined by application of the following formula:

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

where, L = Allowable leakage in gallons per hour
D = Nominal diameter of pipe in inches
S = length of pipe being tested in feet
P = Average test pressure in PSIG

During testing the pressure in the main or line being tested shall be maintained as closely as possible to the test pressure specified. The pressure shall not be allowed to fall more than 5 psi below the specified test pressure. Should the pressure be allowed to drop more than 5 psi the test shall be re-started. The water added to the main or pipe line in order to maintain the desired test pressure shall be metered through a bench-tested meter registering in gallons and fractions of a gallon. The quantity of water added to the main or line during the test period shall be the leakage. All visible leaks shall be repaired even when tested leakage rates are less than the limits as determined by application of the formula given hereinabove.

AIR TEST TABLES*

MINIMUM HOLDING TIME IN SECONDS
REQUIRED FOR PRESSURE TO DROP FROM 3 ½ TO 2 ½ PSIG

	PIPE SIZE													
LF	4”	6”	8”	10"	12"	16"	18"	21"	24"	27"	30"	33"	36"	39”
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
100	18	40	70	110	158	248	356	485	634	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												
450	79	170												
500	88													
550	97													
600	106													
650	113	107	227	283	340	425	510	595	680	765	851	935	1020	1105

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY
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15312 TAPPING SLEEVES & VALVES

Tapping sleeves shall be bolted split type having gaskets extending the entire length of the sleeves to form a watertight joint when bolted in place. Tapping sleeves shall be cast iron, either gray iron or ductile iron, and metal shall conform to the respective chemical and physical properties specified for gray iron and ductile iron fittings in ANSI A21.10/AWWA C110. Walls of sleeves shall be extra heavy and the sleeves shall accommodate gray iron pipe and ductile iron pipe of the various standard thickness classes.

Sleeves shall be equipped with either mechanical joint ends or caulk type ends, according to the suitability of the sleeve to accommodate the pipe to be tapped. Sleeves equipped with

mechanical joint ends shall be used to the maximum extent possible that is wherever found to be suitable. The Contractor shall determine the suitability of the particular type of end for accommodating the pipe before ordering the sleeve. The Contractor shall carefully measure the O.D. of the pipe to be tapped to make certain that he will have sleeves equipped with correct ends of correct patterns.

Branch outlets of sleeves shall be equipped with flanges made with female faces to accommodate raised male faces of tapping valves. Before the pipe is tapped the Contractor shall close the branch with a tapped blind flange and shall test the sleeve at pressure of 100 psi above the line pressure (of the pipe to be tapped) specified and/or indicated on the Drawings.

Tapping valves shall meet or exceed the requirements of these Specifications for AWWA gate valves and pressure rated gray iron (or ductile iron) valves in all respects except for ends and seat rings. The tapping side of the valve shall be equipped with flange having raised male face to ensure proper alignment with the sleeve and the outlet of the valve shall be equipped with flange having slotted bolt holes for attachment of tapping machine. The flange shall either be suitable for mechanical joint connection or shall have caulking recess for making a caulked-type joint as required. Seat rings shall be oversized so as to permit the use of cutters of the full nominal size of the tapping valves.

Payment for tapping sleeves and valves shall be made on the basis of unit price bid for the particular size and type tapping sleeve and valve and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15320 PIPE SADDLES

Pipe saddles shall be manufactured from ductile iron and shall have positively confined "O-Ring" type sealing gaskets. Pipe saddles shall be equipped with high strength stainless steel (or Cor-Ten Steel) straps with minimum cross section dimensions of ¼" x 1½" and fabricated with hexagonal nuts for fastening to transmission mains.

Pipe saddles shall be furnished with mechanical joint outlets conforming to the requirements of ANSI A21.11/AWWA C111) latest revision; or with flange outlet conforming to the requirements of ANSI A21.15/AWWA C110) latest revision as indicated on the Drawings and/or as described in these Specifications. Inside diameter of saddle outlet shall be ¼" greater than the nominal in order that a full size opening can be made in pipe wall. Pipe saddles shall be similar and equivalent to manufacture of American Cast Iron Pipe Company.

Payment for pipe saddles shall be made on the basis of unit price bid for the particular size and type pipe saddle and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15324 FIRE HYDRANTS

Fire hydrants shall be the 3-way with two (2) 2 ½" hose nozzles and one (1) 4 ½" pump nozzle (NST Hose Nozzle 5 ¾" O.D. x 4 ½" threads per inch). Nozzles shall have National Standard Hose Coupling Threading and shall be equipped with caps and chains. Hose nozzle shall be 3 1/16" O.D. x 7 ½" threads per inch.

Hydrant shall be "Safety" or "Traffic" Model with safety flanges and safety stem couplings so that hydrant valve will remain tightly closed after upper section has been broken; shall have oil reservoir and oiling system or permanent lubrication system incorporated in bonnet assembly; and shall have not less than 5 ½" valve opening; shall have 6" inlet opening with mechanical joint shop connection; shall have 1 ¼" (Point to Face) National Standard "Pentagon" operating nut; and shall equal or exceed AWWA Specification C502 (latest revision). Hydrants shall be M&H Style 129, painted yellow with spread enamel Glidden No. Y-4560. Fire hydrant shall open left in 11 ½ turns.

Hydrants shall be so set that "bury" line is at surface of ground and such that the adjoining finish grade within a three (3) foot radius is within 2 inches of the bury line. The lower barrel section of each hydrant shall be of such length (from safety flange to shoe) as to adjust the "bury" line to suit trench depth at the particular location. The location of each hydrant shall be field checked for the purpose of determining the length of lower barrel section required for the particular location. Hydrants shall be set plumb and true with proper nozzles facing street or curb. Broken stone (gradation 1 ½" to 2 ½") shall be placed around hydrant drainage opening to permit effective drainage of barrel. Volume of stone shall not be less than two (2) cubic feet.

Fire hydrant leads less than or equal to 60 inches in length shall be ductile iron with integrally cast mechanical joint gland on one end and an integrally restrained rotatable mechanical joint gland on the other end. Fire hydrant leads greater than 60 inches in length shall be ductile iron pipe with ductile iron gripper glands for ends of lead. The anchoring pipe section shall be complete with glands and bolts for connection to mechanical joint fittings and mechanical joint shoes. Mechanical joint tee shall be a valve and hydrant type tee having standard MJ connections on the run of the tee and a ductile iron integrally restrained rotatable MJ gland on the plain end branch for direct connection to MJ and MJ valve.

The location of each hydrant shall be field checked for the purpose of determining the correct length of fire hydrant lead required for the particular location.

Payment for fire hydrants shall be made on the basis of unit price bid for the particular size and type fire hydrant and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15328 AUTOMATIC AIR RELEASE VALVE ASSEMBLIES – WATER SERVICE

Automatic air release valve assemblies, furnished and installed complete for venting accumulation of air in the finished water mains, shall be provided in locations as indicated on the Drawings. Automatic air release valve assemblies shall be provided for the particular main sizes in accordance with the details shown on the Drawings and as described hereinbelow.

Automatic air release valves shall be similar and equivalent to Crispin PL series.

Housing for automatic air release valve assemblies shall be as shown on the Drawings. The housing shall, depending on the size of valve, be either precast concrete manhole sections or meter box as described herein. Precast concrete manhole sections shall be 5 ft. O.D. manhole risers without bottom slab and with flat slab top (eccentric opening) with cast in place frame and

cover. Frame for cover shall be integrally cast within the manhole flat slab top during manufacture of manhole top. Field setting of manhole frame in precast slab will not be allowed. Meter box where shown on the Drawings to house automatic air release valve shall be constructed of reinforced concrete or cast iron. Concrete boxes shall have tight-fitting concrete covers equipped with insert reading lids of cast iron, hinged type and self-closing; and cast iron boxes shall have tight fitting lids. All lids shall have the words "WATER" integrally cast in the cast iron lid section.

Housing for automatic air release valves shall be set at the proper elevation to allow acceptable top, bottom and side clearances for air release and valve assembly. The Contractor is responsible for determining required depth and elevations of housing to assure correct orientation of housing. Top of housing shall be set flush with ground surface.

Payment for automatic air release valves shall be made on the basis of unit price bid for the particular size and type air release valve and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15340 VALVE MARKERS

The Contractor shall furnish and install valve markers for all valves installed in locations other than in city streets or for locations identified on the Drawings and/or as directed by the Engineers. Valve markers shall be precast, reinforced concrete posts, 4"x 4" or 4"x 6" in cross-section, and 6'-0" long. Markers shall be equipped with brass discs (as for monuments and benchmarks) set monolithically in top of post. Posts shall be marked "WV" for water main valves, "ARV" for air release valves and "BOV" for blow-off valve assemblies. After post has been set, there shall be die-stamped on face of disc an arrow indicating the location of the valve with respect to the marker, and there shall also be stamped on the disc the measured distance of the valve from the marker. Valve markers shall be set within 2'-0" of the road or street right-of-way boundary in the general vicinity of the valves to be referenced. Placement of valve markers shall be at the direction of the Owner.

Payment for valve markers shall be made on the basis of unit price bid for the particular size and type valve marker and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15344 WATER SERVICES, METERS AND METER BOXES

The Contractor shall furnish all labor, materials, and equipment, and shall make the service installations complete in accordance with the Plans and Specifications. Each service installation shall consist of: tapping of water main: 1) corporation stop, of size indicated and as specified herein; 2) length of copper water tube, Type K, sufficient to run from main to meter location, and of size indicated and as specified herein; 3) adapter coupling, of size indicated and as specified herein; 4) curb stop, of size indicated and as specified herein; 5) meter coupling, of size indicated and as specified herein; 6) meter of size indicated and as specified herein; 7) dual check of size indicated and as specified herein; and 8) meter box as specified herein. Components of each service installation shall be those adopted as standards for the system. Where corporation stops are inserted in taps made on ductile iron mains threads of corporation stops shall be double-

wrapped with Teflon tape. The Contractor shall also make connections to existing service and connections shall be included in the unit price for service installations.

Service lines shall be copper tubing meeting the requirements of AWWA Specification 7S-CR, Type K or ASTM B88, Type K. Corporation Stops shall meet the requirements of AWWA C800 and shall be A.Y. McDonald Series 4701T. Curb Stops shall meet the requirements of AWWA C800 and shall be A.Y. McDonald Series 6101W or Ford Model B11-444W. Meter couplings shall meet the requirements of AWWA C800 and shall be Mueller Model H10890. Copper to iron couplings shall meet the requirements of AWWA C800 and shall be A.Y. McDonald Series 4753T or Mueller H15428. Meter boxes shall be furnished and installed for all meter installations. Boxes shall be constructed of plastic and shall be DFW brand Model 1200 with ERT Pocket under lid for ¾" meters and shall be DFW Model 1500 with ERT Pocket under lid for 1" meters. Dual check valve shall be Watts No. 7 Model 710-U2 or equivalent. Meters shall meet the requirements of AWWA C700 and shall be Badger Meter, Inc. Recordall® Cold Water Bronze Disc Meter. The meter shall be fitted with Badger Meter, Inc. Itron® Model 50W-2 Pit ERT for Recordall® Transmitter Register.

Payment for services (with meters and meter boxes) shall be made on the basis of unit price bid for the particular size and type service and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15360 FLUSH HYDRANT ASSEMBLIES

Flush hydrant assemblies, furnished and installed complete, shall be provided in locations as shown on the Drawings. Flush hydrants assemblies shall consist of the following: One (1) compact mechanical joint tee with 6" branch; One (1) 6" mechanical joint plug tapped for 2" IPT; Two (2) 2" galvanized nipples; One (1) 2" bronze gate valve, NRS with tee head and with cast iron valve box and cover; One (1) Eclipse No. 78 Mainguard flush hydrant; One (1) concrete meter box with cover; and all general concrete bracing, ductile iron piping, associated fittings, appurtenances, and retainer glands and all miscellaneous work required to construct a particular flush hydrant assembly in accordance with the details shown on the Drawings.

Payment for flush hydrant assemblies shall be made on the basis of unit price bid for the particular size and type flush hydrant assembly and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15372 CONNECTION TO EXISTING SYSTEM

The Contractor shall make all connections to existing mains as indicated on the Drawings and as specified herein; and these connections shall be made at such times and in such manner as will keep to a minimum any interruptions of service or inconvenience to users of the system. Connections to the existing system shall only be made after obtaining permission from the Owner specifically for each connection.

Payment for connections to existing system shall be made on the basis of lump sum price bid for each connection and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for the connections.

15376 POLYETHYLENE ENCASEMENT OF PIPE

Where indicated on the Drawings ductile iron pipe should be encased with polyethylene. The material used should be polyethylene plastic wrap manufactured for the protection of ductile iron pipe. The polyethylene wrap shall have a minimum thickness of 8 mils (0.008 in.) meet the requirements of AWWA C105 and be constructed from virgin polyethylene material conforming to the requirements of ANSI/ASTM Specification D1248. Polyethylene wrap shall be sealed using heavy duty duct type tape or other method recommended by the manufacturer to create a watertight encasement of the ductile iron pipe. To prevent the polyethylene wrap from being torn or otherwise damaged by backfill material the polyethylene wrapped pipe shall be first backfilled with sand to a depth of at least 6 inches below the bottom, around the sides, and over the top of the pipe.

15388 DISINFECTION OF WATER MAINS

The Contractor shall disinfect the pipe, pipe fittings, valves, and hydrants installed in the system. In general, all disinfection shall be in accordance with AWWA C651, latest revision.

The interior of the pipe fittings and accessories shall be kept clean and free from dirt; pipe shall be cleaned before installation; and shall be protected during laying to prevent earth entering pipe. During periods when pipe laying is not in progress, open ends of laid pipe shall be protected by means of water-tight plug or other means satisfactory to the Engineers. All joints of pipe in trench shall be made up tightly before stopping work at night.

After the mains are laid and pressure tested, they shall be thoroughly flushed, either through fire hydrants or by means of taps at the end of the mains (the taps to be large enough to insure a velocity of at least 2.5 fps in the mains).

The mains shall be chlorinated (after flushing) with sufficient liquid chlorine (sodium hypochlorite), or calcium hypochlorite, to provide 50 mg/l available chlorine to the water in the mains. The chlorine solution shall remain in the pipe at least 24 hours. The super-chlorinated water (residual > 2 mg/l) shall be flushed until the main is filled with water having a normal chlorine residual, or it shall be allowed time to sit until the chlorine residual reaches a normal level. The Contractor shall not discharge or release super-chlorinated water under any circumstances. All super-chlorinated water shall be chemically treated such that the chlorine residual is less than 2 mg/l prior to discharge, or it shall be discharged to a holding facility to allow sufficient time to reduce the chlorine residual to less than 2 mg/l. The Contractor shall meet or exceed all requirements of the Alabama Department of Environmental Management and the Federal Clean Water Act.

All Samples for bacteriological examination by the State Health Department shall be taken on consecutive days (two sets of samples taken 24 hours apart) by the Contractor and delivered to the State Health Department; and if the water quality does not meet the standards of the Health Department, the disinfection process shall be repeated until satisfactory water is obtained. Samples for bacteriological examination shall be collected at not greater than 2000 foot intervals along transmission mains.

The Contractor shall furnish all chemicals, chemical feed pumps, tanks, generator sets, valves,

connections, materials, labor and miscellaneous equipment required for proper disinfection of the mains.

15914 COOPERATION WITH AUTHORITIES AND UTILITY COMPANIES

The construction shall be carried on in close cooperation with all Public Authorities having jurisdiction in the area of the work, the various public utility companies involved, and with any other contractors on the project so as to cause as little interference as possible and to facilitate prompt completion of the project.

The Contractor shall obtain and pay for all necessary permits and shall make all necessary arrangements for carrying out the work with all Public Authorities having jurisdiction in the area of the work, with all utility companies, and with any other agency or authority affected.

The Contractor shall make proper provision, satisfactory to all Public Authorities having jurisdiction over the Public Rights-of-Way in the area of the work, for safe handling of traffic during the prosecution of the work.

All excavation shall be done in a manner satisfactory to the utilities and others involved, and so as to not unnecessarily damage other pipe lines or utility property, or interrupt service.

15921 STREAM CROSSINGS

At locations where the pipelines cross streams or ditches additional protection, such as concrete encasement or rip rap, will be required over the pipelines. A minimum of 12" of concrete shall be placed on all sides of the piping. The locations of the crossings are shown on the Drawings, and the Contractor shall construct each crossing complete with the protective features as shown on the Drawings and/or as specified herein.

The crossings may vary in composition of protective features because of the varying conditions at each particular location. Each particular crossing will therefore appear under separate bid items in the Proposal Form.

The crushed stone bedding for the particular types of pipe shall be as specified under the Section of these Specifications relating to PIPELAYING. For certain types of pipe the quantity of crushed stone bedding required will be increased when the pipe is installed at a stream crossing for the reason that the elevation of top bedding will be raised in order to provide support for the concrete encasement.

The work at each crossing shall include furnishing and installing the pipeline with bedding material, concrete encasement and reinforced concrete headwalls (when specified and/or indicated on the Drawings) within the limits of the particular crossing as specified and/or as indicated on the Drawings.

Payment for constructing each stream crossing complete within the limits shown on the Drawings for the particular crossing will be made on the basis of lump sum price bid for the particular crossing. Such lump sum payment shall be compensation in full for: all labor, tools, materials, supplies, services and equipment; all excavation and backfill; all bedding and backfill; all pipeline installation, all concrete encasement; all reinforcing steel, formwork and

concrete work (when reinforced concrete headwalls are specified and/or/ shown on the Drawings to be included in the crossing; all cleaning and flushing; all testing work; all incidental work involved such as diversion of water, coffer dams, flumes, pumping, draining, sheeting and shoring, disposal of surplus materials, surface restoration, etc.; and supervision, overhead and profit.

15922 HIGHWAY/ROADWAY CROSSINGS

The Owner will have, prior to commencement of work on the project, secured from the Alabama Department of Transportation or other Authority having jurisdiction such Permits as may have been required to undertake the construction of the crossings, and will have posted with the State of Alabama Highway Department or other Authority such Bonds as may have been required to ensure the faithful performance of the work in accordance with the terms and conditions of the Permits. The Contractor shall assume the obligations of the Owner with respect to performance of the work as specified under these Permits.

Highway crossings and road crossings shall be made by the boring-and-jacking method or by the tunneling method unless express permission has been received from the Alabama Department of Transportation, or other Authority having jurisdiction over a particular road, to utilize the open-cut method at a specified location.

The Contractor shall notify the Engineers, the Alabama Department of Transportation, or other Authority having jurisdiction, of the date on which he expects to begin work on a particular crossing.

The Contractor is reminded that all work involved in the making of the crossings is subject to the "Safety and Health Regulations for Construction" of the Occupational Safety and Health Administration as set forth in the Federal Register, latest revision, and to the Rules and Regulations of the U.S. Bureau of Mines, as applicable.

The testing of that section of the pipeline within the limits given for a particular crossing shall be performed separately from the testing of other sections of the pipeline. For pipeline work and testing work refer to applicable Sections of these Specifications.

When a pay item for highway crossing is not included in the Proposal Form, no separate payment for highway crossing shall be made. Compensation for highway crossings in this case shall be included in the Lump Sum Price Bid or the other unit prices in the Proposal Form.

15924 CASING PIPE

Casing pipe shall be smooth wall steel pipe meeting the requirements of ASTM A 139, latest revision, or of ASTM A 262, latest revision, as indicated on the Drawings. Wall thicknesses of casing pipe shall be as shown on the Drawings.

Internal and external surfaces of casing pipe shall receive one coat of corrosion resistant water based asphaltine resin emulsion coating to a dry film thickness of at least 3 mils. Asphalt emulsion coating shall have asphalt solids content of 55 to 65 percent in accordance with ASTM D244 and VOC content of not more than 6 percent according to ASTM D402. Asphalt emulsion

coating shall be Molecular Pipe & Fitting Coating (MPFC) as manufactured by Molecular Coating Specialist, Inc. of DeSoto, Texas, or equivalent.

The Contractor may elect to provide casing with an additional 1/16 inch corrosion allowance to the wall thickness of the casing in which case the internal coating requirements maybe waived. Casing pipe having pitted or corroded surfaces shall not be installed.

Minimum wall thicknesses of casing pipe shall be as follows:

Nominal Diameter 16”	**Wall Thickness**
16”	**0.219”**
24”	**0.312”**
26”	**0.344”**
28”	**0.375”**
30”	**0.406”**
36”	**0.469”**
42”	**0.562”**
48”	**0.625”**

Payment for casing pipe shall be made on the basis of unit price bid for the particular size and type casing pipe and shall be compensation in full for all labor, tools, materials, supplies, equipment, testing, excavation and backfill necessary for installation.

15925 CROSSING INSTALLATION – BORING AND JACKING METHOD

The boring-and-jacking method of installation of casing for the carrier pipe shall be a “dry” operation without use of hydraulic jetting to soften, loosen or sluice away the material to be excavated. Boring shall be prosecuted from work pit located in the open-cut section of the pipeline. The pit shall be of sufficient length and width to accommodate the boring/jacking machine and length of section of casing pipe to be jacked, and also shall be such size as will provide ample and safe working area around the machine. Depth of pit shall be required to make the bore at the elevation shown on the Drawings. The floor of the work pit shall be stabilized so as to provide a firm and stable foundation for the support frame for the machine.

The boring of the hole for the casing and the advancement of the casing in the hole shall be an integrated operation. The hole shall be mechanically bored by a cutting head mounted on a continuous-flight auger rotating inside of the casing. Power source for rotation of auger and advancement of casing shall be a hydraulic power-pack mounted on the boring/jacking machine. The machine shall be mounted on a frame designed to support the weight of the machine and the weight of the incremental length of auger and casing to be advanced. Elevation (grade) control shall be provided by a suitable hydraulic devise and hydraulic line mounted to the casing. The Contractor shall select casing of such diameter as will permit him to install the carrier pipe at the elevation or grade shown on the Drawings, but diameters of casings shall not be less than those shown on the Drawings.

Material discharged from the auger shall be removed from the work pit but shall be separately stored apart from those materials excavated from the work pit until the Engineer has the opportunity to examine the materials removed by the auger.

Successive sections of casing pipe shall be welded to the casing in place as the boring operation and advancement of casing continues. All welding shall be performed in accordance with applicable American Welding Society Standards and recommended procedures. After the boring and jacking has been completed the casing shall be cleaned by means of a plug or pipe cleaning pig mounted on the boring shaft.

Casing for crossings shall be as described in these Specifications. Carrier pipe shall be installed inside the casing and ends of casing sealed as described in these Specifications.

15927 CROSSING INSTALLATION – OPEN CUT METHOD

The open-cut method of crossing a highway may be employed only when permission has been obtained from the Alabama Department of Transportation or governing authority to make a specific highway crossing by use of the open-cut method. Streets and other roads will be crossed by use of the open-cut method when proper permission has been obtained. Casing will not be required where it is not shown on the Drawings.

Casings for highway crossings made by the open-cut method shall be as described in these Specifications.

The bottom of the trench shall be evenly graded to a depth of approximately 6” below the bottom of the casing in order to accommodate foundation material and bedding material. Foundation material, crushed stone (ALDOT No. 8910), shall be placed across the entire width of the trench up to the elevation of bottom of casing and shall be compacted to 100% of Standard Proctor Density according to ASHTO T99 test.

The casing pipe shall be accurately laid on the prepared bed to the alignment and grade shown on the Drawings, and shall be securely blocked in place to prevent movement during the succeeding phase of the backfilling operation. Backfill from level of top of bedding material to top of casing pipe shall be crushed stone, ALDOT No. 8910, and shall be compacted to 100% of Standard Proctor Density according to ASHTO T99 test. Any blocking material required to have been used shall have been removed when level of backfill reached the spring line of the casing pipe.

Backfill from level of top of the pipe to an elevation 6” below the base of paving shall be crushed stone, ALDOT No. 8910, and shall be compacted to 100% of Standard Proctor Density according to ASHTO T99 test. Layers shall not exceed 6” in thickness. A drainage plane, 6” in thickness, shall be placed below paving base and shall be crushed stone conforming to the requirements of ALDOT Specifications, Section 822. The drainage plane materials shall be placed in accordance with the requirements of ALDOT Specifications, Section 315.

The Contractor shall replace the paving base with layer of crushed stone equal in thickness to that of the existing base, but not less than 6". Base materials shall conform to the requirements of ALDOT Specifications, Section 825. Paving base shall be compacted in accordance with ALDOT Specifications Section 306.

Bituminous pavement replaced shall conform to the requirements of these Specifications.

The Contractor shall make all arrangements for diversion of traffic and control of traffic during the making of the crossing, all in accordance with the requirements of these Specifications and

General Conditions. In the event that the Contractor should be unable to complete a road crossings, or partial road crossing, before the end of the work day he shall cover the section of the trench not yet backfilled with steel plates of such size and thickness as to safely withstand heavy traffic over the trench and remain in place under such heavy traffic. The safety of the entire operation is the sole responsibility of the Contractor.

15928 INSTALLATION OF CARRIER PIPE INSIDE CASING

The carrier pipe of size and type as shown on the Drawings shall be threaded through the casing pipe. The carrier pipe shall be stabilized within the casing by use of methods as described herein below:

1. **Support assemblies** of diameter not less than the diameter of the casing minus one-half inch. Support assemblies or spiders shall be molded or hard rubber or high density polyethylene, shall be placed at approximately ten (10) foot intervals and shall be similar and equivalent to manufacture of T .D. Williamson Co. or Maloney Co.

2. **Pea Gravel** blown-in from each end of the casing until the space between exterior of the pipe and interior wall of the casing has been filled.

3. **Other Methods** as may be proposed by the Contractor and as may be acceptable to the Engineer.

The ends of the casing shall be sealed by masonry bulkhead constructed across the open faces of the casing and fully around the casing. Bulkheads shall extend not less than 8" back from the ends of the casing; not less than 8" out from the ends of the casing, and not less than 8" above the top and below the bottom if the casing. If constructed of masonry units, the bulkheads shall be cross-bonded by headers laid parallel to the longitudinal axis of the casing. A drain pipe of either hot-dipped galvanized steel or cast iron soil pipe, 2" in diameter, shall be installed through the bulkhead at the lower end of the casing, and the invert of the drain pipe shall be set at the invert of the casing. The Contractor, at his option, may elect to furnish and install manufactured end seals for closing the ends of the casing.