REQUEST FOR PROPOSALS

No. 17-40

ROCKDALE COUNTY, GEORGIA

August 23, 2017

4 MG WATER STORAGE TANK

ROCKDALE COUNTY FINANCE DEPARTMENT
PROCUREMENT OFFICE
958 Milstead Avenue
CONYERS, GA 30012
770-278-7552

INTRODUCTION:
Rockdale County is requesting Competitive Sealed Proposals for the **4 MG Storage Tank to be located at Gees Mill Water Treatment Plant.** Instructions for preparation and submission of a proposal are contained in this packet. Proposals must be typed or printed in ink.

Rockdale County provides equal opportunity for all businesses and does not discriminate against any person or business because of race, color, religion, sex, national origin, handicap or veterans status. This policy ensures all segments of the business community have access to supplying the goods and services needed by Rockdale County.

PURCHASING CONTACT FOR THIS REQUEST:
All questions concerning this invitation and all questions arising subsequent to award are to be addressed to the Procurement Officer at the following address:

Rockdale County Finance Department
Procurement Division
Attn: Meagan Porch, Buyer
958 Milstead Avenue
Conyers, GA 30012
Phone: (770) 278-7557, Fax: (770) 278-8910
E-mail: meagan.porch@rockdalecountyga.gov

To maintain a "level playing field", and to assure that all proposers receive the same information, proposers are requested **NOT** to contact anyone other than the contact above until after the award of the contract. Doing so could result in disqualification of the proposer.

PROPOSAL COPIES FOR EVALUATION:
Four (4) hard copies and one (1) original hard copy and one (1) CD's in Adobe PDF format will be required for review purposes. *(With the original clearly marked "Original" and the Copies clearly marked "Copies.")* . CD's that are blank or have incorrect information on them will not be acceptable and may be justification for disqualification. Check your disk(s) to ensure that they have the appropriate material on it before submitting.

DUE DATE:
Sealed proposals will be received at the Rockdale County Finance Department, Procurement Division, 958 Milstead Avenue, Conyers, GA 30012 no later than **2:00 P.M., local time, Thursday, September 28, 2017.** Proposals received after this time will not be accepted.

PRE-PROPOSAL CONFERENCE:
There will be a **MANDATORY** Pre-Proposal Conference held at the **Rockdale County Water Treatment Plant, 2090 Gees Mill Road, Conyers, GA 30013 at 10 a.m., local time, Monday, September 11, 2017**. Any questions and/or misunderstandings that may arise from this RFP must be submitted in writing and forwarded to the Procurement Officer at the above address or by email. It shall be the Proposers responsibility to seek clarification as early as possible prior to the due date and time. *Any contractor who intends to submit a Proposal is required to attend this meeting.*

QUESTIONS AND CLARIFICATIONS:
You should submit your questions and/or requests for clarifications about this RFP no later than **2:00 p.m., local time, Thursday, September 21, 2017.** Written responses from the County to the

questions it receives will be in an addendum and posted to the County's website at www.rockdalecountyga.gov, Bids, RFPs and Announcements/Current Bids.

ADDENDA:
Answers to questions submitted that materially change the conditions and specifications of this RFP will be issued in an addendum and posted to the County's website at www.rockdalecountyga.gov, Bids, RFPs and Announcements/Current Bids. Any discussions or documents will be considered non-binding unless incorporated and issued in an addendum.

Proposers should check the website at www.rockdalecountyga.gov, Bids, RFPs and Announcements/ Current Bids frequently during the process to verify that they have received all issued addenda. Proposers have the responsibility of making sure that they have received all issued addenda.

QUANTITIES
The quantities listed in the Proposers Response Schedule are provided as an estimate for proposal purposes. The County will not be obligated to quantities beyond actual needs.

CONTRACT TERM:
The Contract Term will be 15 months from the date of Notice-to-Proceed (NTP).

LOCAL VENDOR PREFERENCE POLICY
The Rockdale County Board of Commissioners adopted a Local Vendor Preference Policy on March 26, 2013. The policy will apply to all qualified Invitations to Bids and Request for Proposals after May 1, 2013. The Local Vendor Preference Policy allows Rockdale County vendors to get an extra 5 points on the evaluation criteria scoring for Request for Proposal. The Policy will give the local bidder the opportunity to match the price of a non-local vendor's bid price if they are low and within 5% of the low bidder's price on Invitation to Bids. A copy of the Policy may be downloaded from the County website at www.rockdalecountyga.gov, under Finance/Purchasing.
The Local Vendor Preference Policy will not apply to this RFP.

ENERGY EFFICIENT, RECYCLING AND WASTE REDUCTION PURCHASING POLICY
Policy #R-2015-08 includes the following language:

> The Rockdale County Board of Commissioners only purchases energy star rated equipment and appliances that are economically responsible and reduce resource consumption and waste within federal, state, and local laws. The County will only purchase recycled copy, computer, and fax paper with at least 30 percent recycled content.

A copy of the policy may be viewed and downloaded by visiting the website at www.rockdalecountyga.gov, Bid Announcements, and scrolling down to the bottom of the page.

QUALIFICATIONS OF OFFERORS:
Proposers must have a current business license from their home based jurisdiction and provide a copy of that license with the submittal of their proposal response.

Proposals from any offeror that is in default on the payment of any taxes, license fees, or other monies due to Rockdale County will not be accepted.

Any contractor submitting a Proposal must complete the Contractor's Qualification Statement and Questionnaire if provided in this package.

In evaluating Proposals, the County may seek additional information from any contractor concerning such contractor's proposal or its qualifications to construct the Project.

PROPRIETARY INFORMATION
Careful consideration should be given before submitting confidential information to Rockdale County. The Georgia Open Records Act permits public scrutiny of most materials collected as part of this process. Please clearly mark any information that is considered a trade secret, as defined by the Georgia Trade Secrets Act of 1990, O.C.G.A. §10-1-760 et seq., as trade secrets are exempt from disclosure under the Open Records Act. Rockdale County does not guarantee the confidentiality of any information not clearly marked as a trade secret.

FINANCIAL STABILITY
The Offeror will provide financial information that would allow proposal evaluators to ascertain the financial stability of the firm.

- If a public company, the Offeror will provide their most recent audited financial report.
- If a private company, the Offeror will provide a copy of their most recent internal financial statement, and/or a letter from their financial institution, on the financial institution's letterhead, stating the Offeror is in good standing with that financial institution.

SELECTION PROCESS:
The Rockdale County Procurement Office and Evaluation Committee makes a recommendation for award. The Board of Commissioners will make the actual award of the contract and has the authority to award the contract to a company different than the company recommended by the Procurement Office and/or Evaluation Committee.

This is a past performance/quality/price trade-off source selection in which competing offeror's past and present performance history and product quality will be evaluated on a basis approximately equal to price. Award will be made to the responsible offeror whose proposal represents the best value after evaluation in accordance with the factors listed below. Rockdale County Board of Commissioners may reject any or all proposals and to waive any technicalities or informalities if such action is in the county's interest.

Rockdale County may evaluate proposals and award a contract without discussions with offerors. Therefore, the offeror's initial proposal should contain the offeror's best terms from a price and technical standpoint. The County reserves the right to conduct discussions if the County later determines them to be necessary.

Proposers will be evaluated based on the following criteria and may be called in for an interview.

The County intends to award the contract to the responsible and responsive contractor whose proposal is determined in writing to be the most advantageous to the County taking into consideration all of the evaluation criteria.

INSURANCE:
The Company shall maintain in full force and effectthe following insurance during the term of the Agreement.

Coverage	Limits of Liability
Workers' Compensation	Statutory
Employers' Liability	$1,000,000.00
Bodily Injury Liability	$1,000,000.00 each occurrence
except Automobile	$1,000,000.00 aggregate
Property Damage Liability	$1,000,000.00 each occurrence
except Automobile	$1,000,000.00 aggregate
Personal & Advertising Injury Limit	$1,000,000.00
Products / Completed Ops.	$2,000,000.00 aggregate
Automobile Bodily Injury	$1,000,000.00 each person
Liability	$1,000,000.00 each occurrence
Automobile Property Damage	$1,000,000.00 each occurrence
Liability	

Property Coverage /Builders Risk Policy	Equal to or greater than the existing building limit if performing renovations.

(If hazardous substances are involved)
Contractor's Pollution Liability (with 1 year extended reporting period)

Each Occurrence	$1,000,000.00
Aggregate	$2,000,000.00

Environmental Impairment Liability (with 1 year extended reporting period)

Each Occurrence	$1,000,000.00
Aggregate	$2,000,000.00

Excess Umbrella Liability	$3,000,000.00

All insurance shall be provided by an insurer(s) acceptable to the County, and shall provide for thirty (30) days prior notice of cancellation to the County. Upon contract award, Contractor shall deliver to the County a certificate or policy of insurance evidencing Contractor's compliance with this paragraph. Contractor shall abide by all terms and conditions of the insurance and shall do nothing to impair or invalidate the coverage.

Rockdale, GA shall be named as Additional Insured under any General Liability, Business Auto and Umbrella Policies using ISO Additional Insured Endorsement forms CG 2010 or its equivalent. Coverage shall apply as Primary and non-contributory with Waiver of Subrogation in favor of Rockdale County, Georgia.

The insurance carrier must have a minimum rating of A or higher as determined by the rating firm A.M. Best.

Certificates to contain policy number, policy limits and policy expiration date of all policies issued in accordance with this contract.

BONDS:

Rockdale County shall request the following for bids/proposals in excess of Fifty Thousand Dollars ($50,000.00).

BID BOND

Each bid shall include a bid bond in the amount of five percent (5%) of the total bid amount as guarantee that the bidder shall not withdraw the bid for 90 days after the scheduled bid opening. If awarded the contract, Bidders shall enter a written agreement with Rockdale County in accordance with the bid.

PERFORMANCE BOND

Upon execution and delivery of the contract, the bidder shall furnish Rockdale County a performance bond for the full amount of the contract. Maintenance provisions of the bond shall remain in effect for a period of twelve (12) months after acceptance of the work by the County. The surety shall be a reputable bonding company authorized to transact business in the State of Georgia.

PAYMENT BOND

Upon execution and delivery of the contract, the bidder shall furnish Rockdale County a payment bond for the full amount of the contract. Maintenance provisions of the bond shall remain in effect for a period of twelve (12) months after acceptance of the work by the County. The surety shall be a reputable bonding company authorized to transact business in the State of Georgia.

PERMITS:

The awarded contractor will be responsible for acquiring any permits that are required for this project/purchase. Rockdale County will waive fees on all permits issued by Rockdale County.

AWARD OF CONTRACT

The Rockdale County Procurement Office and Evaluation Committee makes a recommendation for award. The Board of Commissioners will make the actual award of the contract and has the authority to award the contract to a company different than the company recommended by the Procurement Office and/or Evaluation Committee.

ILLEGAL IMMIGRATION REFORM AND ENFORCEMENT ACT OF 2011
Vendors submitting a Qualification package in response to this RFP must complete the Contractor Affidavit under O.C.G.A. §13-10-91(b)(1) which is provided with the RFP package to verify compliance with the Illegal Immigration Reform and Enforcement Act of 2011.

A. The form must be signed by an authorized officer of the contractor or their authorized agent.

B. The form must be notarized.

C. The contractor will be required to have all subcontractors and sub-subcontractors who are engaged to complete physical performance of services under the final contract executed between the County and the contractor complete the appropriate subcontractor and sub-subcontractor affidavits and return them to the County a minimum of five (5) days prior to any work being accomplished by said subcontractor or sub-subcontractor. Format for this affidavit can be provided to the contractor if necessary.

GENERAL INFORMATION

No proposals received after said time or at any place other than the time and place as stated in the notice shall be considered. No responsibility shall attach to Rockdale County for the premature opening of a proposal not properly addressed and identified.

WITHDRAWAL OF PROPOSAL:

A proposer may withdraw his proposal before the proposal due date, without prejudice to the proposer, by submitting a written request of withdrawal to the Rockdale County Procurement Office.

REJECTION OF PROPOSAL:

Rockdale County may reject any and all proposals and must reject a proposal of any party who has been delinquent or unfaithful in any formal contract with Rockdale County. Also, the right is reserved to waive any irregularities or informalities in any proposal in the proposing procedure. Rockdale County shall be the sole judge as to which proposal is best, and in ascertaining this, will take into consideration the business integrity, financial resources, facilities for performing the work, and experience in similar operations of the various proposers.

STATEMENT OF EXPERIENCE AND QUALIFICATIONS:

The proposer may be required, upon request, to prove to the satisfaction of Rockdale County that he/she has the skill, experience, necessary facilities and ample financial resources to perform the contract(s) in a satisfactory manner and within the required time. If the available evidence of competency of any proposer is not satisfactory, the proposal of such proposer may be rejected. The successful proposer is required to comply with and abide by all applicable federal and state laws in effect at the time the contract is awarded.

NON-COLLUSION AFFIDAVIT:

By submitting a proposal, the proposer represents and warrants that such proposal is genuine and not

sham or collusive or made in the interest or in behalf of any person not therein named, that the proposer has not directly or indirectly induced or solicited any other proposer to put in a sham proposal, or any other person, firm or corporation to refrain from proposing and that the proposer has not in any manner sought by collusion to secure to that proposer any advantage over any other proposer.

INTEREST OF:

By submitting a proposal, the proposer represents and warrants that a Commissioner, Administrator, employee, nor any other person employed by Rockdale County has, in any manner, an interest, directly or indirectly, in the proposal or in the contract which may be made under it, or in any expected profits to arise there from.

DOCUMENTS DEEMED PART OF THE CONTRACT:

The notice, invitation to proposers, general conditions, and instructions for proposers, special conditions, specifications, proposal, and addenda, if any, will be deemed part of the contract.

STANDARD INSTRUCTIONS

1. The instructions contained herein shall be construed as a part of any proposal invitation and/or specifications issued by Rockdale County and must be followed by each proposer.

2. The written specifications contained in this proposal shall not be changed or superseded except by written addendum from Rockdale County. Failure to comply with the written specifications for this proposal may result in disqualification by Rockdale County.

3. All goods and materials shall be F.O.B. Destination Conyers, Georgia and no freight or postage charges will be paid by Rockdale County unless such charges are included in the proposal price.

4. The following number, **17-40** must be written clearly on the outside of each proposal envelope in order to avoid prior opening in error.

5. All proposals must be received and in-hand at proposal due date and time. Each proposer assumes the responsibility for having his/her proposal received at the designated time and place of proposal due date. Proposals received after the stated time and date may be subject to rejection without consideration, regardless of postmark. Rockdale County accepts no responsibility for mail delivery.

6. Unless otherwise stated, all proposals submitted shall be valid and may not be withdrawn for a period of 120 days from the due date.

7. Each proposal form submitted must include the name of the business, mailing address, the name, title and signature of the person submitting the proposal. When submitting a proposal to Rockdale County the first page of your proposal package should be the proposal form listing the price, delivery date, etc., unless the proposal form is requested to be in a separate envelope.

8. Rockdale County reserves the right to accept a proposal that is not the lowest price if, in the County's judgment, such proposal is in the best interest of the County and the public. The County reserves the right to reject any and all proposals.

9. Telephone, Telegraphic or Facsimile proposals will not be accepted.

10. No sales tax will be charged on any orders except for contracts that include construction materials being purchased through a third party.

    i. Federal I.D. #58-6000882
    ii. Sales Tax Exempt #58-800068K

11. If applicable, completed questionnaires must be signed manually. Rockdale County reserves the right to accept or reject any proposal on the basis of incomplete or inaccurate answers to the questionnaire.

12. If applicable, warranty information shall be provided.

13. Proposers shall state delivery time after receiving order.

14. Proposers shall identify any subcontractors, and include an explanation of the service or product that they may provide.

PROPOSAL FORM

Instructions: Complete all THREE parts of this bid form and the bid form provided in Section

PART I: Proposal Summary

Complete the information below. Contractor must use the bid form from Section 00300 for itemized pricing and insert Total Base Bid, Contingency and Total.

1.	**TOTAL BASE BID**	$
2.	**10% CONTINGENCY**	$
3.	**TOTAL**	$

PART II: Addenda Acknowledgements (if applicable)

Each vendor is responsible for determining that all addenda issued by the Rockdale County Finance Department – Purchasing Division have been received before submitting a bid.

Addenda	Date Vendor Received	Initials
"1"		
"2"		
"3"		

PART III: Vendor Information:

Company Name	
Address	
Telephone	
E-Mail	
Representative (print name)	
Signature of Representative	
Date Submitted	

ROCKDALE COUNTY BOARD OF COMMISSIONERS
NON-COLLUSION AFFIDAVIT OF VENDOR

State of _____)

County of _____)

_____, being first duly sworn, deposes and says that:

(1) He is_____ (owner, partner officer, representative, or

agent) of _____, the Vendor that has submitted the attached RFP;

(2) He is fully informed respecting the preparation and contents of the attached RFP and of all pertinent circumstances respecting such RFP;

(3) Such RFP is genuine and is not a collusive or sham RFP;

(4) Neither the said Vendor nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affidavit, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Vendor, firm or person to submit a collusive or sham RFP in connection with the Contract for which the attached RFP has been submitted or refrain from proposing in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Vendor, firm or person to fix the price or prices in the attached RFP or of any other Vendor, or to fix any overhead, profit or cost element of the proposing price or the proposing price of any other Vendor, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against Rockdale County or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached RFP are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Vendor or any of its agents, representatives, owners, employees, or parties in interest, including this affidavit.

_____
(Signed)

_____
(Title)

Subscribed and Sworn to before me this _____ day of _____, 20

Name_____

Title_____
My commission expires (Date)

ROCKDALE COUNTY BOARD OF COMMISSIONERS
NON-COLLUSION AFFIDAVIT OF SUB-CONTRACTOR

State of _____)

County of _____)

_____, being first duly sworn, deposes and says that:

(1) He/She is_____ (owner, partner officer, representative, or

agent) of _____, the sub-contractor that has submitted the attached RFP;

(2) He is fully informed respecting the preparation and contents of the attached RFP and of all pertinent circumstances respecting such RFP;

(3) Such RFP is genuine and is not a collusive or sham RFP;

(4) Neither the said sub-contractor nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affidavit, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Vendor, firm or person to submit a collusive or sham RFP in connection with the Contract for which the attached RFP has been submitted or refrain from proposing in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Vendor, firm or person to fix the price or prices in the attached RFP or of any other Vendor, or to fix any overhead, profit or cost element of the proposing price or the proposing price of any other Vendor, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against Rockdale County or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached RFP are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the sub-contractor or any of its agents, representatives, owners, employees, or parties in interest, including this affidavit.

_____
(Signed)

_____
(Title)

Subscribed and Sworn to before me this _____ day of _____, 20 ___.

Name_____

Title_____My commission expires (Date) _____

Contractor Affidavit under O.C.G.A. §13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. §13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. §13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. §13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,2017.

_____
NOTARY PUBLIC
My Commission Expires:

_____

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice that a sub-subcontractor has received an affidavit from any other contracted sub-subcontractor, the undersigned subcontractor must forward, within five business days of receipt, a copy of the notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,2017.

_____
NOTARY PUBLIC
My Commission Expires:

Sub-subcontractor Affidavit under O.C.G.A. §13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies it compliance with O.C.G.A. §13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract) and (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. §13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. §13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Sub-subcontractors hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Sub-Subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 201__ in _____(city), _____(state).

_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,2017.

_____
NOTARY PUBLIC
My Commission Expires:_____

Affidavit Verifying Status
for County Public Benefit Application

By executing this affidavit under oath, as an applicant for the award of a contract with Rockdale, County Georgia, I _____. [Name of natural person applying on behalf of individual, business, corporation, partnership, or other private entity] am stating the following as required by O.C.G.A. Section 50-36-1:

1) _____ I am a United States citizen

OR

2) _____ I am a legal permanent resident 18 years of age or older or I am an otherwise qualified alien or non-immigrant under the Federal Immigration and Nationality Act 18 years of age or older and lawfully present in the United States.*

In making the above representation under oath, I understand that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of Code Section 16-10-20 of the Official Code of Georgia.

_____
Signature of Applicant:

_____
Date

_____
Printed Name:

*_____
Alien Registration number for non-citizens

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE
_____ DAY OF _____, 2017.

_____
Notary Public
My commission Expires:

***Note**: O.C.G.A. § 50-36-1(e)(2) requires that aliens under the federal Immigration and Nationality Act, Title 8 U.S.C., as amended, provide their registration number. Because legal permanent residents are included in the federal definition of "alien", legal permanent residents must also provide their alien registration number. Qualified aliens that do not have an alien registration number may supply another identifying number below.

_____

CONTRACTOR'S QUALIFICATION STATEMENT AND QUESTIONNAIRE

NAME OF PROPOSED CONTRACTOR:

_____

I. INSTRUCTIONS

A. All questions are to be answered in full. If copies of other documents will answer the question completely, they may be attached and clearly labeled. If additional space is needed, additional pages may be attached and clearly labeled.

B. The owner, Rockdale County, Georgia, its agents and representatives, shall be entitled to contact each and every reference listed in response to this questionnaire, and each entity referenced in any response to any question in this questionnaire. By completing this questionnaire, the contractor expressly agrees that any information concerning the contractor in possession of said entities and references may be made available to the owner.

C. Only complete and accurate information shall be provided by the contractor. The contractor hereby warrants that, to the best of its knowledge and belief, the responses contained herein are true, accurate, and complete. The contractor also acknowledges that the owner is relying on the truth and accuracy of the responses contained herein. If it is later discovered that any material information given in response to a question was provided by the contractor, knowing it was false, it shall constitute grounds for immediate termination or rescission by the owner of any subsequent agreement between the owner and the contractor. The owner shall also have and retain any other remedies provided by law.

D. The completed form shall be submitted with contractor's proposals.

E. This form, its completion by the contractor, and its use by the contractor, and its use by the owner, shall not give rise to any liability on the part of the owner to the contractor or any third party or person.

II. GENERAL BACKGROUND

A. Current address of contractor: _____
_____

B. Previous Name or address of contractor: _____
_____

C. Current president or CEO and years in position: _____

D. Number of permanent employees:_____

E. Name and address of affiliated companies:_____
_____

III. FINANCIAL STATUS

A. Please attach financial statements for the past three years for which they are complete. If such statements are not available, please furnish the following information:

1. LAST COMPLETE FISCAL YEAR:

A.	Revenues (Gross)	_____
B.	Expenditures (Gross)	_____
C.	Overhead & Admin (Gross)	_____
D.	Profit (Gross)	_____

2. YEAR PRIOR TO "1" ABOVE:

A.	Revenues (Gross)	_____
B.	Expenditures (Gross)	_____
C.	Overhead & Admin (Gross)	_____
D.	Profit (Gross)	_____

3. YEAR PRIOR TO "2" ABOVE:

A.	Revenues (Gross)	_____
B.	Expenditures (Gross)	_____
C.	Overhead & Admin (Gross)	_____
D.	Profit (Gross)	_____

B. BANKRUPTCIES

1. Has the Contractor, or any of its parents or subsidiaries, ever had a Bankruptcy Petition filed in its name, voluntarily or involuntarily? (If yes, specify date, circumstances, and resolution).

_____
_____

2. Has any Majority Shareholder ever had a Bankruptcy Petition filed in his/her name, voluntarily or involuntarily? (If yes, specify date, circumstances, and resolution).

_____
_____

C. BONDING

1. What is the Contractor's current bonding capacity?

_____

2. What is the value of the Contractor's work currently under contract?

_____

IV. COMPANY EXPERIENCE – SIMILAR PROJECTS

A. List three projects of reasonably similar nature, scope, and duration performed by your company in the last five years, specifying, where possible, the name and last known address of each owner of those projects:

Project #1:
Name and Address: _____
_____
_____

Date of Project: _____

Type of Project: _____

Contract Price: _____

Owner contact info: _____
_____
_____

Architect/Engineer contact info: _____
(if applicable) _____
_____

Project #2:
Name and Address: _____

_____
_____

Date of Project: _____

Type of Project: _____

Contract Price: _____

Owner contact info: _____
_____
_____

Architect/Engineer contact info: _____
(if applicable) _____
_____

Project #3:
Name and Address: _____
_____
_____

Date of Project: _____

Type of Project: _____

Contract Price: _____

Owner contact info: _____
_____
_____

Architect/Engineer contact info: _____
(if applicable) _____
_____

V ARBITRATIONS, LITIGATIONS, AND OTHER PROCEEDINGS

Has your company been involved in any construction arbitration demands filed by, or against, you in the last five years? _____

Has your company been involved in any construction-related lawsuits (other than labor or personal injury litigation) filed by, or against, you in the last five years? _____

Has your company been involved in any lawsuits, proceedings, or hearings initiated by the National Labor Relations Board or similar state agency in the past seven years? _____

Has your company been involved in any lawsuits, proceedings, or hearings initiated by the Occupational Safety and Health Administration concerning the project safety practices of the Contractor in the last seven years? _____

Has your company be involved in any lawsuits, proceedings, or hearings initiated by the Internal Revenue Service, or any state revenue department, concerning the tax liability of the Contractor (other than audits) in the last seven years? _____

Have any criminal proceedings or investigations been brought against the Contractor in the last ten years? _____

If you answered yes to any of the questions above, please identify the nature of the claim, the amount in dispute, the parties, and the ultimate resolution of the proceeding (attach documentation if needed):

_____
_____
_____
_____

VI COMMENTS

Please list any additional information that you believe would assist the Owner in evaluating the possibility of using the Contractor on this Project. You may attach such additional information as an Exhibit to this Statement and Questionnaire.

_____
_____
_____
_____

I certify to the Owner that the information and responses provided on this Questionnaire are true, accurate and complete. The Owner, or its designated representative, may contact any entity or reference listed in this Questionnaire. Each entity or reference may make any information concerning the Contractor available to the Owner, or its designated representative.

Contractor:

_____ _____

Signature Date

_____

Title

Sworn to and subscribed before me
This _____ day of _____

_____

Signature

_____

Notary Public

My Commission Expires: _____

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Division 1 - General Requirements

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SECTION 00100
Instructions to Bidders

1.01 CONTRACT DOCUMENTS

A. The Contract Documents include the Contract Agreement, Invitation to Bid, Instructions to Bidders, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the Owner prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings, and addenda, together with written amendments, change orders, field orders and the PM/CM's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.

B. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils reports, and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site, are not Contract Documents.

C. The Contract Documents shall define and describe the complete work to which they relate.

1.02 DEFINITIONS

A. Where the following words or the pronouns used in their stead occur herein, they shall have the following meaning:

1. "Owner" shall mean Rockdale County, Georgia, party of the first part to the Contract Agreement, or its authorized and legal representatives.

2. "Program Manager/Construction Manager" shall mean Rockdale Water Resources-Engineering Dept., hereinafter also designated as "PM/CM".

3. "Designer" shall mean Rockdale Water Resources(RWR) and/or EDEC .

4. "Contractor" shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party.

5. "Work" and "Project" shall mean the entire completed construction required to be furnished under the Contract Documents.

6. "Contract Time" shall mean consecutive calendar days as provided in the Contract Document for completion of the Project, to be computed from the date of the Notice to Proceed.

7. "Liquidated Damages" shall mean the sum of $250.00 which the Bidder agrees to pay for each consecutive calendar day beyond the Contract Time required to complete the Project. Liquidated Damages will end upon written notification from the Owner of final acceptance of the Project.

8. "Products" shall mean materials or equipment permanently incorporated into the Project.

9. "Provide" shall mean to furnish and install.

10. "Balanced Bid" shall mean the total amount bid reasonably reflects the value of that item with regard to the entire job considering the prevailing cost of labor, material and equipment in the relevant market. A Bid is unbalanced when, in the opinion of the Owner, total amounts bid on any of the listed items do not reasonably reflect such values.

11. "Substantial completion of the work", solely for the purposes of Official Code of Georgia Annotated (O.C.G.A.) §13-10-20(c), shall be defined as occurring on the date of the written notification from the PM/CM that the Project is ready for final inspection, as specified in Section 00800, Article 30, paragraph (g).

12. "Satisfactorily completed", solely for the purposes of O.C.G.A. §13-10-20(b), shall mean the completion of all work, certifications and affidavits as specified in Section 00800, Article 30, paragraph (g).

1.03 PREPARATION AND EXECUTION OF BID

A. Each Bid must be prepared to represent that it is based solely upon the materials and equipment specified in the Contract Documents.

B. Each Bid must be submitted on the Bid forms which are attached to the Contract Documents. All blank spaces for Bid prices, both words and figures, must be filled in, in ink. In case of discrepancy, the amount shown in words will govern. All required enclosed certifications must be fully completed and executed when submitted.

C. Each Bid must be submitted in a sealed envelope, addressed to the Owner. Each sealed envelope containing a Bid must be plainly marked on the outside as, "Bid for Rockdale County, Georgia-4 MG WATER STORAGE TANK".

D. The Bidder shall provide on the outside of the sealed envelope the following information; otherwise the Bid will not be opened and will be returned to the Bidder:

1. Bidder's Name

2. Georgia Utility Contractor License Number

3. BID# 17-40 4 MG WATER STORAGE TANK

E. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the Rockdale County Department of Finance, Purchasing Division, 958 Milstead Avenue, P.O. Box 289, Conyers, GA 30012, Attn: Meagan Porch.

F. Any and all Bids not meeting the aforementioned criteria for Bid submittal, may be declared non-responsive, and subsequently returned to the Bidder.

G. The Contractor, in signing a Bid on the whole or any portion of the Project, shall conform to the following requirements:

1. Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.

2. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.

3. Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officer of the corporation manually written below the corporate name following the wording "By _____". Corporation seal shall also be affixed to the Bid.

4. The Bidder shall complete, execute and submit the following documents, which are attached to these Contract Documents:

   a. The Bid
   b. The Bid Bond
   c. Corporate Certificate, if the Bidder is a corporation
   d. Non-Collusion Affidavit of Prime Bidder
   e. Non-Collusion Affidavit of Sub-Contractor
   f. Contractor’s Affidavit

g. Sub-Contractor's Affidavit
h. Affidavit Verifying Status for County Public Benefit Application
i. Contractor's License Certification

1.04 METHOD OF BIDDING

Lump sum price for each of the several items in the Bid of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products, obtained by multiplying the quantity shown for each item by the unit price, represents the total Bid. Any Bid not conforming to this requirement may be rejected. Additionally, Unbalanced Bids will be subject to rejection. Conditional Bids will not be accepted. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed.

1.05 ADDENDA AND INTERPRETATIONS

A. No interpretation of the meaning of the Drawings, Specifications or other pre-bid documents will be made to any Bidder orally.

B. Every request for such interpretation should be made in writing and addressed to Rockdale County Department of Finance, Purchasing Division, 958 Milstead Avenue, P.O. Box 289, Conyers, GA 30012, Attn: Meagan Porch, Fax 770-278-8910 and to be given consideration must be received at least fifteen (15) business days prior to the date fixed for opening Bids or as specified in the Invitation to Bid.

C. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be posted on Rockdale County's website www.rockdalecountyga.gov, Bids, RFPs and Announcements/Current Bids. Any discussions or documents will be considered non-binding unless incorporated and issued in an addendum.

D. Failure of Bidders to receive or acknowledge any Addendum shall not relieve them of any obligation under the Bid. All Addenda shall become part of the Contract Documents.

1.06 BID MODIFICATIONS

Bidders may modify their Bid by Facsimile Transmittal at any time prior to the scheduled closing time for receipt of Bids, provided such Facsimile Transmittal is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the Facsimile Transmittal modification over the signature of the Bidder was mailed prior to the closing time. The Facsimile Transmittal should not reveal the Bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed Bid is opened. If written confirmation is not received within two business days from the closing time, no consideration will be given to the Facsimile Transmittal.

1.07 BID SECURITY

A. Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond included herein or a Surety Company's Standard Bid Bond, duly executed by the Bidder as principal and having as surety thereon a surety company authorized to do business in the State of Georgia and listed in the latest issue of U.S. Treasury Circular 570, in the amount of 5 percent of the Bid. Attorneys-in-fact who sign Bonds must file with each Bond a currently dated copy of their power of attorney.

B. If for any reason whatsoever the successful Bidder withdraws from the competition after opening of the Bids, or if Bidder refuses to execute and deliver the Contract and Bonds required within 10 days after receipt of notice of the acceptance of Bid, the Owner may proceed to enforce the provisions of the Bid Bond.

1.08 RECEIPT AND OPENING OF BIDS

The Owner may consider a minor irregularity any Bid not prepared and submitted in accordance with the provisions hereof and may waive any minor irregularities or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be opened.

1.09 SUBCONTRACTS

The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this Contract must be acceptable to the Owner.

1.10 CONDITIONS OF THE PROJECT

A. Each Bidder must be informed fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the Contract. Insofar as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

B. The Bidder is advised to examine the location of the Project and to be informed fully as to its conditions; the conformation of the ground; the character, quality and quantity of the products needed preliminary to and during the prosecution of the work; the general and local conditions and all other matters which can in any way affect the work to be done under the Contract. Failure to examine the site will not relieve the successful Bidder of an obligation to furnish all products and labor necessary to carry out the provisions of the Contract.

C. The Bidder shall notify the Owner of the date and time Bidder proposes to examine the location of the Project. The Bidder shall confine examination to the specific areas designated for the proposed construction, including easements and public right-of-ways. If, due to some unforeseen reason, the Owner's proceedings for obtaining the proposed construction site (including easements), have not been completed, the Bidder may enter the site only with the express consent of the property owner. The Bidder is solely responsible for any damages caused by examination of the site.

1.11 NOTICE OF SPECIAL CONDITIONS

If any special federal, state, county or city laws, municipal ordinances, and the rules and regulations of any authorities having jurisdiction over construction of the Project, enclosed, herein referred to, or applicable by law to the Project, conflict with requirements of the Contract Documents, then the most stringent requirement prevails.

1.12 OBLIGATION OF BIDDER

By submission of a Bid, each Bidder warrants that Bidder has inspected the site and has read and is thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument or document shall in no way relieve any Bidder from any obligation in respect to the Bid.

1.13 METHOD OF AWARD

A. The contract will be awarded to the responsive, responsible Bidder submitting the Bid which is in the best interest of the Owner as determined by the Owner.

B. The Bidder to whom the award is made will be notified. The Owner reserves the right to reject any and all Bids and to waive any minor irregularities in Bids received whenever such rejection or waiver is in the Owner's interest.

C. A responsive Bidder who submits a Bid in the proper form without qualification or intent other than as called for in the Contract Documents, and who binds himself or herself on behalf of the Bid to the Owner with the proper Bid Bond completed and attached, and who properly completes all forms required to be completed and submitted at the time of the Bidding. The Bidder shall furnish all data required by these Contract Documents. Failure to do so may result in the Bid being declared non-responsive.

D. Acceptance of the Bidder's documentation and substantiation or Contract Award by the Owner does not relieve the Bidder of liability for non-performance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

END OF SECTION

SECTION 00300
Bid

TO: ROCKDALE COUNTY, GEORGIA

FROM:_____
(Bidder's Name)

FOR: ROCKDALE COUNTY, GEORGIA
ANNUAL SANITARY SEWER REHABILITATION SERVICES

Submitted:_____, 2017

The undersigned Bidder, in compliance with your Invitation to Bid for the construction of this Project having examined the Contract Documents and the site of the proposed Work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to construct the Project in accordance with the Contract Documents.

The Bidder proposes and agrees, if this Bid is accepted, to contract with Rockdale County, Georgia in the form of Contract Agreement specified, to furnish all necessary products, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of the Work in full and complete accordance with the reasonably intended requirements of the Contract Documents to the full and entire satisfaction of Rockdale County, Georgia with a definite understanding that no money will be allowed for extra work except as set forth in the Contract Documents, for the following prices:

BID FORM

4 MGAL WATER STORAGE TANK

Department of Water Resources

ITEM #	DESCRIPTION (include all expenses, overhead and profit)	ESTIMATED QTY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization, Including Schedule, Bonds and Insurance	1	LS		
2	Construction of a 4 Million Gallon Precast, Prestressed Concrete Water Storage Tank with Baffle Curtain Walls.	1	LS		
3	Sheeting, Shoring and Bracing	1	LS		
4	Erosion and Sedimentation Control	1	LS		
5	Rock Excavation	22,500	CY		
6	Soil Excavation	850	CY		
7	Fill	500	CY		
8	Electrical and Instrumentation(include lighting)	1	LS		
9	Furnish & Install 48" Ductile Iron Pipe	960	LF		
10	Furnish & Install 48" Butterfly Valve	3	EA		
11	Modify Existing 48" Butterfly Valve	2	EA		
12	Furnish & Install 8" Ductile Iron Pipe	50	LF		
13	Furnish & Install 8" Gate Valve	1	EA		
14	Furnish and Install 48"Inflatable Plug Line Stop	2	EA		
15	Concrete Access Road	1	LS		
16	Furnish & Install 24" RCP Storm Drain	166	LF		
17	Furnish & Install Concrete Headwall for 24" pipe	3	EA		
18	Furnish & Install Concrete Headwall for 8" pipe(include flap valve)	1	EA		
19	Outlet Control Structure	1	EA		
20	Chain Link Fence	625	LF		
21	4" Combination Air Valve	1	EA		
	Total (items 1-21)				

TOTAL UNIT PRICE BASE BID, ITEMS 1 THRU 21= = _____

OWNER CONTINGENCIES, 10 % OF TOTAL FROM ABOVE = _____

BID TOTAL

BID TOTAL, ITEMS 1 THROUGH 21 (PLUS CONTINGENCY), INCLUSIVE, THE AMOUNT OF _____DOLLARS ($_____).

The Bidder declares an understanding that the quantities shown for unit price items are subject to either increase or decrease, and that should the quantities of any of the items of Work be increased, the Bidder proposes to do the additional Work at the unit prices stated herein; and should the quantities be decreased, the Bidder also understands that payment will be made on the basis of actual quantities at the unit price bid and will make no claim for additional costs or anticipated profits for any decrease in quantities; and that actual quantities will be determined upon completion of Work, at which time adjustment will be made to the Contract amount by direct increase or decrease. No guarantee can be made as to the number, size or value or type of scope of projects that may be assigned under this contract. Bidders must take into consideration that any combination of bid items may be assigned as a work package. Bidders are cautioned to price bid items in a balanced manner such that the costs of the items appropriately stand alone or in a combination with other items.

The Contract will be awarded to the lowest responsive, responsible Bidder whose Total Unit Price Base Bid as offered in the Bid Form represents the lowest total price and complies with the conditions of the Bid, provided the bid is reasonable and it is to the best interest of the Owner to accept it.

The undersigned further agrees to complete the work as bid within the assigned calendar days after receipt of NTP. As the time allotted for the completion of the Work is of the essence, if the work is not completed within specified time for the completion of the Work, there shall be deducted from the contract price, not as a penalty but as liquidated damages, **$250.00** for each and every calendar day of delay in the completion of the work beyond the time specified, subject to all the terms of the General Conditions.

In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply and the totals shall be corrected to agree with the unit prices. In case of discrepancies between written amounts and figures, written amounts shall take precedence over figures and the sum of all Bid extensions (of unit prices) plus lump sum items shall take precedence over BID TOTAL.

The Bidder furthermore agrees that, in the case of a failure to execute the Contract Agreement and Bonds within ten days after receipt of conformed Contract Documents for execution, the attached Bid Bond accompanying this Bid and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

Attached hereto is a Bid Bond for the sum of _____ Dollars ($ _____) according to the conditions of "Instructions to Bidders" and provisions thereof.

Bidder acknowledges receipt of the Following Addenda:

Addendum No. 1, dated:____

Addendum No. 2, dated:____

Addendum No. 3, dated:____

Addendum No. 4, dated:____

Addendum No. 5, dated:____

Addendum No. 6, dated:____

BIDDER:

By:

Name:
(Print or Type)

Title:

Address:

Phone:_

Attest:

Name:_
(Print or Type)

Title:

(SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a notary.

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full names and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

Name	Address
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

END OF SECTION 00300

SECTION 00410
Bid Bond

STATE OF GEORGIA

COUNTY OF ROCKDALE

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as Principal, and _____, as Surety, are held and firmly bound unto Rockdale County, Georgia in the sum of _____ Dollars ($_____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to the Owner a Bid for construction of "4 MG Water Storage Tank" in Rockdale County, Georgia.

NOW THEREFORE, the conditions of this obligation are such that if the Bid be accepted, the Principal shall, within ten days after receipt of conformed Contract Documents, execute a Contract in accordance with the Bid upon the terms, conditions and prices set forth therein, and in the form and manner required by the Contract Documents and execute sufficient and satisfactory separate Performance and Payment Bonds payable to the Owner, each in an amount of 100 percent of the total Contract Price, in form satisfactory to the Owner, then this obligation shall be void; otherwise, it shall be and remain in full force and effect in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid Owner, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

This bond is given pursuant to and in accordance with the provisions of O.C.G.A. Section 36-10-1 et. seq. and all the provisions of the law referring to this character of bond as set forth in said Sections or as may be hereinafter enacted and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Principal has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 2017.

CONTRACTOR - PRINCIPAL:

By:

Name:
(Print or Type)

Address:

Phone:
Attest:
Name:
(Print or Type)

Title:
(SEAL)

Note: Attest for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a notary.

SURETY:_

By:

Name:
(Print or Type)

Title:

Phone:

Attest:

Name:
(Print or Type)

Title:
(SEAL)

Note: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

Resident agent in state in which Work is to be performed:

Name: _____

Address: _____

Phone: _____

END OF SECTION

SECTION 00422
Corporate Certificate

I, _____, certify that I am the Secretary of the Corporation named as Contractor in the foregoing Bid; that _____, who signed said Bid on behalf of the Contractor was then _____ of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of _____.

This _____ day of _____, 2017.

(Corporate Secretary) _

(SEAL)

END OF SECTION

SECTION 00425
Contractor's License Certification

Contractor's Name: _____

Georgia Utility Contractor's License Number: _____

Expiration Date of License: _____

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed:

Printed:

Date:

END OF SECTION

SECTION 00500
CONTRACT AGREEMENT

This Contract Agreement made and entered into on the _____ day of _____, 2017 by and between Rockdale County, Georgia, party of the first part (hereinafter called the "Owner"), and _____, party of the second part, (hereinafter called the "Contractor"),

WITNESSETH:
That the Contractor, for the consideration hereinafter fully set out, hereby agrees with the Owner as follows:

That the Contractor will furnish all products, tools, construction equipment, skill and labor of every description necessary to carry out and to complete the construction of 4 MG Water Storage Tank and will complete Work in strict conformity with the Drawings and the Specifications, together with the foregoing Bid made by the Contractor, the Invitation to Bid, Instructions to Bidders, General and Supplementary Conditions, Special Conditions, Performance and Payment Bonds and all Addenda hereto incorporated (if applicable) which form essential parts of this Contract Agreement, as if fully contained herein.

That the Contractor shall commence the Work to be performed under this Contract Agreement on a date to be specified in a written Notice to Proceed and shall fully complete all work hereunder within 547 days, in accordance with Contractor's attached schedule.

Time is of the essence and is an essential element of this Contract, and the Contractor shall pay to the Owner, not as a penalty, but as liquidated damages, the sum of $250.00 for each calendar day that there is default of completing the Work within the time limit named herein. If the Contractor abandons the Contract before commencement of the Work or defaults in completion of all the Work after commencement thereof, the Contractor shall be liable for such liquidated damages. These fixed liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the Owner and the Contractor due to the uncertainty and impossibility of making a determination as to the actual and consequential damages incurred by the Owner and the general public of Rockdale County, Georgia as a result of the failure on the part of the Contractor to complete the Work on time. Such liquidated damages referred to herein are intended to be and are cumulative and shall be in addition to every other remedy now or hereafter enforceable at law, in equity, by statute, or under the Contract.

The Owner hereby agrees to pay to the Contractor for the faithful performance of this Contract Agreement, subject to additions and deductions as provided in the Specifications and Bid, in lawful money of the United States a sum of $ _____which sum shall also pay for loss or damage arising out of the nature of the Work aforesaid, or from the action of the elements,

or from unforeseen obstructions or difficulties encountered in the prosecution of the Work, and for all expenses incurred by, or in consequence of the Work, its suspension or discontinuance and for well and faithfully completing the Work and the whole thereof, as herein provided, and for replacing defective work or products for a period of one year after completion.

The Owner shall make monthly partial payments to the Contractor in accordance with the provisions of the Contract Documents.

Final payment on account of this Contract Agreement shall be made within 30 days after the completion by the Contractor of all work covered by this Contract Agreement and Final Acceptance of such Work by the Owner, in accordance with the provisions of the Contract Documents.

It is further mutually agreed between the parties hereto that if, at any time after the execution of this Contract Agreement and the surety bonds hereto attached for its faithful performance, the Owner shall deem the surety or sureties upon such bond to be unsatisfactory, or if, for any reason, such bond ceases to be adequate to cover the performance of the Work, the Contractor shall, at no additional expense to Owner, within five days after the receipt of notice from the Owner to do so, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Owner. In such event, no further payment to the Contractor shall be deemed to be due under this Contract Agreement until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the Owner.

IN WITNESS WHEREOF, the parties hereto have executed this Contract Agreement under their respective seals on the day and date first above written in two counterparts each of which shall, without proof or accounting for the other counterparts, be deemed an original Contract.

APPROVED AS TO FORM BEFORE EXECUTION

By: _____
Attorney for the Owner

OWNER: ROCKDALE COUNTY, GEORGIA

By: _____

Name: _____
(Please Print)

Title: _____
WITNESS:

Name: _____
(Please Print)
(SEAL)

Title: _____

SUPPLIER:

By:

Name: _____
(Please Print)

Title: _____

ATTEST:

Name: _____
(Please Print)

(SEAL)

Title: _____

Note: If the Supplier is a corporation, the Contract Agreement shall be signed by the president or vice president, attested by the secretary and the corporate seal affixed. If the Supplier is a partnership, the Contract Agreement shall be signed in the partnership name by one of the partners, with indication that he or she is a general partner.

END OF SECTION

SECTION 00610
Performance Bond

STATE OF GEORGIA BOND NO._____

COUNTY OF ROCKDALE

KNOW ALL MEN BY THESE PRESENTS, that we, _____,
as Principal, (hereinafter known as Contractor), and we, _____, as Surety, do hereby acknowledge ourselves indebted and firmly bound and held unto Rockdale County, Georgia for use and benefit of those entitled thereto, in the sum of _____ Dollars ($_____) for the payment of which will and truly to be made, in lawful money of the United States of America, we do hereby bind ourselves, successors, assigns, heirs and personal representatives.

BUT THE CONDITION OF THE FOREGOING OBLIGATION OR BOND IS THIS:

WHEREAS, the Owner has engaged the said Contractor for the sum of _____ Dollars ($_____) for construction of Rockdale County, Georgia-4 MG Water Storage Tank as more fully appears in a written Contract Agreement bearing the date of _____, 2017, a copy of which Contract Agreement is by reference hereby made a part hereof.

NOW, THEREFORE, if said Contractor shall fully and faithfully perform all the undertakings and obligations under the said Contract Agreement hereinbefore referred to and shall fully indemnify and save harmless the said Owner from all costs and damage whatsoever which it may suffer by reason of any failure on the part of said Contractor to do so, and shall fully reimburse and repay the said Owner any and all outlay and expense which it may incur in making good any such default, and shall correct all defects in products and workmanship appearing within one year of the completion of all Work, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

And for value received it is hereby stipulated and agreed that no change, extension of time, alteration or addition to the terms of the said Contract Agreement, or in the Work to be performed there under, or the Specifications accompanying the same shall in any wise affect the obligations under this Contract Agreement or Bond, and notice is hereby waived of any such damage, extension of time, alteration or addition to the terms of the Contract Agreement or to the Work or to the Contract Documents.

This bond is given pursuant to and in accordance with the provisions of O.C.G.A. Section 36-10-1 et. seq. and 36-82-100 et. seq. and all the provisions of the law referring to this character of Bond as set forth in said Sections or as may be hereinafter enacted, and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 2017, executed in six counterparts.

CONTRACTOR - PRINCIPAL:___

By:_____

Name:
(Please Print)

Title:

ATTEST:

Name:
(Please Print)

(SEAL)

Title:

Note: Attestation for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a notary.

SURETY:_

By:

Name:
(Please Print)

Title:

ATTEST:

Name:
(Please Print)

(SEAL)
Title:
Note: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

END OF SECTION

SECTION 00620
Payment Bond

STATE OF GEORGIA BOND NO.

COUNTY OF ROCKDALE

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as Principal, (hereinafter known as Contractor), and we, _____, as Surety, are held and firmly bound unto Rockdale County, Georgia (hereinafter called the Owner), in the penal sum of _____ Dollars ($_____) lawful money of the United States of America, for the payment of which sum will and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Contractor has entered into a certain Contract Agreement with said Owner, dated _____, 2017, for construction of 4 MG Water Storage Tank (hereinafter called the Contract), which Contract Agreement and the Contract Documents for said Work shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, the condition of this obligation is such, that if said Contractor and all subcontractors to whom any portion of the Work provided for in said Contract Agreement is sublet and all assignees of said Contractor and of such subcontractors shall promptly make payments to all persons supplying them with labor, products, services, or supplies for or in the prosecution of the Work provided for in such Contract Agreement, or in any amendment or extension of or addition to said Contract Agreement, and for the payment of reasonable attorney's fees, incurred by the claimant in suits on this Bond, then the above obligation shall be void; otherwise, it shall remain in full force and effect.

HOWEVER, this Bond is subject to the following conditions and limitations:

(a) Any person, firm or corporation that has furnished labor, products, or supplies for or in the prosecution of the Work provided for in said Contract Agreement shall have a direct right of action against the Contractor and Surety on this Bond, which right of action shall be asserted in a proceeding, instituted in the county in which the Work provided for in said Contract Agreement is to be performed or in any county in which Contractor or Surety does business. Such right of action shall be asserted in proceedings instituted in the name of the claimant or claimants for its use and benefit against said Contractor and Surety or either party (but not later than one year after the final settlement of said Contract Agreement) in which action such claim or claims shall be adjudicated and judgment rendered thereon.

(b) The Principal and Surety hereby designate and appoint the _____, as the agent of each party to receive and accept service of process or other pleading issued or filed in any proceeding instituted on this Bond and hereby consent that such service shall be the same as personal service on the Contractor and/or Surety.

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

(d) This Bond is given pursuant to and in accordance with provisions of O.C.G.A. Section 13-10-1 et. seq. and 36-82-100 et. seq. hereinafter, and all the provisions of law referring to this character of Bond as set forth in said Sections or as may be hereinafter enacted, and these are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 2017, executed in six counterparts.

CONTRACTOR - PRINCIPAL:

By:

Name:
(Please Print)

Title:

ATTEST:

Name:
(Please Print)
(SEAL)
Title:

Note: Attestation for a corporation must be by the corporate secretary; for a partnership by another partner; for an individual by a notary.

SURETY:

By:

Name:
(Please Print)

Title:

WITNESS:

Name:
(Please Print)
(SEAL)
Title:

Note: Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

END OF SECTION

SECTION 00700
General Conditions

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GENERAL: The provisions of these General Conditions are intended, but are not limited to, providing general conditions of agreement and provisions toward the awarding of the Contract, the obligations of the successful Bidder and requirements for execution and administration of the Contract. IN ANY EVENT, PROVISIONS IN THIS SECTION ARE SUBJECT TO AND GOVERNED BY PROVISIONS IN THE SUPPLEMENTARY CONDITIONS, AS APPLICABLE.

ARTICLE 1 - NOTICE OF AWARD OF CONTRACT

After receipt of Bids, the Owner shall notify the successful Bidder of the award of the Contract as stipulated in the Supplementary Conditions.

ARTICLE 2 - EXECUTION OF CONTRACT DOCUMENTS

Within 10 days of notification of Award of Contract, the Owner will furnish the Contractor with conformed copies of Contract Documents for execution by the Contractor and the surety.

Within 10 days after receipt, the Contractor shall return all the Documents properly executed by the Contractor and the surety. Attached to each Document shall be an original power-of-attorney for the person executing the Bonds for the surety and certificates of insurance for the required insurance coverage.

Within 30 days after receipt of the conformed Documents executed by the Contractor and the surety with the power-of-attorney and certificates of insurance, the Owner will complete the execution of the Documents. Distribution of the completed Documents will be made upon execution by the Owner.

Should the Contractor and/or the surety fail to properly execute the Documents within the specified time, the Owner will have the right to proceed on the Bid Bond accompanying the Bid.

If the Owner fails to execute the Documents within the time limit specified, the Contractor will have the right to withdraw the Bid without penalty. In such event the Owner will have no liability to the Contractor under these Documents or otherwise.

Should either party require an extension of any of the time limits stated above, this shall be done only by mutual agreement between both parties.

ARTICLE 3 - CONTRACT SECURITY

The Contractor shall furnish separate Performance and Payment Bonds each in a sum equal to the amount of the Contract Price, the Performance Bond conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and the Payment Bond conditioned upon the prompt payment by the Contractor to all persons supplying labor and products in the prosecution of the Work provided by the Contract Documents. Such Bonds shall be executed by the Contractor and a corporate bonding company licensed to transact such business in the State where the Project is located and named on the current

list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor. If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the State where the Project is located or is removed from the list of Surety Companies accepted on Federal Bonds, the Contractor shall, within 10 days after notice from the Owner to do so, substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety as may be satisfactory to the Owner. The premium on such Bond (or Bonds) shall be paid by the Contractor. No further progress payments shall be deemed due, nor shall be made, until the new surety furnishes an acceptable Bond to the Owner.

The person executing the Bond on behalf of the surety shall file with the Bond a general power of attorney, unlimited as to amount and type of Bond covered by such power of attorney and certified to by an official of said surety.

ARTICLE 4 - INSURANCE

The Contractor shall not commence any work under this Contract until all insurance, as stipulated in the Supplementary Conditions, has been obtained and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence any work on subcontractor's contract until all similar insurance required of the subcontractor has been so obtained and approved by the Contractor.

ARTICLE 5 - INDEMNIFICATION

The Contractor shall indemnify and hold harmless the Owner, the PM/CM, the Designer and their agents and employees from and against all claims, damages, losses and expenses including claims consultants' and attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting thereof; and is caused in whole or in part by willful act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Owner, the PM/CM, the Designer, or any of their agents or employees, by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under worker's compensation acts, disability benefit acts or other employee benefits acts.

This indemnification and hold harmless obligation shall extend to cover any and all claims not covered by the Owner's Protective Liability Insurance, the requirements of which are specified in Article 4 of the Supplementary Conditions.

ARTICLE 6 - NOTICE TO PROCEED

The Notice to Proceed will be issued, following the pre-construction conference, within 10 days of the execution of the Contract Agreement by the Owner. The time may be extended by mutual agreement between the Owner and the Contractor. If the Notice to Proceed has not been issued within the 10 day period or within the period mutually agreed upon, the Contractor may terminate the Contract Agreement without further liability on the part of either party.

ARTICLE 7 - TERMINATION OF WORK FOR DEFAULT

(a) The Work may be terminated if:

(1) The Contractor is adjudged bankrupt or insolvent.

(2) The Contractor makes a general assignment for the benefit of creditors.

(3) A trustee or receiver is appointed for the Contractor or for any of Contractor's property.

(4) The Contractor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws.

(5) The Contractor repeatedly fails to supply sufficient skilled workmen, materials or equipment.

(6) The Contractor fails to make satisfactory progress toward timely completion of the Work.

(7) The Contractor repeatedly fails to make prompt payments to subcontractors or material suppliers for labor, materials or equipment.

(8) The Contractor disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the Work.

(9) The Contractor fails to comply with directives of the PM/CM.

(10) The Contractor otherwise violates any provision of the Contract Documents.

(b) The Owner may, without prejudice to any other right or remedy and after giving the Contractor and surety a minimum of 10 days from delivery of a written notice, terminate the services of the Contractor and take possession of the Project and of all products thereon owned by the Contractor, and finish the Work by whatever method the Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor and/or surety shall pay the difference to the Owner. Such costs incurred by the Owner will be

determined by the PM/CM and incorporated in a Change Order.

(c) Where the Contractor's services have been so terminated by the Owner, said termination will not affect any right of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the Owner due the Contractor will not release the Contractor from compliance with the Contract Documents.

ARTICLE 8 - TERMINATION FOR CONVENIENCE OF THE OWNER

If, for any reason other than those provided for under Article 7, the Owner elects to discontinue, in whole or part, the Work under this Contract, the Owner may, after 10 days from delivery of a written notice to the Contractor and the PM/CM, terminate, in whole or in part, the Contractor's performance of the Work under this Contract. The notice of termination shall specify the extent to which performance of the Work under the Contract is terminated.

In the event of such termination by the Owner, the Contractor shall be entitled to payment for the Work at the jobsite acceptably performed up to the time of the termination and reimbursement for such costs as are reasonably incurred by the Contractor due to the termination and not otherwise compensated. The Contractor shall also be entitled to profit on the amounts payable to the Contractor, but such profit shall be limited to 6 percent of such amounts. The Contractor will not be entitled to any payment, including any anticipated profit, on Work not performed and will not be entitled to any compensation for other economic loss arising out of or resulting from such compensation or damages of any nature.

ARTICLE 9 - ASSIGNMENTS

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor 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 and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for under this Contract.

ARTICLE 10 - SUBCONTRACTING

(a) The Contractor shall not subcontract the complete Work, or any part thereof, and shall not award any work to any subcontractor without prior written approval of the Owner. Owner approval will not be given except upon the basis of written statements containing such information as the Owner may require. At the pre-construction conference, the Contractor shall submit all subcontractors that the Contractor plans to use on the Project. Any changes or additional subcontractors should be submitted at least 14 days prior to the needed approval.

(b) The Contractor shall utilize the services of specialty subcontractors on those parts of the

Work which, under normal contracting practices, are best performed by specialty subcontractors, as required by the Owner in the Owner's sole discretion, at no additional cost to the Owner.

If the Contractor desires to perform specialty work, the Contractor shall submit a request to the Owner, accompanied by evidence that the Contractor's own organization has successfully performed the type of work in question, is presently competent to perform the type of work, and the performance of the work by specialty subcontractors will result in materially increased costs or inordinate delays.

(c) The Contractor shall be fully responsible to the Owner for the acts and omissions of the Contractor's subcontractors and of persons either directly or indirectly employed by the Contractor. The Contractor shall be fully responsible to the Owner for the acts and omissions of independent contractors or independent subcontractors of the Contractor and of persons indirectly employed by the Contractor as the Contractor is for the acts and omissions of persons directly employed by the Contractor.

(d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

(e) Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

ARTICLE 11 - AUTHORITY OF THE PM/CM

The PM/CM will act as the Owner's representative during the construction period. The Owner will decide questions which may arise as to quality and acceptability of products furnished and Work performed. The Owner will interpret the intent of the Contract Documents in a fair and unbiased manner. The PM/CM will make visits to the site and determine if the Work is proceeding in accordance with the Contract Documents. The PM/CM will judge as to the accuracy of quantities submitted by the Contractor in partial payment estimates which these quantities represent. The decisions of the PM/CM will be final and conclusive.

ARTICLE 12 - SEPARATE CONTRACTS

(a) The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their products and the execution of their work, and the Contractor and other contractors shall properly connect and coordinate their work with each other. If the proper execution or results of any part of the Contractor's work depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the PM/CM any defects in such work that render it unsuitable for such proper execution and results.

(b) The Owner may perform additional work related to the Project with Owner's own forces. The Contractor shall afford the Owner reasonable opportunity for the introduction and storage of products and the execution of work, and shall properly connect and coordinate Contractor's work with work performed by Owner's own forces.

(c) If the performance of additional work by other contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof will be given to the Contractor prior to starting any such additional work. If the Contractor believes that the performance of such additional work by the Owner or others involves the Contractor in additional expense or entitles the Contractor to an extension of the Contract Time, the Contractor may make a claim therefor as provided in Article 29.

ARTICLE 13 - LAWS AND REGULATIONS

The Contractor's attention is directed to the fact that all applicable federal, state, county and city laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the Contract as though written out in full herein. The Contractor shall keep fully informed of all laws, ordinances and regulations of the federal, state, county, city and municipal governments or authorities in any manner affecting those engaged or employed in the Work or the materials used in the Work or in any way affecting the conduct of the Work and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in these Contract Documents herein referred to, in relation to any such law, ordinance, regulation, order or decree, the Contractor shall herewith report the same, in writing, to the Owner. The Contractor shall at all times observe and comply with all such existing and future laws, ordinances and regulations, and shall protect and indemnify the Owner, the PM/CM, the Designer and their agents against the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor or by the Contractor's employees.

ARTICLE 14 - TAXES

The Contractor shall pay all sales, consumer, use and other similar taxes required by the law of the place where the Work is performed. The Owner will be responsible for any sales or use tax due on products furnished by the Owner to the Contractor to be incorporated into the Work.

ARTICLE 15 - NOTICE AND SERVICE THEREOF

(a) All notices, demands, requests, instructions, approvals, and claims shall be in writing.

(b) Any notice to or demand upon the Contractor will be sufficiently given if delivered at the office of the Contractor specified in the Bid (or at such other office as the Contractor may from time to time designate to the Owner in writing), or if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile transmission, followed by written confirmation, in each case addressed to such office.

(c) All papers required to be delivered to the Owner shall be delivered as stipulated in the Supplementary Conditions.

(d) Any such notice or demand shall be deemed to have been given to the Owner or made as of the time of actual delivery to Owner.

ARTICLE 16 - PATENTS

(a) The Contractor shall hold and save the Owner, the PM/CM, the Designer and their agents harmless from liability of any kind, including cost and expenses, reasonable attorney's fees, for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Work, including its use by the Owner.

(b) If the Contractor uses any design, process, device or materials covered by letters, trademarks, patent or copyright, the Contractor shall provide for such use by suitable agreement between the Owner and the holder of such patented or copyrighted design, device or material. The Contract prices shall include royalties or costs arising from the use of such design, device or materials, in any way involved in the Work. The Contractor and the Contractor's sureties shall indemnify and save harmless the Owner, the PM/CM, the Designer and their agents from claims for infringement by reason of the use of such patented or copyrighted design, process, device or materials or any trademark or copyright in connection with Work agreed to be performed under this Contract, and shall indemnify the Owner, the PM/CM, the Designer and their agents for any cost, expense, damage and reasonable attorney's fees which it may be obliged to pay by reason of such infringement, at any time during the prosecution of the Work or after completion of the Work.

ARTICLE 17 - LAND AND RIGHTS-OF-WAY

The Owner will provide, as indicated in the Contract Documents and prior to the Notice to Proceed,

the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of the Contractor. The Contractor shall confine work and all associated activities to the easements and other areas designated for the Contractor's use. The Contractor shall comply with any limits on construction methods and practices which may be required by easement agreements.

If, due to some unforeseen reason, the necessary easements are not obtained, the Contractor shall receive an equitable extension of Contract Time and/or an equitable increase in the Contract Price to cover the Contractor's additional costs as a result thereof, provided the Owner is notified immediately of the claim. The Contractor's claim therefor shall be handled as provided for under Article 29.

Should additional temporary easements for ingress or egress be required by the Contractor for more suitable access to the Work, these easements shall be obtained by the Contractor, at no additional cost to the Owner.

Additional requirements shall be as stipulated in the Supplementary Conditions.

ARTICLE 18 - PRODUCTS

(a) Products shall be so stored in accordance with the manufacturer's recommendations to insure the preservation of their quality and fitness for the Work. Stored products to be incorporated in the Work shall be located so as to facilitate prompt inspection.

(b) Manufactured products shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

(c) Products shall be furnished in accordance with shop drawings and/or samples submitted by the Contractor and approved by the Designer.

(d) Products to be incorporated into the Work shall not be purchased by the Contractor or the subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

ARTICLE 19 - SUPERVISION OF WORK

The Contractor shall supervise and direct the Work. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor shall employ and maintain on the Work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

The supervisor shall have full authority to act on behalf of the Contractor and to execute the orders or directions of the PM/CM without delay. The supervisor shall have full authority to promptly supply products, tools, plant equipment and labor as may be required. The supervisor's authority

shall be such that all communication given to the supervisor shall be as binding as if given to the Contractor.

The Contractor shall employ only competent and skilled personnel. The Contractor shall, upon demand from the PM/CM, immediately remove any superintendent, foreman or workman whom the PM/CM or Owner may consider incompetent or undesirable.

ARTICLE 20 - INTERRUPTION OF FACILITY OPERATIONS

The Contractor shall provide the Owner with written notice at least five days prior to any interruption in facility operations required by construction activity. The notice shall include the date and time of the scheduled interruption; the length of time the interruption will be in effect; the procedures to be followed in effecting the interruption; a complete identification of all those processes, equipment and operations to be affected; and all other information the Owner may require. The Contractor shall provide any equipment, piping, auxiliary power or other means necessary to sustain facility operations or function for interruptions which have not been identified by the Specifications, or when interruptions must exceed the time allowed by the Specifications.

Additional requirements, if any, shall be as stipulated in the Supplementary Conditions.

ARTICLE 21 - PROTECTION OF WORK, PROPERTY AND PERSONS

(a) The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all products to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

(b) The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction, promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). The Contractor shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection.

(c) The Contractor shall remedy all damage, injury or loss to any property, improvements or facilities caused, directly or indirectly, in whole or in part, by the Contractor or any of the Contractor's subcontractors or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. The property, improvements or facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the Work. In case of failure on the part of the Contractor to restore such property, or make good such damages or injury, the Owner may, after 48 hours written notice, proceed to repair, rebuild, or otherwise restore such property, improvements or facilities as may be deemed necessary. The cost thereof will be deducted from any

monies due or which may become due the Contractor under this Contract.

(d) In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the PM/CM or Owner, shall act to prevent threatened damage, injury or loss.

(e) Completed Work and stored products shall be suitably protected during unseasonable weather, to allow Work to proceed in a timely fashion. Work planned, or in progress, should be performed to minimize impact of adverse weather.

ARTICLE 22 - PROTECTION OF THE ENVIRONMENT

(a) The Contractor shall be responsible for taking all measures required to minimize all types of pollution associated with the undertaking of the proposed Work, and shall abide by the requirements of all governmental agencies having jurisdiction over the Work or Contractor's Project operations.

(b) Any area used or involved in the Project that is disturbed by the Contractor, shall be restored to original or better condition, even though such area is outside the limits of that specified for grading, grassing or landscaping.

ARTICLE 23 - PROTECTION, LOCATION AND RELOCATION OF UTILITIES

The Contractor shall notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor shall protect from damage all existing improvements or utilities at, or in proximity to, the site of the Work, and shall repair or restore any damage to such facilities resulting from failure to exercise reasonable care in the performance of Work. If the Contractor fails or refuses to repair any such damage promptly, the Owner may have the Work performed and charge the cost thereof to the Contractor.

Prior to the construction or installation of any proposed facility or pipeline, the Contractor shall expose all existing utilities true to their vertical and horizontal location, within the vicinity of the Work. In order to avoid conflicts between existing and proposed facilities or utilities, the Contractor shall either relocate the existing or proposed utility on a temporary or permanent basis, or shall take whatever means necessary to protect the existing facilities or utilities during the installation of proposed utilities, as approved by the Owner. No separate payment will be made for the relocation of existing utilities or for any work associated with the protection of existing facilities or utilities.

ARTICLE 24 - SCHEDULES, REPORTS AND RECORDS

The Contractor shall submit to the Owner progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed as stipulated in the Supplementary Conditions.

ARTICLE 25 - DRAWINGS AND SPECIFICATIONS

The Drawings, Specifications, Contract Documents, and all supplemental documents, are considered essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all Work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Owner.

The PM/CM will furnish the Contractor five copies of the Contract Documents, one copy of which the Contractor shall have available at all times on the Project site. Any additional copies will be furnished at additional cost.

In case of conflict between the Drawings and Specifications, the Specifications will govern. Figure dimensions on Drawings will govern over scale dimensions, and detailed Drawings will govern over general Drawings.

In cases where products or quantities are omitted from the Specifications, the description and quantities shown on the Drawings will govern.

Any materially differing site condition as between what is shown on the Drawings and Specifications and actually found on site shall be immediately reported to the PM/CM, in writing, prior to the commencement of Work at the site. Failure of the Contractor to notify the PM/CM, in writing, of the differing site condition prior to performance of Work at the site shall constitute a waiver of any claim for additional monies. Any Change Order necessitated by the differing site condition shall be processed as provided under Article 29.

Any ambiguities or need for clarification of the Drawings or Specifications shall be immediately reported in writing to the PM/CM. Any such ambiguity or need for clarification will be handled by the PM/CM, in writing, as authorized by Article 11. No clarification of the Drawings and Specifications hereunder by the PM/CM will entitle the Contractor to any additional monies unless a Change Order has been processed as provided by Article 29 hereof.

Any work done by the Contractor following a discovery of such differing site condition or ambiguity or need for clarification in the Contract Drawings and Specifications, prior to a written report to the PM/CM, shall not entitle the Contractor to additional monies and shall be done at the Contractor's risk.

ARTICLE 26 - SURVEYS

The Owner will furnish AutoCad files of the Construction Drawings to assist with construction layout of the Work. The County's benchmark information will be provided. From this information, unless otherwise specified in the Contract Documents, the Contractor shall develop and make all detailed surveys needed for construction, such as alignment, slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

ARTICLE 27 - TESTING, INSPECTION AND REJECTION OF WORK

(a) Testing of Materials: Unless otherwise specifically provided for in the Specifications,

the inspection and testing of products to be incorporated in the Work at the site shall be made by bureaus, laboratories, or agencies approved by the Owner; the cost of such inspection and testing shall be paid by the Contractor. The Contractor shall furnish evidence, satisfactory to the Owner, that the products have passed the required tests prior to their incorporation into the Work. The Contractor shall promptly segregate and remove rejected products from the site of the Work.

(b) Inspection: The Contractor shall furnish the Owner with every reasonable facility for ascertaining whether or not the Work performed and products used are in accordance with the requirements and intent of the Specifications and Contract Documents. No Work shall be done or products used without suitable inspection by the Owner or the Owner's representative. Failure to reject any defective Work or product shall not in any way prevent later rejection when such defect is discovered, or obligate the Owner to final acceptance.

(c) Authority and Duties of the Resident Inspector: The Resident Inspector will be authorized to inspect all Work done and all products furnished, including preparation, fabrication and manufacture of the products to be used, but the Resident Inspector will not be authorized to alter or waive any requirements of the Contract Documents. The Resident Inspector may reject products or suspend the Work until any question at issue can be referred to and decided by the Owner. The responsibility of the Contractor is not lessened by the presence of the Resident Inspector.

(c) Rejection of Work and Materials: All products furnished and all Work done that is not in accordance with the Drawings or Specifications or that is defective will be rejected. All rejected products or Work shall be removed immediately. If rejected products or Work is not removed within 48 hours, the PM/CM will have the right and authority to stop the Work immediately and will have the right to arrange for the removal of said rejected products or Work at the cost and expense of the Contractor. All rejected products or Work shall be replaced with other products or Work which conforms with the Drawings and Specifications.

(e) Contractor's Responsibilities: Inspection of the Work will not relieve the Contractor of any obligations to fulfill the Contract and defective Work shall be made good regardless of whether such Work has been previously inspected by the Owner and accepted or estimated for payment. The failure of the Owner to reject improper Work shall not be considered a waiver of any defect which may be discovered later, or for Work actually defective.

ARTICLE 28 - CONTRACT TIME AND LIQUIDATED DAMAGES

The Contract Time and Liquidated Damages shall be defined in the Instructions to Bidders.

The Contractor shall proceed with the Work at a rate of progress which will insure completion

within the Contract Time. It is expressly understood and agreed by and between the Contractor and the Owner, that the Contract Time for the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions, and other factors prevailing in the locality of the Work.

If the Contractor shall fail to perform the Work required within the Contract Time, or extended Contract Time if authorized by Change Order, then the Contractor shall pay to the Owner the full amount of liquidated damages specified in the Contract Documents for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.

The Contractor shall not be charged with liquidated damages or any excess cost when the delay in performance of the Work is due to the following and the Contractor has promptly given written notice of such delay to the Owner and PM/CM:

(a) To any preference, priority or allocation order duly issued by the Owner.

(b) To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and,

(c) To any delays of subcontractors occasioned by any of the causes specified in paragraphs (a) and (b).

ARTICLE 29 - CHANGES IN THE CONTRACT

(a) Changes in the Work: The Owner may at any time, as the need arises, order changes within the scope of the Work without invalidating the Contract Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, an equitable adjustment will be authorized by Change Order.

The Owner, also, may at any time, by issuing a field order, make changes in the details of the Work. These changes by field order will not affect Contract Time or Contract Price. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Owner, unless the Contractor believes that such field order entitles Contractor to a change in Contract Price or Contract Time or both, in which event Contractor shall give the PM/CM immediate, written notice thereof and if required by the Owner, an immediate estimate of the direct cost of Work as outlined in (b) below, after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed Change Order or further written instruction from the Owner.

Should the Contractor encounter, or the Owner discover, during the progress of the Work, subsurface or latent conditions at the site materially differing from those shown

on the Drawings or indicated in the Specifications, or unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Drawings and Specifications, the Owner shall immediately be notified in writing of such conditions before they are disturbed. The Owner will thereupon promptly investigate the conditions.

If the Owner finds that conditions do so materially differ, or are of an unusual nature, and upon written request of the Contractor, an equitable adjustment will be authorized by Change Order.

If the Contractor does not immediately notify the Owner in writing of the belief that a field order, additional work by other contractors or the Owner, or subsurface, latent or unusual unknown conditions entitles the Contractor to a Change Order, no consideration for time or money will be given the Contractor.

The Owner may, with the Contractor's concurrence, elect to postpone the issuance of a Change Order until such time that a single Change Order of substantial importance can be issued incorporating several changes. In such cases, the Owner will indicate this intent for each change in the Contract in a written response to the Contractor's request for a change, following agreement by the Owner and Contractor on the change's scope, price and time.

(b) Changes in Contract Price: The Contract Price may be changed only by a Change Order. The value of any Work covered by a Change Order for increase or decrease in the Contract Price will be determined by one or more of the following methods, in the order of precedence listed below:

(1) By estimating the number of unit quantities of each part of the Work which is changed (either increased or decreased) and then multiplying the estimated number of such unit quantities by the price Bid (which price shall include the Contractor's overhead and profit) for a unit quantity thereof.

(2) The Owner will fix the total lump sum value of the change in the Work of the Contractor following the Contractor's submittal, within a reasonable time, of an estimate of the direct cost of the Work. The direct cost estimate will be added to, or deducted from, the Contract Price (which price will include the Contractor's overhead and profit as outlined below). If the Contractor does not submit a cost estimate of the Work in a reasonable time or if the Owner and Contractor do not reach agreement on the cost, the Owner may fix the total lump sum value at a reasonable amount. On any lump sum change which involves a net credit to the Owner, no allowance for overhead and profit will be figured.

(3) By ordering the Contractor to proceed with the Work and to keep and present, in such form as the Owner may direct, a correct account of the cost of the change together with all vouchers therefor. The cost hereunder will only include an

allowance for overhead and profit as outlined below.

For the Work performed in item (2) or (3) above, payment will be made for the documented actual direct cost of the following:

(aa) Labor, including foremen, for those hours they are assigned and participating in the Work covered by the change order (actual direct payroll cost of wages). The Contractor shall furnish, if required by the Owner, certified payrolls to verify wages. All labor related costs will be included in a 30 percent markup of the cost of direct payroll wages. This refers to the Contractor's specific labor wages.

(bb) Material delivered and used on the designated Work, including sales tax, if paid for by the Contractor and as verified by original invoices or otherwise verifiable to the Owner's acceptance.

(cc) Rental, or ownership cost of equipment, including necessary transportation of equipment, having a purchase value in excess of $300.00. Rental or ownership cost will be allowed for only those hours during which the equipment is required on the project site. Cost allowances will not exceed the rates defined as follows: the hourly rate, for equipment not used exclusively in the change to the scope of work, will be the monthly rate, as printed in the current Rental Blue Book for Construction Equipment published by Dataquest, divided by 176; the rate, for equipment used exclusively for those tasks identified in the change to the scope of work, will be the daily, weekly or monthly rate, used singularly or in combination, which will provide the lowest total cost. The rates will be modified by the Rate Adjustment Table factors to reflect a depreciation allowance indexed to the year a machine was originally manufactured and sold. The rates will be adjusted to account for regional differences in annual use hours, cost of labor, freight, taxes, etc. The amount by which basic rates will be increased or decreased is shown on the adjustment maps included in the "Blue Book".

The equipment use period will begin only at the time equipment is unloaded at the site of the changed work, will include each day that the equipment is required at the site of the changed work and will terminate at the end of the day on which the use of such equipment becomes unnecessary, plus reasonable transportation time. The maximum time to be paid per day will not exceed eight hours unless the equipment is in operation for a longer time. The time which will be paid for per day, for equipment not used exclusively in the change to the scope of work, will be the hours which the equipment was actually in operation on the changed work.

In addition to the actual costs in items (aa) through (cc) above, there will be, for the Contractor actually performing the work, a fixed fee of 16 percent for bond, insurance, overhead and profit added to the cost of Items (aa), (bb) and (cc), above.

If all or a portion of the Change Order is performed by a subcontractor, payment will be made for the documented actual direct cost as outlined in (aa), (bb) and (cc), above. A fixed fee of 16 percent for bond, insurance, overhead and profit will be added to the cost of (aa), (bb) and (cc) of the subcontractor's work only.

A fixed fee of 10 percent will be added to the subcontractor's Work for the Contractor's administrative handling of portions of the Work that are performed by an approved subcontractor. No additional fixed fee will be allowed for the Contractor's or a subcontractor's administrative handling of Work performed by a subcontractor's subcontractor, unless by written permission from the Owner. All other costs not specifically listed above are considered to be included in the fixed fee.

(4) The Contractor shall, when required by the Owner, furnish the Owner with an itemized breakdown of the quantities and prices used in computing the value of any change that might be ordered, in a printed format, and with sufficient detail as required by the Owner.

(c) Changes in Contract Time: The Contract Time may be changed only by a Change Order. Changes in the Work described in (a) and any other claim made by the Contractor for a change in the Contract Time will be evaluated by the Owner with the assistance and input of the PM/CM and if the conditions warrant, an appropriate adjustment of the Contract Time will be made.

The Owner, when making these evaluations will take into consideration the amount and scope of Work which has been changed and will evaluate if the change in Work has affected the critical path as currently accepted on the progress schedule such that it would delay the completion of the Project. If after these evaluations have been made and in the sole opinion of the Owner, the Contractor is due an extension of time, then it will be granted by a Change Order and the Owner will pay the associated cost due the Contractor for direct field costs, only as outlined under Changes in Contract Price (aa) and (cc), exclusive of Item (bb), based on any delays to the overall Project. Extensions of time granted as a result of weather will not result in a change in Contract Price.

ARTICLE 30 - PAYMENTS AND COMPLETION

(a) Contract Price: The Contract Price is a lump sum stated in the Contract Agreement, and is the total amount payable by the Owner to the Contractor for the performance of the Work set forth in the Contract Documents.

It is understood that the Contractor shall provide and pay for all products, labor

(including labor performed after regular working hours, on Sundays, or on legal holidays), equipment, tools, water, light, power, sewer, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, place into operation, and deliver the Work.

It is further understood that the Contractor's proposed construction schedule is based on a normal 40 hour, 5 day work week, less recognized holidays. If the Contractor desires to work in excess of this limit, the Contractor shall submit a written request to the Owner a minimum of five days prior to the desired work date. The Contractor shall be responsible for any additional expenses incurred by the Owner as a result of the extended work hours, including resident inspection overtime. The cost associated with resident inspector overtime will be deducted from the Contractor's monthly payment request.

(b) Breakdown of Cost: Before the first application for payment the Contractor shall submit to the PM/CM a breakdown of cost for the various portions of the Work, including quantities if required by the PM/CM, aggregating the total Contract Price prepared in such form as specified or as the PM/CM and the Contractor may agree upon and supported by such data to substantiate its correctness as the PM/CM may reasonably require.

This schedule of values, when approved by the PM/CM, will be used only as a basis for the Contractor's application for payment; however, the payment schedule will correlate directly with the Overall Project Schedule (OPS) cost information, when applicable.

(c) Progress Payments: At the end of each calendar month, the Contractor shall submit to the PM/CM an itemized application for payment supported by such other substantiating data as the PM/CM may reasonably require covering Work completed through the 20th day of the month. Progress payments shall be submitted to the PM/CM no later than the 25th of the month. Any progress payment submitted by the Contractor after the 5th of the month will be included in the following month's payment.

Application for payment may include, at the Contractor's option, the cost of products not yet incorporated into the Work which have been delivered to the site or to other storage locations authorized and approved by the PM/CM. The Owner reserves the right to accept or reject pay requests for stored materials, and to limit payments to those stored materials which, in the PM/CM's judgment, are necessary for continuing satisfactory Project progress.

Payment for stored products will be subject to the following conditions being met or satisfied:

(1) The products shall be received in a condition satisfactory for incorporation in the Work, including manufacturer's storage and installation instructions.

(2) The products shall be stored in accordance with the manufacturer's

recommendations and in such manner that any and all manufacturer's warranties will be maintained and that they will not be damaged due to weather, construction operations or any other cause.

(3) An invoice from the manufacturer shall be furnished for each item on which payment is requested. The request may include reimbursement for cost of delivery, limited to common carrier rates, to the site, but will not include the Contractor handling, on or off site, or for storage expense.

(4) The Contractor shall, on request of the PM/CM, furnish written proof from the supplier of payment (less retention equal in percentage to that being retained by the Owner) for the products no later than 30 days after receipt of payment for same from the Owner.

(5) Shop drawings, product data and samples, showing "No Exceptions Taken", has been received from the Contractor for that specific equipment or material.

The Contractor warrants that title to all Work and products covered by an Application for Payment, whether incorporated into the Project or not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances (except retention equal in percentage to that being retained by the Owner which may be withheld from suppliers and subcontractors to guarantee completion and performance).

(d) Certificate for Payment: If the Contractor has made application for payment as provided above, the PM/CM will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the PM/CM determines to be properly due, or the PM/CM will state, in writing, itemized and specific reasons for withholding a Certificate as provided herein.

After the PM/CM has issued a Certificate for Payment, the Owner will pay to the Contractor the amount covering Work completed plus stored products, less retention and less previous payments made.

No certificate for a progress payment, nor any progress payment, nor any partial or entire use of occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

(e) Retention: The Owner will retain the following amounts from each properly certified estimate:

(1) Until the value of the Work completed, including stored materials, is at least 50 percent of the Contract amount, 10 percent of the value of all Work satisfactorily completed, including stored materials.

(2) When the value of the completed Work totals at least 50 percent of the Contract amount, the Owner will discontinue retaining additional amounts provided the Work is progressing satisfactorily and there is no specific cause for retaining a larger sum. The total amount retained will be at least 5 percent of the Contract amount, adjusted for Change Orders, until the date of final payment.

(3) The Owner may elect to reinstate retention of 10 percent of the value of the Work completed if at any time the Contractor fails to make satisfactory progress or if there is other specific cause. Satisfactory progress is identified as conforming to the construction progress schedule as required in Article 24, as modified by the Supplementary Conditions. No form of collateral in lieu of cash will be acceptable as retainage. Amounts retained by the Contractor from payments due to suppliers and subcontractors (expressed as a percentage) shall not exceed that being retained by the Owner.

(f) Payments Withheld: The PM/CM may decline to approve an Application for Payment and may withhold certificate, in whole or in part, as may be necessary to protect the Owner from loss because of:

(1) Failure of the Contractor to make payments properly to subcontractors or for labor or products.

(2) Unsatisfactory prosecution of the Work by the Contractor either due to quality of the Work or if the Contractor is behind the currently approved construction schedule. When the above reasons for nonpayment are corrected, then payment will be made for amounts withheld because of such reasons, not later than the next payment. Completion and Final Acceptance shall be as stipulated in the Supplementary Conditions.

END OF SECTION

SECTION 00800
Supplementary Conditions

GENERAL

The provisions in this Section of the Specifications shall govern in the event of any conflict between this Section and the General Conditions.

ARTICLE 1 - NOTICE OF AWARD OF CONTRACT

Article 1 - Notice of Award of Contract, of the General Conditions, is hereby modified to include the following:

Within 90 days after receipt of Bids, the Owner will notify the successful Bidder of the award of the Contract.

Should the Owner require additional time to award a Contract, the time may be extended by the mutual agreement between the Owner and the successful Bidder. If an award of Contract has not been made within 90 days from the Bid date or within the extension mutually agreed upon, the Bidder may withdraw the Bid without further liability on the part of either party.

ARTICLE 13 - LAWS AND REGULATIONS

Article 13 - Laws and Regulations, of the General Conditions is hereby modified to include the following:

Article 13, following first paragraph,

Where professional engineering work is required in connection with any of the components required by the Contract, all Bidders and component suppliers must insure that there is full compliance with all applicable laws of the state of Georgia and any other state governing professional engineering. The Owner and PM/CM do not warrant that the name of an entity listed as an acceptable manufacturer is or will be in compliance with said laws.

ARTICLE 15 - NOTICE AND SERVICE THEREOF

Article 15 - Notice and Service Thereof, of the General Conditions is hereby modified to include the following:

(c) All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the Rockdale Water Resources Commissioners, 943 Court Street, Conyers, Georgia 30012, Attn: Oz Nesbitt, Chairman, Board of Commissioners.

Any notice to or demand upon the Owner shall be sufficiently given if delivered to the

Office of said Chairman if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile transmission, followed by written confirmation, in each case addressed to said Chairman or to such other representative of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purposes.

(e) The Contractor shall file all "Notices of Commencement" required for this Project in accordance with O.C.G.A. §44-14-361.5 et.seq. and §36-82-104 et.seq., as applicable. The Contractor shall respond to all requests for copies of a Notice of Commencement. Should the Owner or PM/CM receive such a request, this request will be forwarded to the Contractor for further handling. The name and address of the Owner shall be as stated in paragraph (c) of this Article. The name and general description of the Project shall be as stated in the Invitation to Bid.

ARTICLE 17 - LAND AND RIGHTS-OF-WAY

Article 17 - Lands and Rights-of-Way, of the General Conditions, is hereby modified to include the following:

No additional requirements.

ARTICLE 20 - INTERRUPTION OF FACILITY OPERATIONS

Article 20 - Interruption of Facility Operations, of the General Conditions, is hereby modified to include the following:

Bypasses/interruption of untreated or partially treated wastes will not be permitted unless the Contractor has obtained prior approval from the Owner. The Owner/PM/CM shall be notified at least two weeks in advance and in writing, of the date, time and duration of such bypasses/interruption. The Contractor shall pay all fines that may be imposed on the Owner for the bypassing without prior approval.

ARTICLE 24 - SCHEDULES, REPORTS AND RECORDS

Article 24 - Schedules, Reports and Records, of the General Conditions, is hereby modified to include the following:

(a) The Contractor shall submit to the Owner progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed as stipulated in the various sections of these Specifications.

(b) Immediately after execution of the Contract by the Owner, and before the first partial payment is made, the Contractor shall deliver to the Owner a construction progress schedule in form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required

under the Contract Documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the Progress Schedule.

(c) An updated schedule and an updated Schedule of Submittals shall be presented with each partial payment request. Lack of an updated schedule and/or an updated Schedule of Submittals will delay processing of the pay request until receipt of the updated schedule and/or an updated Schedule of Submittals.

(d) If the schedule reflects a completion date prior to the completion date established by the Contract Agreement, this shall afford no basis to claim for delay should the Contractor not complete the Work prior to the projected completion date. Instead all "float" between the completion date in the Contractor's schedule and the completion date established in the Contract Agreement shall belong to and be exclusively available to the Owner. Should a change order be executed with a revised completion date, the progress schedule shall be revised to reflect the new completion date.

(e) The Contractor shall maintain on the Project site, a complete set of up-to-date Record Documents.

(f) Project Coordination Meetings: The General Contractor shall participate in Project Coordination Meetings to be held on the site monthly, or more often if conditions warrant, to establish the current state of completion and revise the schedule as necessary. The Project Coordination Meeting will be conducted by the PM/CM.

(g) Contractor's Responsibilities

(1) Implement the detailed Near Term Schedule of activities to the fullest extent possible between Project Coordination Meetings.

(2) The Contractor shall prepare and provide one copy of the Contractor's Daily Report to the PM/CM by 10:00 a.m. of the day following the Report date. This Daily Report will contain, as a minimum, the weather conditions; number of workers by craft, including supervision and management personnel on site; active and inactive equipment on site; work accomplished by CPM activity item; problems; and visitors to the jobsite.

(3) If a current activity or series of activities on the OPS is behind schedule and if the late status is not due to an excusable delay for which a time extension would be forthcoming, the Contractor shall attempt to reschedule the activity to be consistent with the Overall Project Schedule so as not to delay any of the Contract milestones. The Contractor agrees that:

a. The Contractor shall attempt to expedite the activity completion so as to have it agree with the OPS. Such measures as the Contractor may choose shall be made explicit during the Project Coordination Meeting.
b. If, within two weeks of identification of such behind-schedule activity, the

Contractor is not successful in restoring the activity to an on schedule status, the Contractor shall:

1. Carry out the activity with the scheduled crew on an overtime basis until the activity is complete or back on schedule.
2. Increase the crew size or add shifts so the activity can be completed as scheduled.
3. Commit to overtime or increased crew sizes for subsequent activities, or some combination of the above as deemed suitable by the PM/CM.

These actions shall be taken at no increase in the Contract amount.

(4) Maintain a current copy of all construction schedules on prominent display in the Contractor's field office at the Project site.

(5) Cooperate with the Owner or Owner's representative in all aspects of the Project Scheduling System. Failure to implement the Project Scheduling System or to provide specified schedules, diagrams and reports, or to implement actions to re-establish progress consistent with the OPS may be causes for withholding of payment.

ARTICLE 30 - PAYMENTS AND COMPLETION

Article 30 - Payments and Completion, of the General Conditions, is hereby modified to include the following:

(g) Completion: ALL WORK REQUIRED BY THE CONTRACT DOCUMENTS, CONTRACT DRAWINGS AND SPECIFICATIONS MUST BE COMPLETED BEFORE THE FINAL INSPECTION IS PERFORMED. This includes, but is not limited to, the following:

(1) Performing tests as described in the detailed Specifications.

(2) Removing temporary plugs, bulkheads, bypasses, etc., and diverting flow into the facility when approved by the PM/CM.

(3) Grassing and restoration of the work area.

Upon completion of all work required, the Contractor shall submit completed Record Drawings to the PM/CM and request, in writing, that the final inspection be performed. The PM/CM will arrange for final inspection of the work by the Owner and Designer. If the PM/CM finds the work of the Contractor complete and acceptable in accordance with the provisions of the Contract Documents and that the Record Drawings accurately depict the complete work, PM/CM will recommend to the Owner that the job be accepted and that final payment be made.

In the event that the final inspection reveals deficiencies in meeting the Contract requirements, the Contractor shall complete all remaining items of work, and make adjustments found to be necessary. Upon receipt of written notice from the Contractor that the work is complete and ready for re-inspection, the PM/CM will arrange a final inspection.

The Contractor will be notified, in writing, by the Owner of the final acceptance of the work. The date of final acceptance shall be the termination date for the Contractor's liability for the physical properties of the facilities and the beginning of the warranty period.

Before final payment can be made, the Contractor must certify, in writing, to the Owner that all payrolls, materials bills, and other indebtedness connected with the work have been paid. If requested by the PM/CM, the Contractor shall provide release of lein documentation from subcontractors or suppliers.

Final payment will not be made if there is disputed indebtedness or if there are liens upon the property.

If upon completion of all work there is disputed indebtedness or there are liens upon the property, semi-final payment may, be made, at the Owner's option, in accordance with the following provisions:

(1) The Owner will retain an amount equal to the disputed indebtedness and/or liens upon the property including all related cost and interest in connections with said disputed indebtedness and liens which the Owner may be compelled to pay upon and subsequent adjudication.

(2) The Contractor shall certify to those items of work not disputed that all payables, materials bills and other indebtedness connected with the work have been paid or otherwise satisfied.

The making of the final payment shall constitute a waiver of all claims by the Owner, other than those for faulty work covered by and appearing within the warranty period.

The acceptance of final payment shall constitute a waiver of all claims by the Contractor, except those previously made, in writing, and still unsettled.

(h) Prompt Payment Clause

(1) Owner and Contractor agree that all partial payments and final payments shall be subject to the Georgia Prompt Pay Act, as originally enacted and amended, and as set forth in O.C.G.A. §§ 13-11-1 through 13-11-11, except as provided below to the extent authorized by law:

a. Interest Rate: For purposes of computing interest on late payments, the rate of interest shall be one-half percent per month or a pro-rata fraction thereof

on the unpaid balance as may be due.

b. Payment Periods:
   1. When the Contractor has performed in accordance with the provisions of these Contract Documents, the Owner shall pay the Contractor within 45 days of receipt by the Owner or the Owner's representative of any properly completed Application for Payment, based upon work completed or service provided pursuant to the terms of these Contract Documents.
   2. When a subcontractor has performed in accordance with the provisions of its subcontract and the subcontract conditions precedent to payment have been satisfied, the Contractor shall pay to that subcontractor and each subcontractor shall pay to its subcontractor, within ten days of receipt by the Contractor or subcontractor of each periodic or final payment, the full amount received for such subcontractors work and materials based on work completed or service provided under the subcontract, less retainage expressed as a percentage, but such retainage shall not exceed that retainage being held by the Owner, provided that the subcontractor has provided or provides such satisfactory reasonable assurances of continued performance and financial responsibility to complete its work as the Contractor in its reasonable discretion may require, including but not limited to a payment and performance bond.

c. Interest on Late Payment: Except as otherwise provided in these Contract Documents and/or in O.C.G.A. § 13-11-5, if a periodic or final payment to the Contractor is delayed by more than the time allotted in Paragraph b. of this Prompt Payment Clause or if a periodic or final payment to a subcontractor is delayed more than ten days after receipt of periodic or final payment by the Contractor or subcontractor, the Owner, Contractor, or subcontractor, as the case may be, shall pay interest to its Contractor, or subcontractor beginning on the day following the due dates as provided in Paragraph b. of this Prompt Payment Clause at the rate of interest as provided herein. Interest shall be computed per month or a pro-rata fraction thereof on the unpaid balance. There shall be no compounded interest. No interest is due unless the person or entity being charged interest receives "Notice" as provided in Paragraph d. of this Prompt Payment Clause. Acceptance of progress payments or final payment shall release all claims for interest on said payments.

d. Notice of Late Payment and Request for Interest: Any person or entity asserting entitlement to interest on any periodic or final payment pursuant to the provisions of this Prompt Payment Clause shall provide "notice" to the person or entity being charged interest of the charging party's claim to interest on late payment. "Notice" shall be in writing, served by U.S. Certified Mail - Return Receipt Requested at the time the properly completed Application for Payment is received by the Owner or Owner's representative, and shall set forth the following:

1. A short and concise statement that interest is due pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause;
2. The principal amount of the periodic or final payment which is allegedly due to the charging party; and
3. The first day and date upon which the charging party alleges that said interest will begin to accrue, pursuant to the provisions of the Georgia Prompt Pay Act and this Prompt Payment Clause.

These "Notice" provisions are of the essence; therefore, failure to comply with any requirement as set forth in this Prompt Payment Clause precludes the right to interest on any alleged late payment to which said "Notice" would otherwise apply.

(2) Integration with the Georgia Prompt Pay Act: Unless otherwise provided in these Contract Documents, the parties hereto agree that these provisions of this Prompt Payment Clause supersede and control all provisions of the Georgia Prompt Pay Act (O.C.G.A. §§ 13-11-1 through 13-11-11 (1994)), as originally enacted and as amended, and that any dispute arising between the parties hereto as to whether or not the provisions of this contract or the Georgia Prompt Pay Act control will be resolved in favor of these Contract Documents and its terms.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The work to be performed under this contract shall consist of furnishing and installation of all tools, equipment, materials, supplies, manufactured articles, transportation and services, including fuel, power, water, and essential communications, for the performance of all labor, work, and/or other operations as required form the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly sown or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be performed, furnished, and installed by the Contractor as though originally so specified or shown, at no increase in cost to the County.

B. Wherever the Contract Documents address a third party, i.e., subcontractor, manufacturer, etc., it is to be considered as the Contractor through the third party.

C. Wherever a reference to number of days is noted, it shall be construed to mean calendar days.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The work of this contract consists of, but is not limited to, the construction, and installation of a 4 million gallon prestressed concrete water storage tank with baffle curtain, associated site work, access road, piping, fittings, stormwater drainage system, erosion and sedimentation control, electrical, lighting and instrumentation and other appurtenances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 DESCRIPTION

A. The following sub-sections describe the measurement of and payment for the Work to be done under the items listed in the BID FORM.

B. Each unit or lump sum price stated in the BID FORM constitutes full compensation as herein specified for each item of work completed in accordance with the Contract Documents, including cleaning up.

C. The Bid lists each item of the Project for which payment will be made. No payment will be made for any items other than those listed in the Bid.

D. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.

E. Final payment quantities shall be determined from the record drawings. The record drawing lengths, dimensions, quantities, etc. shall be determined by a survey/record drawing after the completion of all required work. Said survey/record drawing shall conform to Section 01730 of these Specifications. The precision of final payment quantities shall match the precision shown for that item in the Bid.

F. Payment will not be made for any of the following:
   A. Products wasted or disposed of in a manner that is not acceptable to the Owner.
   B. Products determined as nonconforming before or after the work are completed.
   C. Products not completely unloaded from transporting vehicle.
   D. Products placed beyond the lines and levels of the required Work.
   E. Products remaining on hand after completion of the Work, unless specified otherwise.

G. The Contractor shall carefully acquaint himself with all work associated with each payment item and shall have no claim for his unfamiliarity with the requirement of various items.
   A. The Contractor shall have included in his various bid items, an amount to cover costs for additional work which may be

necessary, to deliver equipment and products to the project sites as required for project completion.

B. The Contractor shall have included in his various bid items, an amount to cover costs for additional work which may be necessary, to construct the water mains in the close proximity of underground facilities, services, poles and other facilities which may exist.

C. The discovery of an underground facility during the construction, not shown on the Contract Drawings shall not constitute automatic initiation of a change order. The additional work to cross or pass this underground facility must be substantial for consideration for additional payment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 00300 – Bid Form

1.3 PAYMENT ITEMS

A.	Item No. 1	Mobilization, Including Schedule, Bonds and Insurance
B.	Item No. 2	Construction of a 4 Million Gallon Precast, Prestressed Concrete Water Storage Tank with Baffle Curtain Walls.
C.	Item No. 3	Sheeting, Shoring and Bracing
D.	Item No. 4	Erosion and Sedimentation Control
E.	Item No. 5	Rock Excavation
F.	Item No. 6	Soil Excavation
G.	Item No. 7	Fill
H.	Item No. 8	Electrical and Instrumentation
I.	Item No. 9	Furnish & Install 48” Ductile Iron Pipe
J.	Item No. 10	Furnish & Install 48” Butterfly Valve
K.	Item No. 11	Modify Existing 48” Butterfly Valve
L.	Item No. 12	Furnish & Install 8” Ductile Iron Pipe
M.	Item No. 13	Furnish & Install 8” Gate Valve

N.	Item No. 14	Furnish and Install 48” Inflatable Line Plug
O.	Item No. 15	Access Road
P.	Item No. 16	Furnish & Install 24” RCP Storm Drain
Q.	Item No. 17	Furnish & Install Concrete Headwall(24”)
R.	Item No. 18	Furnish & Install Concrete Headwall(8”)
S.	Item No. 19	Outlet Control Structure
T.	Item No. 20	Chain Link Fence
U.	Item No. 21	4” Combination Air Valve

PART 2 MEASUREMENT AND PAYMENT

2.1 GENERAL

For accounting purposes, for the Engineer's convenience and as an aid in determining progress payments and price additions or deductions for Contract modifications, the Contractor shall furnish to the Engineer a schedule of values which shall be approved.

The price breakdown schedule shall apportion the total amount of the Contract price(s) for each separate item among the main features or costs that form the completed Work. The price breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs, as well as profit, and shall cover all work involved for the properly completed item and feature listed.

Any amount claimed for subcontracts shall be supported by a similar schedule of values with the total amount shown by this price under the Contract price stated in the bid form.

2.2 MOBILIZATION, INCLUDING SCHEDULE, BONDS AND INSURANCE (ITEM 1)

Payment for mobilization including schedule, bonds and insurance shall be made at the time of the first progress payment after the Contractor has purchased bonds and insurance and has submitted a detailed construction schedule and schedule of values.

2.3 CONSTRUCTION OF A 4 MILLION GALLON PRECAST, PRESTRESSED CONCRETE WATER STORAGE TANK WITH BAFFLE CURTAIN WALL (ITEM 2)

A. The lump sum price for Item 2 shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary to construct a 4 million gallon prestressed concrete water storage tank complete, including but not limited to: design of the tank, materials, tank concrete and reinforcing, grading, flowable fill under tank, ladders, vents, hatches, handrails, baffle curtains, coating, painting, disinfection, sampling, perforated underdrain, engineered fill section below tank, testing and appurtenances necessary to install tank as shown on the Drawings.

2.4 SHEETING, SHORING, AND BRACING (ITEM 3)

Sheeting and shoring for worker protection will be paid as a separate item on a lump sum basis. Payment will include the cost to prepare plans, obtain permits, install, operate, maintain and remove the system. Payment shall be made proportional to work involving sheeting and shoring.

2.5 EROSION AND SEDIMENTATION CONTROL (ITEM 4)

Payment for erosion and sedimentation control including sampling and monitoring shall be made at the contract lump-sum bid price and shall be invoiced equally throughout the length of the contract.

2.6 ROCK EXCAVATION (ITEM 5)

A. Excavation, including excavation operations and monitoring, to establish the subgrade of the new 4 million gallon tank will be paid at the applicable unit price named in the Bid Form. Quantities of excavation for the tank will be measured by surveys provided by the Contractor. Excavations in excess of that shown on the plans shall not be paid for unless pre-approved by the Owner in writing. If the Contractor chooses to verify or dispute the Owner's quantities, he can provide survey information in electronic CAD format from a surveyor with a valid Georgia Surveyor's License. Such information to verify or dispute quantities for excavation shall be accompanied with spreadsheet calculations such that the Owner can resolve the quantities for payment. Payments for partial completion of excavation shall be based on quantity estimates as approved by the Owner's observer. Payment shall include all labor, equipment, and materials for clearing and grubbing, excavation, removal and disposal of deleterious or un-useable materials, temporary storage and movement of materials and other work incidental to excavation. Rock excavation for pipe trench shall be paid under this bid item.

2.7 EARTH EXCAVATION BELOW GRADE (ITEM 6)

A. Measurement. The quantity of earth excavation below grade to be paid for under Item 6 in the Schedule of Bid Items is the number of cubic yards of material so excavated by order of the ENGINEER, beyond what is typically required to complete the work, as measured before excavation.

B. Payment. Payment under Item 6 at the contract unit price per cubic yard shall be full compensation for furnishing all materials, labor, tools and construction equipment and for performing all work required to be done under this item, including the disposal of surplus materials in embankments, backfill, fills, or off site, as directed by the ENGINEER.

2.8 FILL (ITEM 7)

A. Measurement. The quantity of gravel borrow to be paid for under Item 7 shall be the number of cubic yards of offsite gravel borrow furnished, placed and compacted as directed by the Engineer and measured in place in the work. Earth moving and grading are to be paid under related pay items.

B. Payment. Payment under Item 7 at the contract unit price per cubic yard shall be full compensation for furnishing, transporting, placing and compacting gravel borrow for fill or embankment, to replace unsuitable material, and elsewhere as the Engineer may require.

2.9 ELECTRICAL AND INSTRUMENTATION (ITEM 8)

Lump sum payment for furnishing and installing all electrical and instrumentation work in accordance with the requirements of the Contract Documents, including all conduit, wire, panels and pads, light poles and devices, electric motor actuators(for valves) and appurtenances required for a completely functional electrical and instrumentation system.

2.10 FURNISH & INSTALL 48" DUCTILE IRON WATER MAIN (ITEM 9)

Measurement for payment for furnishing and installing Ductile Iron pipe will be based upon the number of linear feet of pipe constructed as determined by measurement along the projected centerline of the pipe in place, inclusive of fittings, megalugs, and any restraints all in accordance with the requirements of the Contract Documents. Rock Excavation will be covered in Item 5.

Payment for furnishing and installing Ductile Iron pipe will be made at the unit price per linear foot of pipe named in the Bid Schedule, which shall constitute full compensation for the complete operation including, but not limited to, providing all necessary pipe, removal/disposal of existing pipe in trench, restraints and accessories, concrete pipe supports, dewatering, backfilling, compaction and all restoration to land/blacktop surface as required.

2.11 FURNISH & INSTALL 48" BUTTERFLY VALVE AND BOX: (ITEM 10)

Measurement for payment to furnish and install 48" butterfly valves will be based upon the number of butterfly valves furnished and installed, all in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing butterfly valves will be made at the unit price, each, named in the Bid Schedule which shall constitute full compensation for the complete installation including, but not limited to, excavation, dewatering, completed installation of the valve, including valve box and extension, electric motor operator, concrete collar (if required), backfilling, and compaction.

2.12 MODIFY EXISTING 48" BUTTERFLY VALVE AND BOX: (ITEM 11)

Measurement for payment to modify existing 48" butterfly valves will be based upon the number of butterfly valves modified, all in accordance with the requirements of the Contract Documents.

Payment for modifying existing butterfly valves will be made at the unit price, each, named in the Bid Schedule which shall constitute full compensation for the complete installation including, but not limited to, excavation, dewatering, completed modification of the valve, including valve box and extension, new access structure, electric motor operator, backfilling, and compaction.

2.13 FURNISH & INSTALL 8" DUCTILE IRON WATER MAIN (ITEM 12)

Measurement for payment for furnishing and installing Ductile Iron pipe will be based upon the number of linear feet of pipe constructed as determined by measurement along the projected centerline of the pipe in place, inclusive of fittings, megalugs, and any restraints all in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing Ductile Iron pipe will be made at the unit price per linear foot of pipe named in the Bid Schedule, which shall constitute full compensation for the complete operation including, but not limited to, providing all necessary pipe, removal/disposal of existing pipe in trench, restraints and accessories, concrete pipe supports, dewatering, backfilling, compaction and all restoration to land/blacktop surface as required.

2.14 FURNISH & INSTALL 8" GATE VALVE AND BOX: (ITEM 13)

Measurement for payment to furnish and install 8" gate valves will be based upon the number of gate valves furnished and installed, all in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing gate valves will be made at the unit price, each, named in the Bid Schedule which shall constitute full compensation for the complete installation including, but not limited to, excavation, dewatering, completed installation of the valve, including valve box and extension, concrete collar (if required), backfilling, and compaction.

2.15 FURNISH & INSTALL 48" INFLATABLE PLUG LINE STOP(ITEM 14)

Measurement for payment to furnish and install 48" inflatable plug line stop will be based upon the number of inflatable plug line stops furnished and installed, all in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing line stops will be made at the unit price, each, named in the Bid Schedule which shall constitute full compensation for the complete installation including, but not limited to, excavation, dewatering, completed installation of the line stop, backfilling, and compaction.

2.16 ACCESS ROAD (ITEM 15)

Paved Access Road shall be paid for at the lump price as shown in the Bid Schedule. Payment for these items shall include full compensation for furnishing all labor, materials, equipment, as per the Contract Documents. Include all demo of existing pavement as required.

2.17 FURNISH & INSTALL 24" RCP STORM DRAIN (ITEM 16)

Measurement for payment for furnishing and installing RCP pipe will be based upon the number of linear feet of pipe constructed as determined by measurement along the projected centerline of the pipe in place, in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing RCP pipe will be made at the unit price per linear foot of pipe named in the Bid Schedule, which shall constitute full compensation for the complete operation including, but not limited to, providing all necessary pipe, dewatering, backfilling, compaction and all restoration to land/blacktop surface as required.

2.18 FURNISH & INSTALL CONCRETE HEADWALL FOR 24” PIPE(ITEM 17)

Measurement for payment for furnishing and installing concrete headwall will be based upon the number of concrete headwalls constructed in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing concrete headwall will be made at the unit price per number of headwalls named in the Bid Schedule, which shall constitute full compensation for the complete operation.

2.19 FURNISH & INSTALL CONCRETE HEADWALL FOR 8” PIPE(ITEM 18)

Measurement for payment for furnishing and installing concrete headwall will be based upon the number of concrete headwalls constructed in accordance with the requirements of the Contract Documents. This item includes the 8” flap valve at end of pipe.

Payment for furnishing and installing concrete headwall will be made at the unit price per number of headwalls named in the Bid Schedule, which shall constitute full compensation for the complete operation.

2.20 FURNISH & INSTALL OUTLET CONTROL STRUCTURE (ITEM 19)

Measurement for payment for furnishing and installing outlet control structure will be based upon the number outlet control structures constructed, in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing outlet control structure will be made at the unit price per outlet control structure quantity in the Bid Schedule, which shall constitute full compensation for the complete operation..

2.21 CHAIN LINK FENCE WITH BARBED WIRE(ITEM 20)

A. Measurement. The quantity of 8-ft chain link fence with barbed wire shall be the number of linear feet measured furnished and complete in place.

B. Payment. The unit price bid per linear foot for 8-ft chain link fence with barbed wire shall include all labor, tools, materials, and equipment required and expense incidental thereto to furnish and install 8-ft chain link fence with barbed wire, complete as shown and specified.

2.22 FURNISH & INSTALL 4" COMBINATION AIR VALVE(ITEM 21)

Measurement for payment to furnish and install a 4” combination air valve will be based upon the number of 4” combination air valves furnished and installed, all in accordance with the requirements of the Contract Documents.

Payment for furnishing and installing 4” combination air valves will be made at the unit price, each, named in the Bid Schedule which shall constitute full compensation for the complete installation including, but not limited to, excavation, dewatering, completed installation of the 4” combination air valve, backfilling, and compaction.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01026
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 0 and Division 1 of these Specifications.

1.03 GENERAL

A. For accounting purposes for the Engineer's convenience and as an aid in determining progress payments and price additions or deductions for Contract modifications, the Contractor shall furnish to the Engineer a schedule of values which shall be approved.
   1. The schedule of values shall apportion the total amount of the Contract price(s) for each separate item among the main features or costs that form the completed Work.
   2. The price breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs, as well as profit, and shall cover all work involved for the properly completed item and feature listed.
   3. Any amount claimed for subcontracts shall be supported by a similar schedule of values with the total amount shown by this price under the Contract price stated in the bid form.

1.04 SUBMITTALS

A. Prior to first application for payment, submit a proposed Schedule of Values to the Engineer.
   1. Meet with the Engineer and determine additional data, if any, required to be submitted.
   2. Secure the Engineer’s approval of the Schedule of Values prior to submitting first application for payment.

END OF SECTION

SECTION 01091
CODES AND STANDARDS

PART 1 GENERAL

1.01 DESCRIPTION

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organizations' standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 STANDARD ORGANIZATIONS

A. Piping and Valves

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society

NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
UPPA	Uni-Bell PVC Pipe Association

B. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute

NRMA	National Ready-Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration

H. Government and Technical Organizations Contd.

SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single-Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation

K. Plumbing

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute

SPC	SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. Equipment

AFBMA	Anti-Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 GENERAL

1.1 GENERAL

A. Owner's Project Representative will schedule physical arrangements for meetings throughout progress of Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

1.2 SUBMITTALS

A. Administrative Submittals:

1. Provide suggested agenda for pre-installation meeting and facility start-up meeting to Owner's Project Representative to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.3 PRECONSTRUCTION CONFERENCE

A. Be prepared to discuss the following subjects, as a minimum:
   1. Required schedules.
   2. Status of Bonds and insurance.
   3. Sequencing of critical path work items.
   4. Progress payment procedures.
   5. Project changes and clarification procedures.
   6. Use of site, access, office and storage areas, security and temporary facilities.
   7. Major product delivery and priorities.
   8. CONTRACTOR's safety plan and representative.

B. Attendees will include:
   1. Owner's representatives.
   2. CONTRACTOR's office representative.
   3. CONTRACTOR's resident superintendent.
   4. CONTRACTOR's quality control representative.
   5. Subcontractors' representatives whom CONTRACTOR may desire or ENGINEER may request to attend.
   6. ENGINEER's representatives.

7. Others as appropriate.

1.4 PRELIMINARY SCHEDULES REVIEW MEETING

A. As set forth in General Conditions and Section 01310, PROGRESS SCHEDULES.

1.5 PROGRESS MEETINGS

A. Owner's Project Representative will schedule regular progress meetings at site, conducted weekly to review Work progress, progress schedule, Shop Drawing and Sample submissions schedule, Application for Payment, contract modifications, and other matters that require discussion and resolution.

B. Attendees will include:

1. Owner's Project Representative and others, as appropriate.
2. CONTRACTOR, Subcontractors, and Suppliers, as appropriate.
3. ENGINEER's representative(s).
4. Others as appropriate.

C. ENGINEER shall prepare agenda and distribute 48 hours prior to meeting, preside at meetings, and prepare and distribute minutes of proceedings to all parties.

D. CONTRACTOR shall provide data required and be prepared to discuss all items on agenda.

E. Agenda:

1. Agenda will include but not necessarily be limited to the following:
    a. Revisions and/or Corrections to Previous Minutes.
    b. Unresolved Items.
    c. Administrative Items.
    d. New Agenda items to be discussed.
    e. Change Orders and review of Change Order Log.
    f. Shop Drawings and review of Shop Drawing Log.
    g. Request for Information (RFI) and review of RFI Log.
    h. Request for Proposal (RFP) and review of RFP Log.
    i. Problems, Conflicts, Observations.
    j. Coordination with OWNER and other CONTRACTOR's.
    k. Progress since last meeting.
    l. Planned Progress for Next Meeting and milestone work.
    m. Schedule Assessment / Delay.
    n. Project security and Project Safety.
    o. Testing.

p. Subcontractors.
q. Work Hours.
r. Other Business and planned visitors

1.6 QUALITY CONTROL AND COORDINATION MEETINGS

A. Scheduled by Owner's Project Representative on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of Work and work of other contractors.

C. Attendees will include:

1. CONTRACTOR.
2. CONTRACTOR's designated quality control representative.
3. Subcontractors and Suppliers, as necessary.
4. Owner's Project Representative.
5. ENGINEER's representative(s), as necessary.

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1.7 PREINSTALLATION MEETINGS

A. When required in individual Specification sections, convene at site prior to commencing Work of that section.

B. Require attendance of entities directly affecting, or affected by, Work of that section.

C. Notify Owner's Project Representative 5 business days in advance of meeting date.

1.8 OTHER MEETINGS

A. In accordance with Contract Documents and as may be required by OWNER and ENGINEER.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTIONS (NOT USED)

END OF SECTION

SECTION 01310
CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 SCOPE

A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction program/schedules as specified herein.

B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time, and meet all required interim milestones.

1.02 QUALITY ASSURANCE

The Project Schedule shall be developed using Microsoft Project or other approved method/program. Coordinate with the PM/CM to insure compatibility of software and computer systems.

1.03 SUBMITTALS

A. Project Schedule

1. Submit the Project Schedule within 5 days after date of the Notice to Proceed.

2. The PM/CM will review schedule and will return the reviewed copy within 5 days after receipt.

3. If required, resubmit within five days after receipt of a returned review copy.

B. Updating: Submit an update of the schedule with each request for payment.

C. Submit the number of copies required by the Contractor, plus four copies to be retained by the PM/CM.

1.04 APPROVAL

Approval of the Contractor's construction program and revisions thereto, shall in no way relieve the Contractor of any duties and obligations under the Contract. Such approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the Work.

1.05 PRELIMINARY PROJECT SCHEDULE (PPS)

A. The Project Schedule shall be a bar chart or time scaled network diagram showing the Contractor's proposed operations.

1.06 UPDATING

A. Written Narrative Report: Provide a written narrative report with each update including:

1. A status review of the Project.

2. A discussion of problem areas including current and anticipated delay factors and their impact.

3. Direct action taken, or proposed, and its effect.

4. A description of revisions including:

a. Their effect on the schedule due to the change of scope.
b. Revisions in duration of activities.
c. Other changes that may affect the schedule.

5. A listing of behind-schedule materials and equipment procurement activities.

6. A listing of any significant changes in the activities and restraints occurring since the last update and why the changes were made.

B. Critical Work List: Provide a listing of critical work to be performed prior to the next Project Coordination Meeting, specifically listing what must be done during the next 30 days to stay on the critical path schedule.

C. At each Project Coordination Meeting, the Contractor shall present for discussion the most current update of the schedule.

END OF SECTION

SECTION 01320
CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with construction photographs of the Project.

B. Negatives shall become the property of the Owner and none of the photographs herein shall be published without express permission of the Owner.

1.02 PRE AND POST CONSTRUCTION PHOTOGRAPHS

A. Prior to the beginning of any work, the Contractor shall take project photographs of the work area to record existing conditions.

B. Following completion of the work, another recording shall be made showing the same areas and features as in the pre-construction photographs.

C. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

D. The Contractor shall coordinate the taking of pre and post-construction photographs with the PM/CM. The PM/CM shall observe the taking of the photographs.

E. The pre-construction photographs shall be submitted to the PM/CM within 20 calendar days after the date of receipt by the Contractor of Notice to Proceed. Post-construction photographs shall be provided prior to final acceptance of the project.

1.03 PROGRESS PHOTOGRAPHS

A. Photographs shall be taken to record the general progress of the Project during each pay period. Photographs shall be representative of the primary work being performed at that time.

B. The photographs shall include the date and time marking of the recording. All photographs shall be labeled on a tab connected to the bottom of the photo to indicate date and description of work shown.

C. A minimum of 10 photographs shall be submitted with each request for payment. The view selection will be as agreed to with the PM/CM. Two prints of each photograph shall be submitted to the PM/CM.

1.04 SUBMITTALS

A. A CD disc is an acceptable method for submitting the photographs.

B. Construction photographs shall be submitted with each payment request. Failure to include photographs may be cause for rejection of the payment request.

END OF SECTION

SECTION 01460
TESTING SERVICES

PART 1 - GENERAL

1.1 SCOPE

A. General:
   1. Testing and special inspection services (Services) are required for portions of this Project to verify Building Code and Contract Document compliance of materials, installation, fabrication, erection or placement of components and mechanical connections.
      a. The following paragraphs define the division of responsibilities between the OWNER and CONTRACTOR as related to these Services.
      b. Because the nature of these Services is broad, these Services may be provided by more than one (1) Service Provider for either the OWNER and/or CONTRACTOR.

B. Product Production Testing:
   1. This testing category addresses all factory and fabrication plant testing required to certify that materials meet Contract Document requirements.
   2. Examples of this category of testing include steel mill tests, concrete block certification, precast plant production, establishment of mix designs, etc.
   3. Documentation requirements may include definition of factory test procedures, testing reports, certificates or other forms as applicable.
   4. Costs associated with all phases of securing satisfactory product production testing information required by the Contract Documents are the full responsibility of the CONTRACTOR.

C. Field Testing:
   1. Strength/condition of materials testing:
      a. This testing category addresses all testing required to verify strength of materials or conditions of subgrade or fireproofing during construction.
      b. Examples of this subcategory of testing include soil density testing, concrete testing, grout and mortar testing, structural steel inspection, weld testing and sprayed fire resistant materials testing.
      c. CONTRACTOR will hire independent testing lab(s) for this testing.
      d. Costs associated with first time tests will be paid for by the CONTRACTOR. Costs of corrective action and costs of retesting are the sole responsibility of the CONTRACTOR.

2. Non-strength related testing:
   a. This subcategory addresses non-strength related testing such as piping pressure testing, etc.
   b. Documentation requirements may include definition of test procedures, testing reports, certificates or other forms as applicable.
   c. Contractor shall have the option of hiring an independent testing lab(s) for these tests, or may perform the testing using CONTRACTOR's forces.
   d. Costs associated with all phases of securing required satisfactory test information required by the Contract Documents are the full responsibility of the CONTRACTOR.

D. The General Contractor shall employ and pay for an independent testing laboratory to perform the following services at no additional cost to the OWNER:
   1. Shop or laboratory testing of equipment provided by General Contractor where specified in the technical specifications.
   2. In-place soil density testing as specified in the technical specifications, except for testing required for building or structure foundations.

E. All laboratories shall be subject to the approval of the OWNER.

1.2 QUALITY ASSURANCE

A. Laboratory shall be licensed and authorized to work in the State of Connecticut.

B. Laboratory shall meet the applicable requirements of the following:
   1. "Recommended Requirements for the Independent Laboratory Qualification", latest edition, as published by the American Council of Independent Laboratories.
   2. ASTM International (ASTM):
      a. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

C. Submit a copy of the current inspection report of facility made by Materials Reference Laboratory of National Bureau of Standards. Additionally, provide a letter summarizing remedies to deficiencies noted during inspection.

D. Test Equipment Calibration:
   1. Testing equipment shall be calibrated at a maximum 12-month interval. Calibration shall be performed using devices of accuracy traceable to either the National Bureau of Standards or accepted natural physical constants.
   2. Submit a copy of certificate of calibration, made by an accredited calibration agency, for all testing equipment to be utilized on this project.

1.3 LABORATORY RESPONSIBLITIES

A. Perform inspection, sampling and testing in accordance with Contract Documents and applicable standards.

B. Cooperate with ENGINEER and CONTRACTOR.

C. Provide qualified personnel after due notice.

D. If deficiencies or non-conformances are observed, notify ENGINEER and CONTRACTOR promptly.

E. Submit a minimum of five copies of inspection or test reports to ENGINEER. Reports shall at a minimum include the following:

1. Testing laboratory name, location and phone number.
2. Project name and location.
3. Date of report.
4. Date of inspection or sampling.
5. Date of test.
6. Location of sample or test in the Project.
7. Temperature and weather conditions at the time of inspection, sampling or testing.
8. Reference to applicable Specification Section.
9. Type of inspection or test.
10. Results of test or inspection, including statement of compliance with Contract Documents.
11. Name and signature of inspector or person authorized to approve testing.
12. Interpretation of test results, when requested by ENGINEER.

F. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge upon requirements of Contract Documents.
2. Approve or accept any portion of the Work.

1.4 CONTRACTOR RESPONSIBILITIES

A. CONTRACTOR shall pay for all testing to meet the requirements of the Contract Documents.

B. CONTRACTOR shall pay for any tests performed for the CONTRACTOR'S convenience.

C. Notify laboratory and ENGINEER in sufficient time prior to testing in order to schedule personnel for inspection or testing.

D. Provide to the laboratory the preliminary design mix proposed to be used for concrete and other materials mixes that require control by the testing laboratory.

E. CONTRACTOR shall furnish labor and equipment as required to:
   1. Provide access to work to be tested.
   2. For testing laboratory to obtain, store and cure samples.
   3. Facilitate inspections, sampling and testing.
   4. Where allowed, provide laboratory with required samples to be tested.

F. Additionally, CONTRACTOR shall perform duties as required and specified in other portions of this Specification Section.

1.5 SHOP TESTING

A. CONTRACTOR shall pay all costs associated with specified shop tests of materials and equipment, including retesting of items that fail original tests.

B. Related requirements specified elsewhere:
   1. Inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities: Conditions of the Contract.
   2. Certification of products: The respective sections of Specifications.
   3. Test, adjust, and balance of equipment: The respective sections of Specifications.
   4. Shop tests required and standards for testing: Each Specification section listed.

C. Observation of shop tests:
   1. Where the Specifications call for a shop test to be witnessed by a representative of the
      ENGINEER, notify ENGINEER not less than 14 days prior to the scheduled test date.
   2. OWNER is to pay for all costs of ENGINEER's first visit.
   3. If subsequent visits by ENGINEER are required because of incomplete tests, retesting, or subsequent tests, CONTRACTOR shall reimburse OWNER for or OWNER shall secure through deductive change order all costs of the subsequent visits.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01510
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section shall consist of providing the following temporary facilities:

1. Water,
2. Sanitary Facilities,
3. Electrical Service

PART 2 PRODUCTS

2.01 TEMPORARY WATER

A. Drinking water shall be provided by the Contractor for his personnel and the personnel of his sub-contractors.

1. Drinking water shall be tested and approved by the State Agency as "safe drinking water suitable for human consumption".
2. Contractor shall furnish water for construction.

2.02 TEMPORARY SANITARY FACILITIES

A. Sanitary conveniences, properly screened from public observation, for the use of all persons employed on the work and beginning with the first man engaged in preliminary operations, shall be provided and maintained by the Contractor in sufficient numbers through the completion of the work.

B. Contractor shall be diligent in maintaining sanitary facilities; pumping weekly, or more often as required to protect soil and water quality.

2.03 ELECTRICAL SERVICES

A. Provide the necessary temporary electrical service connections as required by the local electrical power provider.

1. Temporary distribution wiring and boxes as needed by the construction trades working on the site(s).
2. Temporary service to field offices.

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01570
TRAFFIC REGULATION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work under this Section shall consist of maintaining and protecting traffic in the project area to the satisfaction of the applicable Local Regulatory Agencies, and the Owner.
   1. Unless otherwise specified within the Contract Documents, the Contractor must maintain pedestrian and vehicular traffic and permit access to businesses, factories, residences, and intersecting streets

PART 2 PRODUCTS

2.01 TRAFFIC SIGNS

A. The Contractor shall furnish light(s) and maintain traffic signs as may be directed, or may be necessary for the safe regulation, or convenience of traffic.
   1. Said signs shall be as shown or noted on the Contract Drawings or elsewhere herein, or if not specified, they shall be adequate for the regulation, safety and convenience of traffic and in conformance with the applicable requirements of the State/Federal Manual on Uniform Traffic Control Devices.

2.02 BARRICADES

A. Suitably lighted barriers or barricades shall be furnished by the Contractor and put up and maintained at all times during the night or daytime, around all open ditches, trenches, excavation, or other work potentially dangerous to traffic.
   1. Such barricades shall be as shown on the Contract Drawings, or if not shown, shall be constructed of 2 inch by 8 inch rough lumber, securely supported, braced and at least 3 feet high above the ground.
   2. Barricades shall be placed on all sides and throughout the entire length and breadth of all open ditches, trenches, excavations, or other work which must be barred to the general public.
   3. Barricades shall be properly painted to the satisfaction of the Local Regulatory Agency in order to retain a high degree of visibility to vehicular and pedestrian traffic.

2.03 FLASHERS

A. The Contractor shall furnish and securely fasten flashing units to signs, barricades, and other objects in such numbers and for such lengths of time as are required for the maintenance and protection of traffic.
   1. The flashers shall be in operation during all hours between sunset and sunrise, and during periods of low visibility.
   2. Suitably lighted barricades shall be defined as barricades lit by flashers in accordance with this Section or other lighting methods approved by the Local Regulatory Agency in lieu thereof.
   3. Flashers shall be placed along the entire length of the barricades at an interval no greater than 8 feet, center to center. Flashers shall be power operated, lens directed, enclosed light units which shall provide intermittent light from 70 to 120 flashers per minute, with the period of light emittance occurring not less than 25 percent of each on-off cycle, regardless of temperature.
   4. The emitted light shall be yellow in color and the area of light on at least one face of the unit shall be not less than 12 square inches. The discernible light shall be bright enough to be conspicuously visible during the hours of darkness at a minimum distance of 800 feet from the unit under normal atmospheric conditions.
   5. For units which beam light in one or more directions, the foregoing specifications shall apply 10 degrees or more to the side and 5 degrees or more above and below the photometric axis.

2.04 TEMPORARY BRIDGING

A. The Contractor shall include in his bid, bridging for trenches at and all street and driveway crossings in such manner as the Local Regulatory Agency may direct for the accommodation and safety of the traveling public, to provide facilities for access to private driveways for vehicular use, and to prevent blocking of intersecting traffic.
   1. He shall erect suitable barriers around the excavation to prevent accidents to the public and shall place and maintain, during the night, sufficient lights on or near the work.
   2. A space of 20 feet must be left so that free access may be had at all times to fire hydrants and proper precautions shall be taken so that the entrances to fire hydrants and fire stations shall not be blocked or obstructed.

2.05 DETOURS

A. Temporary detours shall be constructed on the site as proposed by the Contractor and approved by the Applicable State and/or Local Authorities required by the Contract Drawings or specified elsewhere herein.

1. Detours shall not have grades in excess of 10% anywhere along their lanes unless otherwise shown on the Contract Drawings. Detours shall be smooth riding.
2. Suitable barricades shall be installed continuously along both sides of a detour where:
   a. The adjacent side slope is steeper than 1 on 6 inches.
   b. The Contractor's operations or equipment may operate within 20 feet of the detour.
   c. Other unsafe conditions requiring them for the protection of traffic along the line of detour.

2.06 MISCELLANEOUS

A. The Contractor may be required to employ traffic persons and/or uniform police officers as required and take other such reasonable means or precautions as the Local Regulatory Agency may direct, or as may be needed to prevent damage or injury to persons, vehicles, or other property and to minimize the inconveniences and danger to the public by his construction operations.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section consists of procedures and requirements for contract closeout, such as cleaning, restoration of project site to original condition, inspections and guarantees.

PART 2 MATERIALS (Not Applicable)

PART 3 EXECUTIONS

3.01 CLEANING UP

A. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. All local water courses, catch basins and drains discharge into the drinking water reservoir. No material or debris shall be washed or flowed into or be placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be entirely removed and legally disposed of during progress of the work, and the ditches, channels, drains, etc., shall be protected from spillage and kept in a neat, clean and functioning condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operation in a neat and satisfactory condition.

D. Unless otherwise specifically directed or permitted in writing, the Contractor shall perform the following tasks:
   1. Tear down and remove all temporary buildings and structures built by him.
   2. Remove all temporary works, tools, and machinery or other construction equipment furnished by him.

3. Remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him.
   a. Subsequent to disinfection, remove or suitably neutralize disinfectant residuals from treated area(s).

4. Remove all rubbish from any grounds which he has occupied.
5. Leave roads and all parts of premises and adjacent property affected by his operations in a neat and satisfactory condition.

3.02 RESTORATION

A. The Contractor shall restore or replace, when and as directed by the Engineer, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations.
   1. To this end, the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work.
   2. Suitable materials, equipment and methods shall be used for such restoration, or as required in other divisions of this Specification.

B. In restoring the disturbed areas the Contractor shall:
   1. Replace to an equivalent depth any loam that has been removed during the excavation.
   2. Remove from the property and legally dispose of in an approved fashion all trees, brush and other items that the Contractor has cut in order to prosecute his work.
   3. Remove from the property upon completion of the work thereon, all excess materials of construction such as stone, pipe, concrete block, gravel, etc., that the
      Contractor may have stockpiled for use during the course of the work.
   4. Leave the land in a smooth, even condition. All ruts, holes or other undesirable grading conditions which resulted from work under this Contract shall be filled and the area so graded to eliminate ponding.
   5. All drainage course(s) shall be restored to their pre-existing condition or better.
   6. Reset all public or private monuments, iron pipes or other types of property line and geodetic markers damaged or disturbed by operations under this Contract.
      This work shall be done by a licensed land surveyor at no additional cost.
   7. Repair, reset or replace as directed all pipes, walls, utilities, fences, railings, stone walls, etc., and ornamental or utilitarian domestic accessories, such as, but not limited to, arbors, fireplaces, sheds and

incinerators, or other surfaces structures, or property which may have been damaged, either directly or indirectly by his operations under this Contract.

8. Restore to a condition at least equal to that in which they were found immediately prior to the beginning of construction all sidewalks, gutters, driveways and curbs which have been damaged by the Contractor's operations.

3.03 FINAL INSPECTION

A. At completion of all work, the Owner and Engineer, along with the General Contractor and each of the subcontractors shall conduct a final inspection jointly for "punch list" purposes and to determine the exact status of the project before final acceptance.

3.04 GUARANTEES

A. The Contractor shall take notice of special guarantees required in the technical Sections of these Specifications.

1. If, in the opinion of the Owner, any item requires excessive maintenance during guarantee periods, the item shall be considered defective and the Contractor shall correct the defects.
2. All defects so corrected shall be at the expense of the Contractor.

END OF SECTION

SECTION 01710
CLEANING

PART 1 GENERAL

1.01 SCOPE

This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 QUALITY ASSURANCE

A. Daily, and more often if necessary to conduct inspections verifying that requirements of cleanliness are being met.

B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 HAZARDOUS MATERIAL AND WASTE

A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.

B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.

C. Burning or burying rubbish and waste materials on the site shall not be allowed.

D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

1.04 DISPOSAL OF SURPLUS MATERIALS

Unless otherwise shown on the Drawings, specified or directed, the Contractor shall legally dispose off the site all surplus materials and equipment from demolition and shall provide suitable off-site disposal site, or utilize a site designated by the Owner.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the PM/CM.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.

2. Daily, completely remove all scrap, debris and waste material from the job site.

3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Restack materials stored on site weekly.

3. At all times maintain the site in a neat and orderly condition which meets the approval of the PM/CM.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand-held broom.

3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.

4. Following the installation of finish floor materials, clean the finish floor daily. "Clean", for the purpose of this paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the PM/CM, may be injurious to the finish floor material.

5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 FINAL CLEANING

A. Definitions: Unless otherwise specifically specified, "clean" for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.

C. Site: Unless otherwise specifically directed by the PM/CM, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.

D. Structures

1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the PM/CM may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.

3. Clean all glass inside and outside.

4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.

E. Post-Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, shall be removed as directed by the PM/CM.

F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The PM/CM will decide what method of restoration shall be used.

G. Timing: Schedule final cleaning as approved by the PM/CM to enable the Owner to accept the Project.

3.03 CLEANING DURING OWNER'S OCCUPANCY

Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the PM/CM in accordance with the Supplementary Conditions of the Contract Documents.

END OF SECTION

SECTION 01720
PRODUCT HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

1.02 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURER'S RECOMMENDATIONS

A. Comply with manufacturers' recommendations on product handling, storage and protection.

1.04 PACKAGING

A. Deliver products to the job site in their manufacturer's original container(s), with labels intact and legible.
   1. Maintain packaged materials with seals unbroken and labels intact until time of use.
   2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.05 PROTECTION

A. Mechanical equipment subject to damage by the atmosphere if stored outdoors, shall be stored in a building with a controlled environment. The building may be a temporary structure on the site or a building off the site.

B. PVC pipe shall be covered to protect it from UV degradation.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Engineer at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01730
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the maintenance, recording and submittal of project record documents as herein specified.

B. Maintain at the site for the Owner one record copy of:

1. Drawings,
2. Specifications,
3. Change orders and other modifications to the Contract,
4. Engineer field orders or written instructions,
5. Reviewed shop drawings, product data and samples,
6. Field test records.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage

1. Store documents and samples apart from documents used for construction.
2. Provide files and racks for storage of documents.
3. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with format of these Specifications.

C. Maintenance

1. Maintain documents in a clean, dry, legible condition and in good order.
2. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by Engineer.

1.03 RECORDING

A. Label each document "PROJECT RECORD" in neat, large printed letters.

B. Recording

1. Record information concurrently with construction progress.
2. Do not conceal any work until required information is recorded.

C. Drawings: Record drawings shall be reproducible, shall have a title block indicating that the drawings are record drawings, the name of the company preparing the record drawings and the date the record drawings were prepared. The Contractor will be provided paper sepias of the Contract Drawings, at the cost of reproduction, or he may elect to provide reproducible drawings via another method. Legibly mark drawings to record actual construction:

1. Depths of various elements of foundation in relation to finish first floor datum.
2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
4. Field changes of dimension and detail.
5. Changes made by Requests for Information (RFI), field order or by change order.
6. Details not on original Contract Drawings.

D. Specifications: Legibly mark each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Requests for Information (RFI), field order or by change order.

1.04 SUBMITTAL

A. At Contract closeout, deliver record documents to Engineer for the Owner.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date,
2. Project title and number,
3. Contractor's name and address,
4. Title and number of each record document,
5. Signature of Contractor or Contractor's authorized representative.

END OF SECTION

DIVISION 2 – SITEWORK

SECTION 02110
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Clear and grub to the limits required by the Contract Documents. Clear and grub the areas to be occupied by the facilities to be constructed including all areas to be excavated, filled, paved or planted as shown on the Drawings and as specified herein.

1.2 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1. Section 02200 - Earthwork
2. Section 02210 - Site Grading

1.3 DEFINITIONS

A. Clearing: Clearing shall consist of the cutting and felling of trees and vegetation as per Section 3.03 of this Technical Specification and the satisfactory disposal of trees, limbs, rubbish, structures and other vegetation.

B. Grubbing: Grubbing shall consist of the removal and disposal of roots, root mat, stumps, logs, footings, slabs, and other objectionable matter which could affect the quality of the subgrade or borrow material.

C. Topsoil: Topsoil material is defined in Section 02210 - Site Grading.

D. Disposal: Disposal of cleared and grubbed material shall be performed as indicated in 3.5 of this Technical Specification.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and

experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.5 COORDINATION

A. Coordinate clearing and grubbing of the easements with the Owner.

1. Obtain permission if working outside of the easement lines.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Flag limits of clearing.

3.2 PROTECTION

A. Only trees and brush within the limits of the easement shall be cleared.

1. Protect trees and shrubs, where indicated to remain, by providing a fence around the tree or shrub at its drip line and of sufficient height so trees and shrubs will not be damaged.
2. All areas not designated to be cleared shall be protected from damage.
3. Clearing operations shall be conducted so that cut trees are felled within the easement boundaries and existing trees designated to remain, are protected from damage.
4. Protect control points, benchmarks and existing work.
5. Maintain access to the site at all times.

3.3 CLEARING AND GRUBBING

A. Within the area to be cleared:
1. Fell trees and brush.
2. Chip all wood and waste.
3. Grub out all roots 1 inch in diameter and larger to a depth of at least 12 inches below the existing ground surface.

4. Remove all stumps and other matter that cannot be removed by a root rake. Remove stumps to a minimum depth of 2 ft below grade.

3.4 CONSERVATION OF TOPSOIL

A. After the area has been cleared of vegetation, strip the existing top-soil.

1. Stockpile in an area clear of new construction.
2. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
   a. Maintain stockpile free from debris and trash.
   b. Keep top-soil damp to prevent dust.
   c. Place hay bales around stockpile.

3.5 REMOVAL AND DISPOSAL

A. All debris, wood waste, trees, shrubs, brush, roots, stumps and etc. cleared and grubbed from the site shall be removed from the site and disposed of in accordance with Federal, State, and local codes.

1. Burning and/or burial of cleared and grubbed material on the site shall not be permitted.
2. Depressions remaining from the removal of stumps below finish grade shall be backfilled with compacted fill to the approximate density of the surrounding soil.

3.6 UTILITIES

A. Protect existing utilities indicated or made known.
   1. Coordinate with utility companies and agencies as required.

END OF SECTION

SECTION 02160
SUPPORT OF EXCAVATION

PART 1 GENERAL

1.2 DESCRIPTION

A. Provide excavation support as required by the Contract Documents.

1. In general this work shall consist of furnishing and placing timber and/or steel sheeting and shoring of the types and dimensions required for proper excavation support.

1.3 DEFINITIONS

A. Shoring shall mean the use of a steel trench box, steel sheeting, or timber sheeting braced as required.

B. Timber sheeting shall mean the use of tongue and groove wood sheeting or steel soldier beams with wood lagging braced as required.

C. Steel sheeting shall mean the use of steel sheet pilings with interlocking joints, braced by steel members as required.

1.4 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1. Section 02200 - Earthwork

B. As established in the General Conditions of the Contract, the Contractor is solely responsible for means and methods of construction and for the sequence and procedures to be used.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1. The Contractor shall not perform excavations in unstable ground and shall employ a positive means of containing the unstable ground behind shoring, before excavation may proceed.

B. Employ a qualified professional engineer, properly permitted to provide such services at the location of the work, to design the shoring system and to inspect and report on the quality of its construction.

C. Comply with all pertinent requirements of governmental agencies having jurisdiction.

1.6 STANDARDS

A. The following Standards form a part of this Specification as referenced:

1. ASTM A328, Specification for Steel Sheet Piling
2. State of Georgia DOT Standard Specifications.
3. Code of Federal Regulations (CFR), 29 CFR 1926, OSHA Standards - Excavation.

1.7 SUBMITTALS

A. Submit shoring design to Engineer for record purposes only.

PART 2 PRODUCTS

2.1 DESIGN

A. Design a shoring system which will safely and adequately prevent collapse of adjacent materials and which will permit construction of the Work to the arrangement shown on the Drawings.

B. All shoring systems shall be designed so as to support all vertical and lateral loads and other surcharge loads imposed on the system during construction, including earth pressures, utility loads and other surcharged loads in order to provide safe and expeditious construction of the permanent structures and prevent movement and/or damage to adjacent soil, buildings, structures and utilities.

C. Secure all needed approvals, including those of governmental agencies having j jurisdiction and of adjacent property owners if required, at no additional cost to the Owner.

2.2 MATERIALS

A. Material shall include, but not necessarily be limited to sheet piling, solder piles, lagging, bracing members such as wales, struts, shores and tieback anchors.

B. Lumber for Timber Sheeting and Shoring.

1. Shall be sound Spruce, Douglas Fir, white or yellow Lodgepole, Ponderosa pine, or western hemlock plank, planed on one side and either tongue and grooved or splined.

C. Steel Sheeting

1. Shall be of approved section and quality, either new or secondhand, conforming to the requirements of ASTM A328.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Construct and install the shoring system in strict accordance with the design engineer's requirements.

1. When using soldier piles and lagging, where boulders or cobbles are encountered, soldier piles shall be installed in pre-augered holes over the full depth as required to prevent misalignment and damage.

2. Vibration monitoring during installation and extraction of braced excavation shall be provided wherever the excavation is within 100 feet of existing structures.

3.3 SHEETING REMOVED

A. All sheeting not left in place shall be carefully removed in such manner as to not endanger the construction or other structures, utilities, or property.

1. All voids left or caused by withdrawal shall be immediately refilled with approved material, and compacted with tools especially adapted to that purpose.

2. Vibratory extraction methods shall be used only when it can be demonstrated that settling of pipe and structures will not occur. If such settling occurs, it shall be corrected at the Contractor's expense.

3.4 TRENCH BOX OR SHIELD

A. Use of a trench box or shield shall not relieve the Contractor of any liability for damages to persons or property growing out of a failure of the Contractor to leave in place sufficient sheeting and bracing to prevent the caving or moving of the ground or disturbance of the completed work.

1. Care shall be taken, when a trench box or shield is moved ahead, so as not to pull apart the joints of pipe already placed or leave voids around the pipe wall.

2. At no time shall the portable box or shield be allowed to be positioned below the spring line of the pipe.

3. The width of the trench box or shield shall be such that a minimum 6 inch horizontal clearance is maintained between the pipe and shield at all times. The minimum width of the trench shall be in accordance with Specification Section 02200 – Earthwork, Subsection 3.3 – Trench Excavation.

4. If the pipe has moved, it shall be reset to the proper line and grade.

5. Any voids between the trench box or shield and the undisturbed trenchwall within the pipe zone (bottom of trench to top of cover material) shall be filled with crushed stone, bank run gravel, or approved material as per Specification Section 02200 – Earthwork, Subsection 2.3 (A), immediately after the box or shield is positioned.

END OF SECTION

SECTION 02200
EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION

A. Work under this section includes providing all labor, material, and equipment to complete all earthwork consisting of stripping and stockpiling of suitable topsoil, excavation of all materials encountered, trenching, blasting, backfill, fill, providing borrow and off-site fill materials, compaction, and grading.

1.2 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1. Section 02110 – Clearing and Grubbing
2. Section 02160 – Support of Excavation
3. Section 02227 – Rock Removal-Blasting.
4. Appendix B – Geotechnical Reports
   i. Geotechnical Exploration, Water Storage Tank, 3090 Gees Mill Road, Rockdale County, Conyers, Georgia, by United Consulting dated November 28, 2014, Project No. 2014.5138.01.
   ii. Geotechnical Exploration, Rockdale Co. Water Resources Gees Mill WTP New Storage Tank 48" Waterline Extension, Conyers, Georgia, by United Consulting dated September 19, 2016, Project No. 2016.5078.01

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity and numbers to accomplish the work of this Section in a timely manner.

C. Comply with requirements of governmental agencies having jurisdiction.

1.4 SUBMITTALS

A. The Contractor shall submit Project Record Documents of topographic surveys and calculations of excavation and fill volumes. The Contractor shall provide

topographic surveys of top of rock as well as separate volume calculations for rock excavation requiring blasting to the design grade elevations shown on the Drawings.

1.5 STANDARDS

A. The Contractor shall comply with the provisions of the following agencies as they apply to this project and as referenced:

1. Associated General Contractors of America, Inc. (AGCA) "Manual of Accident Prevention in Construction".

2. Occupational Safety and Health Administration (OSHA), United States Department of Labor Requirements.

3. American National Standards Institute (ANSI) "Safety Requirements for Construction and Demolition".

B. The following American Society for Testing and Materials (ASTM) standards form a part of this specification as referenced:

1.	ASTM C33	Concrete Aggregates
2.	ASTM D422	Particle-Size Analysis of Soils
3.	ASTM D698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb Rammer and 12-in. Drop
4.	ASTM D1556	Density of Soil in Place by the Sand-Cone Method
5.	ASTM D1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. Rammer and 18-in. Drop
6.	ASTM D2217	Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
7.	ASTM D2937	Density of Soil in Place by the Drive-Cylinder Method
8.	ASTM D4355	Deterioration of Geotextile by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
9.	ASTM D4491	Water Permeability of Geotextiles by Permittivity
10.	ASTM D4533	Trapezoidal Tearing Strength of Geotextiles
11.	ASTM D4632	Grab Breaking Load and Elongation of Geotextiles
12.	ASTM D4751	Determining Apparent Opening of a Geotextile

13.	ASTM D5261	Measuring Mass per Unit Area of Gotextile
14.	ASTM D6241	Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

C. The following State of Georgia Department of Transportation (GADOT), Standard Specifications for Roads, Bridges and Incidental Construction form a part of this specification as referenced:

1. Section 800 – Coarse Aggregate
2. Section 801 – Fine Aggregate
3. Section 803 – Stabilizer Aggregate
4. Section 805 – Rip Rap and Curbing Stone
5. Section 815 – Graded Aggregate

1.6 UTILITY COORDINATION

A. Utility agencies shall be contacted and advised of proposed work prior to the start of excavation by the Contractor.

B. The Contractor shall obtain information from the proper sources and authorities concerning locations of all utilities within the scope of this work.

C. If and when encountered, utilities shall be supported and protected, and the Engineer shall be notified. Ample time shall be allowed for entrance and taking such measures as may be required for the continuance of such services by the utility Owners.

D. Rules and regulations governing the respective utilities shall be observed. Utilities shall not be removed or relocated except as indicated or directed.

1.7 PROJECT/SITE CONDITIONS

A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table, or similar physical conditions at the site, the conformation and subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the execution of the work, and all other matters which can in any way effect the work or the cost thereof under this contract.

B. Any existing property boundary markers, control points and datum elevation markers or bench marks shall be preserved, and all such established survey points which are displaced or destroyed by the Contractor shall be replaced by a registered Engineer or Land Surveyor with all expenses for such replacement paid by the Contractor.

C. Extreme care shall be exercised to prevent damage to existing trees, shrubs,

facilities, construction, utilities, fences, and private property that are to remain. The Contractor at his own expense shall repair any damage to these items as a result of work performed by the Contractor.

D. Any failure by the Contractor to acquaint himself with all available information concerning these conditions will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work.

PART 2 MATERIALS

2.3 STRUCTURAL FILL

A. Except where directed otherwise by the Engineer, all fills below buildings, for backfill against tank walls, and for raising site grades below tanks shall be Structural Fill as described below or as shown on the Drawings and Specifications.

B. Material shall consist of well-graded sand or clayey sand, fine-grained, silty, or clayey sand, medium-to-well graded sandy clays, sandy silts and clay with some mica classified as SW, SP, SM, SC, CL and ML soils based in the Unified Soil Classification System (USCS).

C. All Structural Fill materials shall be obtained from the required excavation or from designated borrow areas and stockpiles as directed by the Owner. The selection, blending, routing, and disposition of materials in the various fills shall be subject to approval by the Owner.

D. Structural Fill materials shall contain no sod, brush, roots or other perishable and unsuitable materials and the types of materials used in the various Structural Fills shall be as listed and described in the Specifications and Drawings.

E. All soil to be used as Structural Fill shall be inspected by the Owner or Construction Quality Assurance (CQA) Consultant designated by the Owner prior to actual use.

F. Rock fragments, boulders, and cobbles contained in Structural Fill shall not exceed four (4) inches in any dimension. Additionally, the material with particle sizes greater than 50 mm (2 inches) in any dimension shall not exceed 40 per cent by weight of the total material. Material shall be inspected to remove limbs, roots, and other deleterious material to the extent practical.

G. Moisture-density determinations shall be performed for each soil type used, to provide data necessary for quality assurance testing. The natural moisture content at the time of compaction should be within moisture content limits, which will allow the required compaction to be obtained. The Contractor shall be prepared to increase or decrease soil water content.

2.2 COMMON FILL

A. Fill for general filling outside the limits of structures shall be Common Fill.

B. Material for compacted Common Fill shall consist of mineral soil, substantially free

of organic material, loam, wood, trash and other objectionable material, and shall meet the requirements of ASTM D698.

C. Maximum size of stone shall be 6 inches. Inclusion of snow, ice and frozen soil will not be permitted.

2.3 BEDDING MATERIAL

A. Gravel Bedding Type I & Type II

1. Gravel bedding Type I shall be placed under storage tanks or other locations as shown on the Drawings or requested by the Engineer.

2. Gravel bedding Type II shall be placed in all pipe trenches except where otherwise specified herein.

3. Except where directed otherwise by the Engineer, material for compacted gravel bedding shall be obtained from an off-site source and shall be crushed quarry rock or crushed gravel, free of organic and decomposable substances, and shall be well graded within the following limits as per GADOT Section 800 - Coarse Aggregates for No. 57 Stone and No. 67 stone for Gravel Bedding Type I and Type II, respectively:

Table 1 – Gravel Bedding Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT	
	TYPE I (No. 57)	TYPE II (No. 67)
1-1/2	100	-
1	95-100	100
3/4	-	90-100
1/2	25-60	-
3 /8	-	20-55
No. 4	0-10	0-10
No. 8	0-5	0-5

B. Sand Bedding

1. Where ordered by the Engineer or as shown on the Drawings, sand bedding material shall be placed as bedding in trenches where PVC pipe is laid and for the first 12 inches of backfill over all pipe.

2. Sand bedding shall consist of clean, inert, hard, durable grains of rock free from loam or clay, surface coatings and deleterious materials primarily of particles with 100 percent passing the one-inch sieve and shall be well graded and shall be well graded within the following limits as per GADOT Section 801 - Fine Aggregates for No. 10 Sand conforming to ASTM C33 within the

following limits:

Table 2 – Sand Bedding Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT
3/8	100
No. 4	95-100
No. 16	45-95
No. 50	8-42
No. 100	1-10
No. 200	0-5

C. Screened Gravel, Crushed Stone or Filter Gravel

1. Where ordered by the Engineer to stabilize the trench base, below the gravel bedding, the Contractor shall place graded screened gravel, crushed stone or filter gravel. The crushed stone should meet the gradation of Type I Stabilizer Aggregate as per GADOT Section 803:

Table 3 – Crushed Stone Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT
1-1/2	100
1	80-100
No. 8	0-5

2. Filter gravel shall consist of inert material that is hard durable sand and gravel, free from loam, clay, surface coating and other deleterious materials and shall conform to the gradation of Type II Stabilizer Aggregate as per GADOT Section 803:

Table 4 – Filter Gravel Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT
2-inch	100

1-1/2 -inch	95-100
No. 10	15-45
No. 200	0-12

2.4 GRADED AGGREGATE

A. Graded aggregate shall consist of hard durable gravel and sand that is crushed or processed as part of mining operations, with material passing the No. 10 sieve relatively free of detrimental substances, such a soil overburden, decomposed rock, and/or swelling silts.

B. Graded aggregate shall be used for aggregate base, subbase, or shoulder course material for construction or reconstruction of asphalt pavement surfaces as shown on the Drawings, or as requested by the Engineer. The graded aggregate shall conform to the gradation of Group I Aggregates as per GADOT Section 815:

Table 5 – Graded Aggregate Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT
2	100
1-1/2	95-100
3/4	60-95
No. 10	25-50
No. 60	10-35
No. 200	7-15

2.5 DRAINAGE STONE

A. Drainage crush stone shall consist of hard durable gravel that is crushed or processed as part of mining operations, with material free of organic and decomposable substances.

B. Drainage stone shall be used for drainage systems as shown on the Drawings or as requested by the Engineer. The drainage stone shall be graded within the following limits as per GADOT Section 800 - Coarse Aggregates for No. 57 stone:

Table 6 – Drainage Stone Grain Size

SIEVE SIZE (inch)	PERCENT PASSING BY WEIGHT (No. 57)
1-1/2	100

1	95-100
1/2	25-60
No. 4	0-10
No. 8	0-5

2.6 RIP RAP

A. Rip rap shall consist of sound, tough, durable and angular rock, free from decomposed stones or other defects impairing its durability. The size of a stone as hereinafter specified shall be its least dimension. Broken concrete or rounded stones are not acceptable. The type of material to be used shall be as noted on the Drawings or as requested by the Engineer.

B. Rip rap material shall meet the following aggregate quality requirements as per GADOT Section 805:

Table 7.1 – Rip Rap Quality

AGGREGATE QUALITY	MAXIMUM PERCENT
Abrasion loss "B' grading	65
Soundness loss	15
Flat and shabby pieces (length five times more than the average thickness)	5
Weathered and/or decomposed pieces and shale	5

C. Rip rap material shall conform to the gradation for stone-dumped rip rap Type 1 or Type 3 as per GADOT Section 805:

Table 7.2 – Rip Rap Size

SIZE BY VOLUME (ft^3)	APPROXIMATE WEIGHT (lbs)	PERCENT SMALLER THAN	
		TYPE 1*	TYPE 3**
4.2	700	100	-
1.8	300	50-90	-
1	165	-	100
0.8	125	20-65	-
0.1	15	-	10-65

*Between 0% and 15% of the Type 1 rip rap shall pass a 4 in square opening sieve.

**Between 0% and 15% of the Type 3 rip rap shall pass a 2 in square opening sieve.

2.7 GEOTEXTILE

A. The geotextile shall be either a non-woven, needle-punched, polyester or polypropylene material. The geotextile shall be non-rotting, acid and alkali resistant and have sufficient strength and permeability for the purpose intended, including handling and backfilling operations, and design service life. Fibers shall be low water absorbent. The fiber network must be dimensionally stable and resistant to delamination. The geotextile shall be free of any chemical treatment or coating that will reduce its permeability. The geotextile shall also be free of any flaws or defects which will alter its physical properties. Torn or punctured geotextiles shall not be used.

B. The geotextile shall meet or exceed the properties specified in Tables 8.1 and 8.2 below for the different applications:

Table 8.1 – Geotextile Application

TYPE	APPLICATION
1	For installation of subsurface drains or other drainage locations.
2	For installation behind and beneath rip rap Type 3, buttresses, inlays, shear keys, and erosion control applications, installation on subgrade and in other material separation applications.
3	For installation behind and beneath rip rap Type 1, buttresses, inlays, shear keys, and erosion control applications, installation on subgrade and in other material separation applications, and installation within or under embankments for stabilization.

Table 8.2 – Geotextile Roll Properties

PROPERTY	UNIT	VALUE[a,c]			TEST METHOD
		TYPE 1[d]	TYPE 2[e]	TYPE 3[f]	
Mass/Unit Area	oz/yd^2	6.0[b]	8.0[b]	10.0[b]	ASTM D5261
Grab Tensile Strength (50% Elongations)	lb	160	205	250	ASTM D4632
Trapezoidal Tear Strength	lb	60	80	100	ASTM D4533
Puncture Strength	lb	410	500	625	ASTM D6241
Permittivity	sec^{-1}	1.3	1.2	0.8	ASTM D4491

Apparent Opening Size (AOS)	US Standard Sieve	No. 70 sieve or smaller opening	No. 80 sieve or smaller opening	No. 100 sieve or smaller opening	ASTM D4751
UV Resistance (500 hours)	% strength retained	70	70	70	ASTM D4355

[a]All values are minimum average values, except as noted.
[b]Nominal values.
[c]Out-of-range values shall be reviewed and can be approved by the CQA Consultant on a case-by-case basis.
[d]Type 1: Tencate Mirafi 160N, Propex Geotex 601, or equivalent (Drainage)
[e]Type 2: Tencate Mirafi 180N, Propex Geotex 801, or equivalent (Drainage, Separation)
[f]Type 3: Tencate Mirafi 1100N, Propex Geotex 1001, or equivalent (Drainage, Separation)

C. The geotextile shall be installed at the locations and to the dimensions shown on the Drawings or as directed by the Engineer. Geotextile shall be installed as recommended by the manufacturer for the specific use or purpose intended, or as otherwise approved by the Engineer.

D. The Engineer reserves the right to reject any geotextile which he deems unsatisfactory for a specific use. The brand name shall be labeled on the geotextile or the geotextile container. Geotextiles which are susceptible to damage from sunlight or heat shall be so identified by suitable warning information on the packaging material. Geotextiles susceptible to sunlight damage shall not be used in any installations where exposure to light will exceed 30 days, unless specifically authorized in writing by the Engineer.

E. Provide complete rolls of geotextile as furnished by the Manufacturer and protect against damage and deterioration. Store all geotextile rolls in a dry place and off the ground at all times according to ASTM D4873. Cover all rolls or partial rolls with a dark protective cover when received at the project site. The geotextile will be rejected for use if the Engineer determines it has defects, deteriorations, or has been damaged.

F. The Contractor may use field seam stitching equipment that provides an acceptable lock-type stitch as recommended by the geotextile manufacturer and approved by the Engineer. Alternatively, adjacent geotextile panels may be overlapped at least 24 inches or as shown on the Drawings or requested by the Engineer.

G. Traffic or construction equipment shall not be placed directly on the geotextile unless approved by the Engineer. When placed for construction, cover the geotextile with specified cover material as soon as possible. The Contractor shall not leave the geotextile uncovered for more than 3 days except when used with temporary retained earth walls and asphalt overlays.

H. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted. The Contractor shall use a minimum 6-inch thick cover

layer or twice the maximum aggregate size, whichever is thicker. End-dumping cover material directly on the geotextile shall not be permitted.

I. The Contractor shall limit construction vehicles in size and weight so rutting in the initial layer above the geotextile is not more than 3-inch deep or 1/2 the layer thickness, whichever is less. Turning of vehicles on the first layer shall not be permitted.

PART 3 EXECUTION

3.5 GENERAL EXCAVATION

A. Confirm procedures with Appendix A – Geotechnical Reports as listed under Subsection 1.2 of this Specification.

B. Earth shall consist of all materials not classified as Rock in Subsection 3.7 (A) of this Specification. The Contractor shall perform all excavations for graded areas, the trenches and appurtenant structures of every description and of whatever substances encountered, to the widths and depths indicated on the Drawings and as otherwise specified by the Engineer.

C. During excavations, material determined by the Engineer to be suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the excavation to avoid overloading and to prevent slides or cave-ins, but within the limits of construction activities.

D. All excavated materials not required or suitable for backfill shall be removed and legally disposed of off-site. Care shall be taken not to over excavate below the depths indicated unless otherwise authorized by the Engineer. Unauthorized over excavations shall be backfilled at the Contractor's expense with approved granular fill material and shall be compacted to not less than 95 percent of maximum density as defined herein.

E. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods.

F. Unless otherwise specified, excavation shall be open cut except that short sections of a trench may be tunneled if, in the opinion of the Engineer, the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.

G. Bottoms of excavations shall be protected from frost. Pipe, structures, or concrete shall not be placed on frozen ground.

3.2 STRUCTURE EXCAVATIONS

A. The areas to be occupied by structures shall be cleared of all natural obstructions and other items which will interfere with the construction operations. The excavations shall conform to the dimensions and elevations indicated on the Drawings for the structures, and shall include trenching for utility and drainage systems.

B. Excavations shall extend a sufficient distance from walls to allow for placing and removal of forms, installation of utilities and for inspection.

C. Where muck, peat, organic material or other wet or unsuitable material underlies the structure, such material shall be removed and shall be replaced with compacted structural fill as directed by the Engineer.

D. Excavation below elevations shown that has not been directed by the Engineer shall be considered as unauthorized and shall be filled with compacted structural fill or concrete at the expense of the Contractor.

E. If rock is encountered at part of the bottom of the excavation for gravel bedding for structures, the rock shall be over excavated approximately one foot over the whole structure area and replaced with compacted gravel bedding to the elevation of the bottom of the footing or bearing as per Subsection 2.3 (A) in this Specification.

3.3 TRENCH EXCAVATIONS

A. Trenches shall be excavated by open cut except in reaches where sheeting and shoring may be necessary for protection of the work and for the safety of personnel.

B. The width of the trench at a point 12 inches above the top of pipe shall be such that the clear space between the barrel of the pipe and the trench shall be carefully maintained to control the loads imposed on the pipe by the backfill.

C. Maximum allowable trench width shall be 3 feet for pipes 15 inches or less in diameter and the outside diameter plus 2 feet for larger pipes. Should the trench be made wider than these limits, the Contractor shall provide alternate methods of assuring proper field strength of pipe, by substitution of higher class pipe or by use of concrete cradle or encasement.

D. The width of the trench greater than 12 inches above the pipe may be as wide as necessary for sheeting and bracing and the proper performance of the work.

E. Elevations of pipes shown on the Drawings are invert elevations, unless designated otherwise. The bottom of the trench shall be excavated to a minimum

depth of 6-inches below the bottom of the pipe and shall be backfilled as specified under Subsection 3.12. Rock, if encountered, shall be excavated to a minimum depth of 6-inches below the bottom of the pipe as specified in Subsection 3.10.

F. When wet or otherwise, unstable soil that is incapable of properly supporting the pipe, as determined by the Engineer, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled with screened gravel, crushed stone or filter gravel as directed by the Engineer.

3.4 EXTRA EXCAVATION

A. Whenever soil that is incapable of properly supporting the pipe or structure, or fine sand or silt, which may work into the bedding material, is encountered below a depth of 6 inches below the bottom of the pipe barrel or below the bottom of a structure, as determined by the Engineer, such soil shall be removed to the full width of the trench and refilled with filter gravel, screened gravel, crushed stone or sand bedding at the Engineer's option, placed in 8-inch lifts and thoroughly compacted. Unsuitable material shall be excavated to its full depth or as ordered by the Engineer.

B. No excavation shall be made below the limits of the excavation called for on the Drawings or herein specified without prior approval by the Engineer in writing. If the Contractor excavates below grade through error, for his own convenience or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade in which case the work of excavating below grade and furnishing and placing the refill shall be performed at his own expense.

C. Whatever the nature of unsuitable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

D. Where fine sand and silt are encountered at the bottom of the trench, it shall be the option of the Engineer to require a 6-inch compacted depth of sand bedding as per Subsection 2.3 (B) meeting ASTM C33 for fine aggregate to be installed beneath the pipe bedding to the full width of trench.

3.5 EXCAVATION NEAR EXISTING STRUCTURES AND UTILITIES

A. It is called to the attention of the Contractor that there may be above- and below-ground utilities along the course of the work. Information shown on the Drawings as to location is from best available sources, but no guarantee is inherent or to be assumed that such information is accurate or complete.

B. The Contractor shall exercise special care during his operations to avoid injury to aboveground and underground utilities and structures. The Contractor shall cooperate with, and consult with representatives of the utility companies in order to avoid damage to the pipes and structures.

C. The Contractor shall furnish and erect suitable supports and shoring or other means of protection, all at his own expense, where required. Hand methods of excavating shall be used around buried utilities and included in the work to be done under this Contract, at no additional cost to the Owner.

3.6 PAVEMENT REMOVAL

A. The Contractor shall remove only as much existing pavement as necessary to do the work. Where excavations are to be made in paved surfaces, the Contractor shall cut the pavement ahead of the excavation before breaking it with pavement-breaking apparatus.

B. All pavement shall be cut with saws or pneumatic tools. Cutting and removal shall be done so as to produce relatively clean, uniform, vertical edges without damage to the remaining pavement.

C. Pavement removed shall not be mixed with other excavated material, but shall be disposed of away from the site of the work.

3.7 ROCK EXCAVATION

A. Excavation techniques will vary based on the weathering of the materials, fracturing and jointing in the rock, and the overall stratigraphy of the feature. Actual field conditions in the region typically display a gradual weathering progression with poorly defined and uneven boundaries between layers of different materials from soil, to partially weathered rock (PWR), to rock. Rock shall be defined as follows:

3. General Excavation: Any material occupying an original volume of more than 1 cubic yard which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a minimum draw bar pull rating of not less than 80,000 lbs. usable pull (Caterpillar D-8 or larger), and that requires explosives, wedging or impact hamer removal.

4. Trench Excavation: Any material occupying an original volume of more than 1/2 cubic yard which cannot be excavated with a backhoe having a bucket curling force rated at not less than 40,000 lbs., using a rock bucket and rock teeth (John Deere 790 or larger), and that requires explosives, wedging or impact hamer removal.

B. Rock excavation shall be completed in accordance with Specification Section 02227 – Rock Removal-Blasting.

3.8 MAINTENANCE OF EXCAVATION

A. Support of Excavation

1. The Contractor shall be fully responsible for providing adequate support and protection of excavations, slopes, and earthbanks to prevent cave-ins, to protect persons and adjacent construction, and to permit proper execution of the work.

2. Where such support requires shoring, sheeting or bracing, the work shall be as specified in Section 02160 – Support of Excavation.

B. Surface Water Control

1. Surface water control shall be maintained to prevent accumulation of water in footing, water storage tank foundation slab or trench excavations. Standing water in footing and trench excavation shall be removed promptly. Soil softened by the water shall be removed, and the Engineer or his representative shall re-examine the area.

2. The subgrade of any structure foundation or water storage tank shall be evaluated by the Engineer or his representative prior to concrete placement.

3.9 FILL AND BACKFILL FOR STRUCTURES AND GRADING

A. Before placing any fill, the areas to receive the fill shall be stripped and excavated as specified herein. Fill and backfill materials shall be classified as specified in Part 2 and herein, and shall be placed and thoroughly compacted to conform to the lines, elevations and cross sections indicated on the Drawings or as otherwise required to complete the work satisfactorily. Careful quality control and testing shall be exercised during the placement of the compacted backfill. Particular attention shall be given to adjusting the moisture content of the backfill material so that it is as near as possible to the optimum value, since small variations in the moisture content will produce major variations in the amount of compaction achieved and in the amount of compactive effort required. Special attention shall be given to compaction at the inside edge of ringwalls of water storage tanks.

B. No fill or backfill material shall be placed adjacent to concrete that is less than 7 days old.

C. The Contractor shall submit for approval, to the Engineer, at least 7 days prior to anticipated use analyses and representative samples of material to be used. The samples of material will be examined, and if considered necessary, will be tested to

determine if the materials meet specified requirements. All materials shall be approved by the Engineer before use.

D. Placement of Structural Fill and Common Fill

1. Structural and common fill material, conforming to the requirements of Part 2 shall be placed in horizontal layers not exceeding 8 inches in loose thickness to the limits as shown on the Drawings. After spreading and prior to compaction, all stones larger than 4 inches shall be removed from the fill material for structural fill and 6 inches for common fill.

2. No fill material shall be placed on a surface of frozen material nor shall snow, ice or frozen earth be incorporated in the fill. Fill material shall not be placed on material which, in the opinion of the Engineer, has been affected by frost or moisture.

3. No fill material shall be placed on muck, peat or organic material.

4. Each lift shall be compacted by a minimum of 4 coverages of a sheepsfoot roller (CAT 815 or larger equivalent) or a smooth steel drum vibratory compactor weighing at least 2,000 pounds unless other equipment is approved by the Engineer. Additional coverages shall be performed, if required, to achieve the required density as defined by ASTM-D698. The compaction equipment shall be operated at a maximum speed of two miles per hour.

5. Structural fill placed under water storage tanks shall be placed to at least 98% of the maximum dry density and at +/- 3% from the optimum moisture content as determined in accordance with the Standard Proctor (ASTM D698).

6. Common fill and structural fill outside water storage tanks shall be compacted in maximum 8-inch thick, loose lifts to at least 95% of the maximum dry density and at +/- 3% from the optimum moisture content as determined in accordance with the Standard Proctor (ASTM D698).

7. No fill or concrete shall be placed until the surface against which it is to be placed has been observed by the Engineer.

8. Where equipment clearances or the protection of structures does not permit compaction with the normal compaction equipment, the fill material shall be compacted with heavy duty power tampers, and/or vibratory compactors, approved by the Engineer. Fill materials compacted with such equipment must satisfy the minimum compaction requirements specified.

E. Placement of Backfill for Structures

1. Filling shall consist of placing structural fill materials to provide foundation bedding and to refill excavations for footings, foundation walls and floor slabs. The material used for fill shall be as specified in Part 2 for the particular use intended and shall be approved by the Engineer before use.

2. No fill material shall be placed on a surface of frozen material nor shall snow, ice or frozen earth be incorporated in the fill material.

3. Backfilling shall be performed after the permanent work in the excavation has been inspected and approved and after all forms have been removed and the excavation cleaned of loose soil, trash and debris. Excavated material approved by the Engineer or approved structural or common fill as specified in Part 2 shall be used for backfill around structures.

4. The backfill shall be thoroughly compacted in 8 inch lifts, or greater at the discretion of the Engineer. Structural fill backfill shall be placed as specified below.

5. Gravel bedding shall be placed 12 inches beyond the widths of a utility structure foundation (base) and to a depth of 12 inches from the bottom of the excavation to the bottom of the foundation base, except that in ledge, depth shall be 6 inches below bottom.

3.10 BACKFILL FOR TRENCHES

A. Backfill for trenches shall be carried out as soon as practicable after the pipes have been placed, jointed, and examined by the Engineer.

B. Approval for backfilling may be given by the Engineer, but unsatisfactory or unapproved materials shall be replaced by the Contractor at his own expense if later tests show defects.

C. The bottom of the trench shall be backfilled and thoroughly compacted from 6 inches below the pipe to the centerline of the pipe with gravel bedding to form a bed for the pipe and to the full width of the trenches. The bed shall be formed so that at least the lower half of the pipe shall rest firmly for the full length of the barrel except at the joints which shall be back filled and tamped when the joint is completed and pipe set to final grade. The space between the pipe and the sides of the trench shall be packed full and tamped. The filling shall be carried up evenly on both sides, care being taken not to disturb the pipe. While this part of the backfilling is being done, at least one man tamping shall be provided for each man shoveling backfill material into the trench. This material shall be placed in 8 inch layers and thoroughly compacted.

D. Where ledge and boulders have been removed, the Contractor shall furnish and place gravel bedding or gravel, as directed, at no additional expense to the Owner in the same manner as above.

E. Placement of Backfill above Gravel Bedding

1. From the centerline of the pipe to a point 12 inches above the top of the

pipe sand bedding material shall be placed by hand and hand tamped. Above this point, backfill shall be common fill material from excavation or, if ordered, from off site, all as specified under Part 2. This backfill shall be placed in layers 12 inches deep or greater at the discretion of the Engineer and each layer shall be thoroughly compacted with mechanical tampers to the satisfaction of the Engineer. This backfill shall be carried up to the bottom of materials specified to be placed for surfacing requirements.

2. In areas where the finished surface is to be loam, the Contractor shall complete the backfilling with the respective specified material to thoroughly compacted depths to the bottom of the loam layer.

3. In areas where the finished surface is to be paved, the Contractor shall install and thoroughly compact 18 inches of gravel base course material to a depth below the finished surface as required to allow for the pavement depth. Paving shall be as shown on the Drawings.

F. Where the existing ground surface does not permit at least 4 feet of cover over the finished pipe, and as indicated on the Drawings, the Contractor shall place and thoroughly compact fill material to the depth necessary to provide the 4 foot minimum cover, including allowance for loam and minimum width at top of mound of 6 feet or as otherwise shown on the Drawings or as requested by the Engineer. Minimum side slopes shall be two horizontal to one vertical, and the Contractor shall provide for drainage of uphill side of embankments as indicated on the Drawings. Fill material shall be clean, dry common fill or gravel capable of satisfactory compaction, all as approved by the Engineer, and shall be placed in layers not exceeding 12 inches thick and compacted.

G. The trench shall be excavated in the compacted fill and the remainder of the work shall be in accordance with the other portions of these specifications.

3.11 COMPACTION REQUIREMENTS AND TESTING

A. All backfill materials shall be thoroughly compacted by rolling, tamping or vibrating with approved mechanical or pneumatic compacting equipment so that pipe, structures, paving and other construction will not settle at the time of construction or in the future. The responsibility for thorough compaction is that of the Contractor irrespective of methods of backfill and depth of backfill layers placed.

B. All percentages of compaction specified herein shall be of the maximum dry density within 3% from the optimum moisture content as established by ASTM D698 and verified by ASTM D1556 (Sand Cone) or ASTM D2937 (Drive Cylinder). When the term "thoroughly compacted" is used in these specifications, it shall mean compaction to at least 95% for common fill and structural fill outside

water tank storage areas, and 98% for structural fill under water storage tanks at +/- 3% from the optimum moisture content.

C. The following numbers and types of soil tests shall be made where directed by the Engineer. These tests shall be made by qualified personnel of an independent testing laboratory, acceptable to the Engineer and paid by the Contractor. The testing laboratory shall deliver directly to the Engineer three copies of all test results.

1. Particle-Size analysis of Soils and Backfill Materials in accordance with ASTM D422. A minimum of 2 tests of each type of fill material used, samples to be obtained after placement in the work.

2. Moisture-Density Relationship of soil in accordance with ASTM D698. A minimum of one test for each different gradation of fill.

3. In-Place Density Tests of materials in accordance with ASTM D1556 or D2937. A minimum of one test shall be performed per 1500 yd^3 of fill in open areas and 200 yd^3 in trenches or one per lift, whichever comes first. Tests shall be taken at random on compaction layers below and at finished surfaces as the work is performed.

4. Failed tests shall be repeated at the Contractor's expense.

D. The Owner reserves the right to have additional compaction tests performed by an independent laboratory with testing costs borne by the Owner, except that failed tests shall be repeated at the Contractor's expense.

E. If any of the field density test results fail to meet the density as specified herein for the earthwork involved, then the Contractor shall remove all of the earthwork in that portion of the work involved as determined by the Engineer, and shall replace it in accordance with these specifications to the required density. After the work is replaced, additional field density tests will be made by an independent testing laboratory retained by the Owner, and the Contractor shall reimburse the Owner for all costs for such additional testing.

3.13 DISPOSAL OF SURPLUS AND UNSUITABLE MATERIALS

A. Materials excavated or stripped during earthwork which are unsuitable for fill and backfill shall be removed from the site and legally disposed of off the Owner's property. The Engineer shall be notified before removal of unsuitable material.

B. Surplus excavated materials shall be removed from the site and properly disposed of after approval is given by the Engineer.

C. The Contractor shall not dispose of surplus or unsuitable materials on wetlands or other areas prohibited by the Corps of Engineers, the State, the local Conservation Commission, or any other government agency having jurisdiction in such matters.

3.14 DUST LAYING AND CONTROL

A. The Contractor shall perform dust control operations during excavation and fill placement activities acceptable to the Engineer.

3.15 CLEARING AND GRUBBING

A. Clearing and Grubbing shall be performed in accordance with Specification Section 020110 – Clearing and Grubbing.

3.16 SAFETY AND ACCOMMODATION

A. The Contractor shall provide, at his own expense, suitable bridges over trenches where required for the accommodation and safety of the traveling public, and provide facilities for access to private driveways for vehicular use. He shall erect suitable barriers around the excavation to prevent accidents to the public and shall place and maintain during the night sufficient lights on or near the work.

B. A space of twenty (20) feet must be left so that free access may be had at all times to fire hydrants and proper precautions shall be taken so that the entrances to fire hydrants and fire stations shall not be blocked or obstructed.

END OF SECTION

SECTION 02210
SITE GRADING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as required by the Contract Documents.

1.2 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1. Section 02110 – Clearing and Grubbing
2. Section 02200 - Earthwork.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

PART 2 MATERIALS

2.1 SOIL

A. Fill Material

1. The soil to be used for grading shall be obtained from the site cuts or a designated borrow area on the site.
2. Do not permit rocks having a dimension greater than 6 inches in the upper 12 inches of fill or embankment.

2.2 TOPSOIL

A. Where shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 2 inches in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.

B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.3 STRUCTURAL AND COMMON FILL

A. Structural fill and common fill shall meet the requirements of Specification Section 02200.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

A. The Contractor shall grade the site to the elevations and lines shown on the Drawings.

3.3 PROCEDURES

A. Utilities

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.

2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.

3. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer.

4. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.

2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Dewatering

1. Remove all water, including rain water, encountered during trench and substructure work to an approved location by pumps, drains and other approved methods.

2. Keep excavations and site construction area free from water.

D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

A. Perform excavating within the limits of the Work to the lines, grades, and elevations shown on the Drawings and specified herein.

B. Satisfactory excavated materials:

1. Transport to, and place in, fill or embankment areas within the limits of the Work.

C. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

D. Ditches and gutters:

1. Cut accurately to the cross sections, grades and elevations shown.

2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the Work.

3. Dispose of excavated materials as shown on the Drawings or directed by the Engineer.

E. Unauthorized excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Engineer.

F. Ground surface preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from the ground surface prior to placement of fills.

2. Plow, strip, or break up surfaces steeper than one vertical to four horizontal, so that fill material will bond with existing services.

3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

4. At exposed soils in areas to be paved, scarify to a minimum depth of 6 inches, and recompact at a moisture content that will permit proper compaction as specified from fill.

3.5 GRADING

A. General

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.

2. Smooth the finished surfaces within specified tolerance.

3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.

4. Where a change of slope is indicated on the Drawings, construct a rolled transition section with a minimum radius of approximately 8 feet, unless adjacent construction will not permit such a transition or if such a transition defeats positive control of drainage.

B. Grading outside building lines:

1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.

2. Finish the surfaces to be free from irregular surface changes, and:

a. Shape the surface of areas scheduled to be under walks to line, grade and cross-section, with finished surface not more than 0.10 feet above or below the required subgrade elevation.

b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 feet above or below the required subgrade elevation.

3.6 COMPACTING

A. Control soil compaction during construction to provide the minimum percentage of density and moisture content specified for each area.

B. Compaction density and moisture content shall meet the requirements of ASTM D698 and Specification 02200 – Earthwork, Subsection 3.11.

C. Moisture control:

1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

3.7 FIELD QUALITY CONTROL

A. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing under the provisions of Section 02200.

3.8 MAINTENANCE

A. Protection of newly graded areas:

1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

3.9 TANK SUBGRADE PROTECTION

A. The on-site soils may be frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade soils from freezing. Such measures should include the use of heat blankets or excavating the final 6 inches just before pouring concrete. Footings should be backfilled with soil as soon as possible after footing construction. Soil used as fill should be free from frozen material, as should the ground on which it is placed.

B. The on-site soils may be sensitive to moisture content variations. This general sensitivity to water may influence construction, since subgrade support capacities may deteriorate when this soil becomes wet and/or disturbed. The Contractor shall keep exposed subgrades properly drained and free of ponded water. This may be achieved by sloping the site topography adjacent to the construction to direct the water away from the excavation, by trenching and berming to collect the excess run-off, or by other means.

C. The Contractor should not place concrete on disturbed subgrades. If the subgrade soils are wet, machine or foot traffic should be reduced or eliminated to lessen disturbance of the subgrade.

END OF SECTION

SECTION 02227
ROCK REMOVAL-BLASTING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Remove all rock encountered while excavating for structures, utility trenches as required by the Contract Documents.

1.2 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily General Conditions, Supplementary Conditions and Sections in Division 1 specifications.

1. Section 02200 - Earthwork

1.3 DEFINITIONS

A. Rock excavation shall be defined as per Specification Section 02200, Subsection 3.7.

1.4 STANDARDS

A. All handling of explosives and blasting shall be in compliance with Georgia Rules and Regulations for Explosives and Blasting Agents promulgated and adopted by the Georgia Safety Fire Commissioner as contemplated by and pursuant to authority set forth in O.C.G.A. Sections 25-2-4, 25-2-17, and 25-8-9.

1.5 QUALITY ASSURANCE.

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced the necessary crafts and who are completely familiar with the specified required the methods needed for proper performance of the work of this section.

B. Comply with all pertinent requirements of governmental agencies having jurisdiction

1.6 SUBMITTALS

A. Submit plans for proposed pre-blast survey (Record purposes only).

B. Submit Copy of Blasting Licenses and Permits

C. Submit Conceptual Blasting Plan at least 30 days prior to start of blasting including but not limited to:

General blasting methods that are expected to be used for rock excavation
Description of blasting techniques as well as techniques to control noise, blasting vibrations, air-overpressures, and fly rock. Include detailed specifications of blasting mats and how they will be safely placed to cover all blasts.

Blast monitoring plan to monitor peak ground vibration and air-overpressure. Minimum trigger levels for monitoring shall be 0.05 in/s for ground motion and 120 dB for air-overpressure. Trigger levels may be adjusted to higher levels if authorized by Owners' representative.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.6 NOTIFICATION

A. When rock is encountered, it shall be uncovered and the Engineer notified.

1. The Contractor shall provide the Engineer with cross sections of the rock surface or a profile of the rock where trenches are concerned.

2. The Engineer shall be present when the cross sections or profiles are taken.

3. The average end area method shall be used in computing the volumes wherever practicable.

3.7 LIMITS OF EXCAVATION IN ROCK

A. Excavation in rock shall be performed, so that no projection shall come within vertical planes twelve (12) inches outside of the structure being built or twelve (12) inches below the bottom of the structure base slab and footings.

B. In trenches, the rock shall be removed to the limits shown on the typical trench section.

1. Where excavation is carried beyond the above determined limits, the additional space shall be refilled at the Contractor's expense with concrete or other specified materials as per Specification Section 02200 - Earthwork.

3.8 BLASTING

A. All Blasters-in-charge shall be properly licensed and have a minimum of ten years of construction blasting experience at projects with similar scope and complexity. All blasting plans, test blasting plans and revisions shall be prepared by or reviewed by and covered with a signed review letter by the blasting consultant. The blasting consultant will not be required to sign the individual blast plans provided they are signed by an on-site licensed blaster. The Blasting Consultant must not be an employee of any Contractors or associated companies of Contractors involved in the work.

B. Pre-Blast Survey: Prior to any blasting, the Contractor shall submit a pre-blast survey. The independent professional performing the pre-blast condition surveys shall have at least 5 years of documented experience in performing surveys of structures similar to those that may be impacted by the blasting activities including but not limited to residential, light and heavy civil structures. The survey professional must also be a completely independent third party who is not be an employee of the Contractor, associated companies, or any suppliers to the work.

1. The survey shall satisfy the insurance requirements of the Contractor and be acceptable to the Contractor's insurance carrier, as well as provide data to assess damages to personal property and real estate due to blasting operations.

2. The survey shall be complete as warranted by the nature of the work.

C. When explosives are delivered to the work sites, they must not be unloaded from delivery vehicles until a responsible blaster-in-charge has signed the delivery paperwork and assumes full authority and responsibility for the security of the explosive materials. Unused explosive materials must be similarly signed over to a properly licensed driver with a Commercial Drivers' License with a Hazmat endorsement before explosive materials are loaded onto a fully-DOT-compliant vehicle for removal from the site.

D. Take all precautions necessary to warn and/or protect any individuals exposed to his operations. Such precautions shall include but not be restricted to the following:

1. Present written certificate of insurance showing evidence that his insurance includes coverage for blasting operations, before doing any blasting work.

2. Make necessary arrangements as may be required by the applicable Federal,

State, County or Municipal codes, rules, regulations and laws, and shall be responsible for compliance.

3. Obtain a permit from the local authorities to perform blasting operations.
   iii. The Engineer shall be notified in writing that such permit has been obtained.
4. Schedules for blasting shall be thoroughly coordinated with the proper authorities – Federal, State and Local.
   a. No blasting shall be done unless the Contractor has notified all concerned parties that he may blast.
   b. The Contractor shall also notify any commercial installation in the immediate area whose operations or instrumentation may be affected by blasting, at least twenty four (24) hours prior to blasting operations.
5. Seismographic recordings shall be made of all blasting operations on the project by a qualified testing agency hired and coordinated by the Contractor.

   a. A copy of these recordings shall be made available to the Engineer.
   b. The Contractor shall provide a minimum of six seismographs for monitoring peak ground vibration and air-overpressure at any given time during blasting. The equipment and its use shall conform fully to the standards developed by the Vibration Section of the International Society of Explosive Engineers (ISEE).
   c. The Peak Particle Velocity (PPV) limits shall not exceed:
      i. 5.0 in/s at ground above buried utilities
      ii. 0.5 in/s at residential structures
      iii. 2.0 in/s at buildings and facilities
   d. The maximum charge-per-delay for all blasts shall not exceed 100 pounds.
   e. Intensity of air-overpressure at any off-site structures shall not exceed 133 decibels (0.01295 psi)

6. Blasting shall be performed by persons who are licensed to use explosives.

7. The Contractor shall keep an accurate record of each blast and submit a copy to the Engineer. The record shall show the date, time, exact stationing of the blast, the depth and number of drill holes, and kind and quantity of explosive used, peak particle velocity, air-overpressure and any other data required for a complete record.

8. The Contractor shall be fully responsible for damages caused by his blasting operations.

9. At the start of blasting, perform at least two test blasts to establish that rock movement is adequately controlled and intensities of specified ground motion and air-overpressure are in conformance with specified levels. The scaled distance to the nearest residential property for the test blast must be 75 or greater.

10. If rock below the limits of excavation is shattered by blasting, caused by holes drilled to deep, too heavy a charge of explosives or any other circumstance due to blasting, the shattered rock shall be removed and the void refilled with gravel borrow (gravel bedding, screened gravel, crushed stone or filter gravel) at the expense of the Contractor.

    a. Gravel borrow shall be as specified in Section 02200 - Earthwork.

3.9 DISPOSAL AND REPLACING OF ROCK

A. Remove and dispose of all pieces of rock which are not suitable for use in other parts of the Work.

    1. Rock disposed of by hauling away to spoil areas shall be replaced by surplus excavation obtained elsewhere on the site, insofar as it is available.

B. Fragments of rock approximately twenty five (25) pounds or less may be used in the common fill areas of the site (roadway areas and under water storage tanks excluded) as approved by the Engineer.

    1. The Contractor shall place these pieces of rock in thin layers alternating them with layers of earth to be sure that all voids between the rocks are completely filled with earth.
    2. If in the opinion of the Engineer the quantity is excessive, he may order the removal and disposal of the rock.

C. Be responsible for obtaining spoil locations and the removal of all excess rock from the site.

END OF SECTION

SECTION 02640
BURIED VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide buried valves, valve boxes, and valve accessories, as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to,
General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications
1. Section 02160 Support of Excavation
2. Section 02200 Earthwork
3. Section 15062 Ductile Iron Pipe and Fittings

1.03 RELATED WORK

A. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. An exploded view diagram with a materials list.

1.04 STANDARDS

A. The following American Water Works Association (AWWA) standards form a part of this specification as referenced:
1. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service,
2. AWWA C504 Rubber-Seated Butterfly Valves.

PART 2 MATERIALS

2.01 VALVES

A. Resilient Seated Gate Valves:

1. Valves shall be as manufactured by Kennedy Valve, M&H Valve, Mueller, Clow Corporation, or approved equal.
2. Meet or exceed the requirements of ANSI/AWWA C509,
3. Joints: Mechanical joint conforming to ANSI/AWWA C111/A21.11,
4. Cast iron body,
5. Bronze stem,
6. Resilient sealed wedge type:
   a. Wedge: Fully encapsulated; no exposed iron, 7. Triple O-ring seal stuffing box,
8. Non rising stem,
9. Two (2) inch11 square operating nut,
10. Rated for a working pressure of 200 psi and tested to 500 psi,
11. Open right, clockwise
12. Gate valves will be equipped with mechanical joints and retainer glands, unless otherwise specified.
13. All internal and external surfaces except rubber coatings shall be coated with fusion bonded epoxy to a minimum thickness of 8 mils:
    a. Coating shall be non-toxic, impart no taste to water and shall conform to AWWA C-550.

B. Butterfly Valves:

a. General

1) Unless otherwise shown or specified, resilient seated butterfly valves for water or air service shall be of the tight-closing type and shall conform in all respects to the applicable material and dimensional requirements of AWWA C504(Class 150B). Conforms to ANSI/NSF 61. Butterfly valves shall be drip-tight and bubble-tight at rated differential pressure across the valve in both directions. Butterfly valves shall operate from fully open to fully closed with a 90-degree rotation of the valve stem. Valves shall be designed for a minimum working pressure of 150 PSI. Where the valve is installed adjacent to a fitting, flow meter, another valve, or similar items, a spool piece or adapter coupling shall be furnished as a spacer so that valve disc does not interfere with operation of the adjacent meter or valve or contact cement linings on pipe or fittings. Resilient seated butterfly valves shall be DeZurik BAW, Kennedy Valve, M&H Valve Company or approved equivalent.

b. Valve Body

1) Valve bodies shall be of ductile iron per ASTM A126 Class B. Flange end valves shall be of the short body design with 125 lb. flanged ends faced and drilled per ANSI B16.1 standard for cast

iron flanges. Mechanical Joint end valves shall meet the requirements of AWWA C111/ANSI 21.11.

c. Valve Disc and Shaft

1) Discs shall be offset to provide an uninterrupted 360 degree seating edge and shall be ductile iron per ASTM A48, Class 40C. The disc seating edge shall be solid 316 stainless steel. . The disc shall be securely attached to the valve shaft using 304 stainless steel. The disc shall be securely attached to the valve shaft using 304 stainless steel taper pins. Discs structures containing hollow cavities are not acceptable.

Valve shaft shall be type 304 stainless steel. Valve shaft seals shall be self-compensating V-type packing with a minimum of four sealing rings. One-piece molded shaft seals and o-ring shaft seals are not acceptable.

d. Valve Bearings and Packing

1) Valve shaft bearings shall be non-metallic and permanently lubricated.

e. Valve Seats

1) The seat shall be of Buna-N for water, or as required for other services, and shall be molded in and vulcanized to the valve body. The seat shall contain an integral shaft seal protecting the valve bearings and packing from any line debris. Seats vulcanized to cartridge inserts in the valve body and seats on the disc are not acceptable.

f. Suitable for direct bury when required.

g. Valve Operator

1) Butterfly valves shall be furnished with Rotork IQ3 Electric Motor operators as shown on the Drawings or specified herein.

2.02 VALVE BOXES

A. Valve boxes shall be provided for each buried valve. They shall be:

1. Domestic manufacture,
2. Telescopic in design with a two piece, sliding construction, a top with a cover and a bottom.
3. Heavy Pattern Cast iron with a cast iron covers of at least six (6) inches in diameter,

4. Cover shall have the word "WATER" and an arrow indicating the direction of opening cast into the cover in raised letters,
5. Valve box barrel shall not be less than (5-¼) inches in diameter,
6. Shall be two (2) pieces sliding type, providing a minimum overlap of six (6) inches, top shall be 24" bottom shall be 36".
7. The lower section shall enclose the operating nut and stuffing box/gear box of the valve and shall have a minimum diameter of 8 inches,
8. The box shall not transmit shock or stress to the valve.
9. The box shall be manufactured by Buffalo Pipe and Foundry, Mueller Company, J.B. Clow & Sons, Bingham & Taylor, Inc., or equal.

2.03 VALVE ACTUATORS

A. Provide lever or wrench actuators for exposed valves 6 inches and smaller. For larger valves, provide handwheels.

B. Where manually operated valves (size 4 inches and larger) are installed with their centerlines more than 6 feet 9 inches above the floor, provide chainwheel and guide actuators.

C. Provide 2-inch AWWA operating nuts for buried and submerged valves.

D. Provide enclosed gear actuators on butterfly, ball, and plug valves 6 inches and larger, unless electric motorized valve actuators are shown in the drawings. Gear actuators for valves 6 through 20 inches shall be of the worm and gear, or of the traveling nut type. Gear actuators for valves 24 inches and larger shall be of the worm and gear types. Gear actuators for motorized valves shall be of the worm and gear type, regardless of size.

E. Design gear actuators assuming that the differential pressure across the plug, gate, or disc is equal to the pressure rating of the valve and assuming a fluid velocity of 16 fps for valves in liquid. Size actuators using a minimum safety factor of 1.5 for valves in open/close service and 2.0 in modulating service.

F. Gear actuators shall be enclosed, oil lubricated, with seals provided on shafts to prevent entry of dirt and water into the actuator. Gear actuators for valves located above ground or in vaults and structures shall have handwheels. The actuators for valves in exposed service shall contain a dial indicating the position of the valve disc or plug. Gear actuators for buried or submerged valves shall have 2-inch-square AWWA operating nuts.

G. For buried or submerged service or valves installed in buried vaults, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed actuators designed for buried or submerged service.

H. Traveling nut and worm and gear actuators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full differential pressure rating of the valve with a maximum pull of 40 pounds on the handwheel or crank. Provide stop limiting devices in the actuators in the open and closed positions. Actuators shall be of the self-locking type to prevent the disc or plug from creeping. Design actuator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel actuators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.

I. Handwheel diameters for traveling nut actuators shall not exceed 8 inches for valves 12 inches and smaller and shall not exceed 12 inches for valves 32 inches and smaller.

J. Self-locking worm gear shall be a one-piece design of gear bronze material (ASTMB427; or ASTM B84, Alloy C86200), accurately machine cut. Actuators for eccentric and lubricated plug valves may use ductile-iron gears provided the gearing is totally enclosed with spring-loaded rubber lip seals on the shafts. The worm shall be hardened alloy steel (ASTM A322, Grade G41500 or G41400; or ASTM A148, Grade 105-85), with thread ground and polished. Support worm-gear shaft at each end by ball or tapered roller bearings. The reduction gearing shall run in a proper lubricant. The handwheel diameter shall be no more than twice the radius of the gear sector in contact with the worm. Worm-gear actuators shall be Limitorque Model HBC, EIM Series W, or equal.

K. Design actuators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.

L. Valve actuators, handwheels, or levers shall open by turning counterclockwise.

2.04 EXTENSION STEMS FOR BURIED AND SUBMERGED VALVE ACTUATORS

A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Where the valve is submerged, provide operating extension stems to bring the operating nut to 6 inches above the water surface.
Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension

stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

B. Extension stem diameters shall be as tabulated below:

Valve Size(inches)	**Minimum Extension Stem Diameter(inches)**
48	*******

*****Confirm stem diameters with valve manufacturer.**

2.05 FLOOR STANDS, EXTENSION STEMS, AND EXTENSION STEM SUPPORT BRACKETS

A. When required by the installations, provide floor stands and extension stems for operation of valves. Floor stands shall be of the nonrising stem, indicating type, complete with steel extension stems, couplings, handwheels, stem guide brackets, and special yoke attachments as required by the valves and recommended and supplied by the stand manufacturer. Floor stands shall be cast-iron base type: Clow, Figure F-5515; Bingham and Taylor; Stockham; or equal. Handwheels shall turn counterclockwise to open the valves.

B. Provide Type 316 stainless steel anchor bolts.

C. Provide steel extension stems.

D. Provide adjustable stem guide brackets for extension stems. The bracket shall allow valve stems to be set over a range of 2 to 36 inches from walls. Provide bushings drilled to accept up to 2-inch-diameter stems. Base, arm, and clamp shall be ductile iron. Coat ductile iron components with fusion-bonded epoxy per Section 099761. Bushing shall be bronze (ASTM B584, Alloy C86400 or C83600). Bolts, nuts, screws, and washers (including wall anchor bolts) shall be Type 316 stainless steel. Provide slots in the bracket to accept 3/4-inch bolts for mounting the bracket to the wall. Products: Trumbull Industries, Inc., Adjustable Stem Guide or equal.

Extension Bonnet for Valve Operator: Complete with enclosed stem,extension, support brackets, and accessories for valve and operator.

1. Manufacturers and Products:
    a. Pratt.
    b. DeZurik.

PART 3 EXECUTION

3.01 HANDLING AND INSPECTION

A. Care shall be taken to prevent damage to valves, and appurtenances during handling and installation. All materials shall be carefully inspected for defects in workmanship and materials.

B. All operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves which do not operate easily or are otherwise defective shall be replaced at the Contractor's expense.

3.02 INSTALLATION

A. General:

1. Construction methods for the work under this Section shall conform to the applicable portions, Buried Ductile Iron Pipe and Fittings, details as shown on the Contract Drawings, manufacturer's recommended installation procedures, and procedures specified herein.

B. Valves and Appurtenances:

1. Generally, valves shall be set and aligned plumb, supported by a flat stone or solid concrete block, with the trench bottom being firmly compacted.
2. Valve boxes shall be set centered and plumb over the operating nuts of all, direct burial valves. The top of each valve box shall be set to finished grade with at least 10 inches of overlap remaining between the upper sections for future vertical adjustment. Minimum overlap for lower, extension pieces shall be 6 inches.
3. Valves, bolts and all other appurtenances shall be thoroughly cleaned and given a shop coat of asphalt varnish.
4. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

END OF SECTION

SECTION 02650
JOINT RESTRAINTS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide thrust blocks and joint restraints for the underground water mains as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications:
   1. Support of Excavation
   2. Section 02200 Earthwork
   3. Section 02640 Buried Valves and Appurtenances
   4. Section 15062 Buried Ductile Iron Pipe and Fittings

1.03 SUBMITTALS

A. Contractor to submit the following.
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed, to insure compliance with the specified requirements.

PART 2 MATERIALS

2.02 JOINT RESTRAINTS

A. Mechanical joint restraint shall be Megalug 1100 Series as manufactured by EBAA Iron Sales Inc., Eastland, Texas, or an approved equal
   1. Glands shall be manufactured of ductile iron conforming to ASTM A536.
   2. The wedges shall be ductile iron, heat treated to a minimum hardness of 370 BHN
   3. Shall have a minimum working pressure of 350 psi for pipe diameters up to 16 inches with a minimum safety factor of 2:1.
   4. Twist-off nuts.

2.03 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 JOINT RESTRAINTS

A. Mechanical joint restraint devices shall be installed manufacturer's written instructions.

B. Mechanical joint restraint devices or locking pipe pipe and all fittings as shown in the Drawings.

END OF SECTION

SECTION 02675
DISINFECTION OF WATER MAINS AND WATER STORAGE FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Disinfect water mains, and their appurtenances as required Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limit General Conditions, Supplementary Conditions and Sections in Division 1 of Specifications.
   1. Section 15062 Ductile Iron Pipe and Fittings
   2. Section 02676 Testing Piping Systems

1.03 SUBMITTALS

A. The Contractor shall submit plans of disinfection that outline the chemicals to be their strength, and the methods of application to be used for water mains.

B. Submit copies of the test results as specified herein.

1.04 STANDARDS

A. The following standards form a part of this specification as referenced:
   1. AWWA C651 Disinfecting Water Mains,
   2. AWWA C652 Disinfection of Water Storage Facilities

1.05 COSTS ASSOCIATED WITH TESTING

A. All costs associated with the testing of the potable water, as described in this Section shall be paid for by the Contractor.

PART 2 MATERIALS

2.01 CHLORINE

A. Form of chlorine for disinfecting solutions shall be calcium hypochlorite or hypochlorite and shall conform to the provisions of AWWA C651.

2.02 WATER SAMPLE BOTTLES

A. Sterile water sample bottles shall be obtained from an approved laboratory.
   1. Sterile bottles for bacteriologic analyses shall be treated with sodium thiosulfate.
   2. Two bacteriological samples are required at each sampling point, 1 coliform bacteria and 1 heterotrophic plate count (HPC).

PART 3 EXECUTION

3.01 WATER LINES

A. All water mains, valves, hydrants, hydrant connections, and other appurtenances built under this Contract shall, upon completion of all water supply related construction, except water service connections, be disinfected in accordance with AWWA Standard C651 as modified herein.
   1. Chlorine residual after 24 hours shall not be less than 10 mg/l.
   2. The location of the chlorination and sample points shall be determined by the Engineer in the field.
   3. Taps for chlorination and sampling shall be installed by the Contractor at no additional expense to the Owner. The Contractor shall uncover and backfill the taps as required.
   4. All mains shall be flushed prior to disinfecting.
   5. No site for flushing shall be used unless it has been determined to have adequate drainage.
   6. Hypochlorite solutions shall be applied to water mains with a gasoline or electrically-powered chemical feed pump designed for feeding chlorine solutions.
   7. Chlorine application shall be made by connection of the chemical feed pump to water main upstream from the new main.
   8. Hydrants shall not be used for chlorination or sampling points.
   9. The rate of chlorine solution application shall be proportioned so that chlorine concentration shall be a minimum 50 mg/l of available chlorine.
   10. In the absence of a meter, rate may be determined either by placing a pitot gage at discharge or by measuring time to fill a container of known volume.

11. The chlorine application shall not cease until the entire main is filled with chlorine solution, as indicated by the production of a red color when the orthotolidine reagent is added to the water discharging at the end of the main.
12. All valves and hydrants shall be operated to insure their proper disinfection.
13. During application of chlorine, all valves shall be manipulated to prevent super-chlorinated water from flowing into the existing distribution system.
14. After the 72-hour retention period, chlorinated water shall be flushed from every hydrant branch on the main until the chlorine concentration leaving the main is no higher than that generally in the system or less than 1.0 mg/l.
15. Chlorinated water being flushed from the mains shall be neutralized:

Residual Chlorine mg/l	Sodium Sulfite Lbs.	Sodium Thiosulfate Lbs.
1	1.4	1.2
2	2.9	2.4
10	14.6	12.0
50	73.0	60.0

The Contractor shall be responsible for the satisfactory disposal of chlorinated water discharged, in such a manner that will not adversely affect flora and fauna, drainage courses and shall conform to applicable State regulations for waste discharge, at no additional expense to Norwich Public Utilities.

3.02 WATER STORAGE FACILITIES

A. All surfaces of the water storage facilities and their appurtenances shall be disinfected in accordance with these specifications and the requirements of the State/County Department of Health, the Local Water Department and AWWA C652, as modified herein.
   1. All surfaces of the water storage facilities shall be cleaned thoroughly using a high pressure water jet, sweeping, scrubbing, or equally effective means.
   2. All water, dirt and debris accumulated in this cleaning operation shall be removed before disinfecting.
   3. Chlorination shall be by any of the three methods described in AWWA C652.
   4. The surfaces to be chlorinated shall be the floor and walls in the tank.

5. Chlorinated water shall be pumped out of the tank and disposed of as described in subsection 3.01 A (16).

3.03 TESTING

A. A minimum of 48 hours after flushing and before the system is placed in service, coliform samples shall be collected from the end of the water main and tested for bacteriologic quality.
   1. Coliform samples shall show the absence of coliform organisms.
   2. Unless otherwise specified, the Contractor, under the supervision of the Local Water Department/Company, shall take the samples and have the same tested by an approved laboratory
   3. If the number and frequency of samples is not prescribed by the public health authority having jurisdiction, at least one of each sample shall be collected from chlorinated supplies
   4. From un-chlorinated supplies, at least two of each sample shall be collected at least 24 hours apart.
   5. In the case of extremely long mains, samples will be collected along the length of the water main every 1,000 feet as well as its end.
   6. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulfate.
   7. No hose or fire hydrant shall be used in collection of samples.
   8. A suggested sampling tap consists of a standard corporation stop installed in the main with a PVC gooseneck assembly.
   9. After samples have been collected, the gooseneck assembly may be removed, and retained for future use.
   10. The water samples shall be taken and delivered to the laboratory by the Contractor.
   11. Results of the samples shall be mailed directly to the Engineer from the Laboratory.
   12. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. When the samples are satisfactory, and upon approval of the State/County Department of Health, the Local Water Department/Company, the system may be placed in service.

END OF SECTION

SECTION 02676
TESTING PIPING SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide pressure/leakage tests (of pipe, castings, fittings, valves and accessories) as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   1. Section 15062 Ductile Iron Pipe and Fittings
   2. Section 02675 Disinfection of Water Mains and Water Storage Facilities

1.03 STANDARDS

A. The following American Water Works Association Standard shall form a part of this specification as referenced:
   1. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances.

1.04 SUBMITTALS

A. Submit for acceptance a list of equipment and personnel to be used for the pressure test.

PART 2 PRODUCTS

2.01 WATER

A. The Owner shall furnish water free, for flushing and testing the water main, if hydrants or other connection points are convenient to the work. Otherwise, the Contractor shall be responsible for securing an acceptable potable water supply at no additional cost to the Owner.

PART 3 EXECUTION

3.01 TESTING

A. A formal pressure/leakage test shall be required of the water mains, valves and appurtenances in the system constructed.

1. The pressure/leakage test shall be conducted in accordance with these specifications and the applicable requirements of AWWA C600, Section 4.
2. Where any section of a water main is provided with concrete thrust blocks, the test shall not be made until at least 5 days have elapsed since the concrete was placed.
3. If high-early-strength cement is used in the concrete thrust blocks, the test shall not be made until at least 2 days have elapsed since the concrete was placed.
4. Prior to testing, the pipe line or section thereof, the section to be tested shall be thoroughly flushed, and all air expelled. All air shall be expelled by appropriate methods including the use of corporation stops installed by the Contractor, at no additional cost to the Owner, at high points along the water main.
5. After all the air has been expelled, and the corporation stops closed, the test pressure shall be applied by means of a pump connected to the pipe.
6. The pump, pipe connections, and all necessary apparatus including the gages, shall be furnished by the Contractor.
7. Unless otherwise specified the test pressure shall be 50 psi or 150 percent of the working pressure, whichever is greater, but in no case shall the pressure exceed 150 psi.
8. This pressure shall be maintained for 2 hours.
9. Any excessive indicated leakage, as determined by the pressure test, shall be located and repairs made. The total leakage from the pipeline or sections thereof shall not exceed the amount allowed by AWWA C600 Section 4.
10. Should the pipe line or sections thereof not come within the permissible leakage limits, the Contractor (at his own expense) shall be required to excavate and locate the source of leakage and make repairs.
11. After the Contractor has notified the Engineer that repairs have been made, the test shall be repeated until the pipeline or sections thereof are within the allowable leakage specified by AWWA C600 Section 4.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03000
REINFORCED CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

Concrete, forms, placing of sleeves, pipes, and anchor bolts, finishing, curing, and all equipment and incidentals necessary to do all the concrete work as shown on the drawings or specified.

1.02 REFERENCE STANDARDS

All work hereunder shall comply with the following except as called for otherwise herein:

A. ACI Standard 301- Latest Revision Specifications for Structural Concrete for Buildings.

B. ACI Standard 318 - Latest Revision Building Code Requirements for Reinforced Concrete.

C. ACI Standard 306R - Latest Revision Cold Weather Concreting.

D. ACI Standard 305R - Latest Revision Hot Weather Concreting.

E. ACI Standard 304R - Latest Revision Guide for Measuring, Mixing, Transporting and Placing Concrete.

1.03 SUBMITTALS

A. Shop Drawings: Submit complete Shop Drawings including:

1. Location of all proposed construction joints, keying, and water stops.

2. Location of all openings, depressions, construction and control joints, trenches, sleeves, inserts, and other items affecting the reinforcement and placing of concrete.

B. Product data: Submit complete product data on the following:

1. Complete materials list of items proposed to be furnished and installed under this section.

2. Complete information on cement source of supply, physical and chemical characteristics, transportation and intermediate terminating procedures for mill-to-site handling, and site storage procedures.

3. Complete information on aggregate procurement, processing, and storage.

4. Complete information on proposed batching and mixing equipment and procedures, including water chilling or other devices or systems to reduce mix temperatures.

5. Complete information on concrete handling equipment proposed to be used, including capacities, for chutes, pumps, tremies, buckets, and all other equipment.

6. Complete description of proposed curing materials and methods.

7. Complete mix designs.

8. Remolded joint filler.

9. Waterstops.

10. Wedge inserts.

11. Expansion bolts.

12. Anchor bolts.

13. Foundation bolts.

14. Admixtures.

15. Hardening and dust-proofing compounds.

16. Form ties.

17. Any gang forming information.

C. Do not begin concrete production until all products and mix designs have been reviewed and approved by the Engineer.

1.04 SUBMITTALS

The following classes of concrete are included in these specifications and shall be used where specified herein or called for on the plans:

	Class "A" Concrete	Class "B" Concrete
Cement content - Minimum number of sacks (94 lb.) per cubic yard	6	5
Maximum water to cement ratio (gal. Water per sack cement)	5.1	6.5
Entrained air	3% - 6%	3% - 6%
Minimum Superplasticizer content per 100 lbs. of cement	45 oz.	0 oz.
Minimum 7 day compressive strength	2,400 psi	1,400 psi
Minimum 28 day compressive strength	4,000 psi	2,500 psi

B. In the absence of contrary designation, concrete used for all construction shall be Class "A."

PART 2 PRODUCTS

2.01 CEMENT

Unless otherwise specified or shown on the plans, concrete shall be made with the Portland cement conforming to A.S.T.M. Specification C-150, Type I. The lightest colored Portland cement, competitively available shall be used, and the same brand of cement shall be used throughout the entire project. High early strength Portland cement shall conform to A.S.T.M. Standard Specification #C-150, Type III.

2.02 AGGREGATES

A. General: All aggregates shall conform to requirements of ASTM C 33.

B. Fine Aggregate

1. The fine aggregate shall consist of clean, hard, durable, uncoated particles of sand. It shall be free from dust mica, shale, alkali, organic matter, loam, soft or flaky particles.

2. Deleterious Substances - The fine aggregate shall contain not more than one percent (1%) by weight of clay lumps of more than three percent (3%) by

weight of material removed by decantation.

3. Grading - Fine aggregate shall conform to the following requirements:

Total Passing	Percent by Weight
3/8" sieve	100
No. 4 sieve	95 - 100
No. 16 sieve	45 - 95
No. 50 sieve	10 - 30
No. 100 sieve	2 - 8

4. Tests - Fine aggregate shall be subjected to the Colorimetric test for organic impurities and if it produces a color darker than the standard, it shall be rejected. It shall conform in all other respects to A.S.T.M. Designation C-33.

C. Coarse Aggregate

1. Composition and Quality - Coarse aggregate shall be washed gravel or crushed stone and shall consist of hard, tough, uncoated, durable particles. It shall contain no vegetable matter or soft, flaky, thin, or elongated particles. Deleterious substances shall not exceed the following amounts:

Soft fragments	0.20%
Coal and lignite	0.25%
Clay lumps	0.25%
Material passing No. 200 Sieve	1.50%
Thin or elongated pieces (length greater than 5 times the average thickness)	10.00%

The percentage of wear, by the Los Angeles test, shall not exceed 45.

2. Grading - Coarse aggregate shall be well graded between the limits specified below, and shall conform to the limits shown in the following table:

Total Passing	Percent by Weight
2" Sieve	100
1-1/2" Sieve	90 - 100
1" Sieve	55 - 80
3/4" Sieve	35 - 70
1/2" Sieve	20 - 45

3/8" Sieve	10 - 30
No. 4 Sieve	0 - 15
No. 16 Sieve	0 - 1

2.03 WATER

The water used in mixing concrete shall be fresh, clean, potable and free from oil, acid, alkali, organic matter, and deleterious amounts of chloride ion.

2.04 CONCRETE ADMIXTURES

A. Admixtures shall conform to ASTM C494; Type F for high range water-reducing and Type G for high range water-reducing/set-retarding. Air entraining agents shall conform to ASTM C260. When more than one admixture is used the two products shall be compatible and have a single manufacturer.

B. All Class "A" Concrete shall contain a (Daracem - 100 or an alternate approved by the Engineer) high range water-reducing agent. The dosage of the high range water reducing agent shall be at least 8 oz./100 lbs. of cement, but shall not produce a plasticized slump greater than 8". The high range water reducing agent shall be added at the site prior to concrete placement.

C. Admixtures, if not specified, may be used only upon written approval of the Engineer and shall be used only as recommended by the Manufacturer. Admixtures shall, when added to the mixture, produce a concrete of specified strength in both 7 and 28 day tests. Documentary evidence of acceptability will be required when new or unknown admixtures are proposed for usage.

D. Admixtures shall be Grace Construction Products or an alternate approved by the Engineer.

2.05 FORM WORK

A. Forms shall result in a final structure which conforms to the shape, lines, and dimensions of the members as required by the plans and specifications, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape. Forms and their supports shall be designed so that previously placed structure will not be damaged.

Form ties shall be so designed that when the forms are removed no metal shall be within 1-1/2 inches of the finished surface. Form ties shall have an approved type waterstop that is an integral part of the tie and made of the same material as the tie. Gang form ties shall be filled from one end with a compressible plug a minimum of 1 1/2 inches from the edge of wall, shall have a bentonite plug in the center of the wall

and all voids filled with non-shrink grout. Removal of forms and shores - no construction loads exceeding the dead load plus live load shall be supported on any unshored portion of the structure under construction. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with the remaining forming and shoring system has sufficient strength to support safely its weight and the loads placed thereon. This strength may be demonstrated by job-cured test specimens and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of the forming and shoring system. Such analysis and test data shall be furnished by the contractor to the Engineer when so required. In no case shall forms for walls or columns be removed in less than 36 hours. Form work supporting weight of concrete, such as beams and slabs shall remain until the concrete has attained a minimum of the 28 day design strength.

B. The design and engineering of the form work, as well as its construction, shall be the responsibility of the Contractor. Except as specifically called for otherwise herein, all form work shall meet the "ACI Standard Recommended Practice for Concrete Form work (ACI 347 - Latest Revision)".

C. Chamfer: Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaces to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction. All exposed corners shall be chamfered.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before the placing of any concrete, the footing trenches shall be drained of water and mud film removed and any loose dirt lifted out. Any flow of water shall be diverted by side drains to a sump, or removed by other approved methods, while the concrete is being placed.

B. Before placing concrete in any forms, the forms shall be cleaned, and all debris shall be removed. All reinforcing shall be checked to be sure that no reinforcing is touching the form or pan sides.

C. Before placing any concrete, it shall be determined that all work that is to be built into the concrete work is located and installed. All such items shall be placed so as not to interfere with the reinforcing steel.

D. Wood board forms shall be soaked with water just before the concrete is poured.

E. Special measures shall be taken in both severe cold and hot weather and shall be in

accordance with ACI Recommended Practice (ACI 306 - Latest Revision and ACI 605 - Latest Revision).

F. Before placing any new concrete on or against concrete which has set, the existing surfaces shall be thoroughly roughened and cleaned of all foreign matter and "Laitance." Forms shall be retightened and the existing surfaces slushed with a coat of grout. The new concrete shall be placed immediately after grouting, and the work shall be performed in such manner as to insure complete bonding of newly poured concrete to the existing work.

Grout for construction joints shall consist of a mixture of neat cement and water, and shall be applied to the old concrete surface immediately before the new concrete is poured. Grout for setting column bases, wall plates, and beams shall be composed of one part Portland Cement two parts sand, and sufficient water to produce the consistency required.

G. Where excavations exceeding a depth of five feet are prescribed to be made to install the foundations or any part of the structure, or any retaining walls on the site, the back slope of such excavation shall be at an incline not exceeding one vertical to one and one-half horizontal unless such back slope is sheeted and braced. If sheeting and bracing is to be provided, such sheeting and bracing shall be designed by an Engineer registered in the project state. The cost of such design work shall be paid for by the Contractor.

3.02 MIXING AND DELIVERY

A. Machine Mixing: All mixing of concrete shall be done in a batch mixer of approved design, which will insure a uniform distribution of the material throughout the mass, so that the mixture is uniform in color and homogenous. The entire content of the mixer drum shall be discharged before recharging. All material to be mixed per batch shall not exceed the manufacturers' rated capacity of the mixer.

B. Time of Mixing: The mixing of each batch shall continue not less than one and one-half (1-1/2) minutes after all the materials, including water, are in the mixer, during which time the mixer shall rotate at a peripheral speed of about two hundred feet per minute.

C. Mixing at Central Plant: Concrete mixed in a central plant, shall be conveyed to the work in approved mixer trucks which mix the concrete in route to the work. Plant layout and equipment shall meet the approval of the Engineer. Loading tickets shall be initialed and the time of loading stamped thereon. The loading tickets shall be handed to the resident inspector on the work before the load is placed, and no concrete will be accepted which has been in the mixer truck more than one and one-half (1-1/2) hours after the water has been added. In all other respects,

ready-mixed concrete shall conform to A.S.T.M. Specification C-94.

D. Waste concrete shall be deposited and mix trucks washed out only in areas designated by the owner or the engineer.

3.03 SLUMP

A. The maximum slump allowed for the various types of construction are as follows:

Type of Construction	Maximum Slump
Reinforced Foundation Walls & Footings	4"
Slabs, Beams, Reinforced Walls & Columns	4"
Heavy Mass Construction	2"
All Concrete Plasticized by Admixtures	8"

B. Slump tests shall be made at the discretion of the Engineer, and concrete having greater slump than specified shall not be incorporated into the work. The Contractor shall furnish slump test cones conforming to the provisions of ASTM C-143.

3.04 PLACING CONCRETE

A. All concrete shall be placed in daylight, and any portion of the concrete work started shall be started so that it can be completed in daylight. No concrete shall be placed until the foundation, forms, false-work, and the placing of the steel have been approved by the Engineer. Approval by the Engineer in no manner relieves the Contractor of his obligation to produce finished concrete as required by the plans and specifications.

B. The concrete shall be placed in such a manner as to avoid the possibility of segregation or separation of the aggregates, or the displacement of the reinforcement steel. The concrete shall be placed as near its final resting place as possible. If pipes, troughs, or chutes are used in placing the concrete, they shall be so arranged and used that the concrete is not separated, and shall be kept clean and free of hardened concrete at all times. Troughs and chutes shall be either made of metal or shall be metal lined, and shall extend as nearly as possible to the point of deposit. In walls and columns, the concrete shall not be dropped more than five feet (5') without the use of a tremie. Concrete shall be placed in continuous horizontal layers, approximately 10" to 12" thick, and the batches shall follow each other so closely that each one is placed and compacted before the preceding one has taken an initial set. Succeeding layers shall be placed before the underlying layer has become set, and

shall be compacted in a manner that will entirely break up and obliterate the tendency to produce a cold joint between layers. Concrete in beams, girders, columns and walls shall be well spaded at the form surface and all concrete shall be compacted by an approved mechanical type vibrator having a frequency of not less than 3,000 vibrations per minute. The Contractor shall provide the necessary number of vibrators to properly execute the work, and shall have on the job at all times necessary spare vibrators to be used in case of mechanical failure. Construction joints shall be made only at the location as shown on the plans, except by approval of the Engineer.

C. In making construction joints, the previous work shall be cleaned of all "laitance," and other objectionable material, and shall be brushed with a thin mixture of Portland cement and water immediately before the new concrete is placed.

D. The operation of placing and compacting the concrete, shall be conducted so as to form a compact, dense, impervious artificial stone of uniform texture, with smooth faces on exposed surfaces. Any section of concrete that is porous, or has been plastered, or is otherwise defective, shall be removed and replaced, in whole or in part, entirely at the contractor's expense, as directed by the Engineer.

E. Depositing Concrete Under Water: Concrete shall not be exposed to the action of water before setting, or deposited in the water, except upon the approval of the Engineer, and under his supervision.

F. Cold Weather Placing

1. Comply with ACI 306 to protect all concrete work from physical damage and reduced strength which would be caused by frost, freezing actions, or low temperatures. No concrete shall be placed when the atmosphere temperature is below 40 degrees F.

2. If the temperature drops below 40 degrees F. after the concrete has been placed, the Contractor shall provide adequate means for maintaining concrete temperature of not less than 45 degrees F. for a period of five (5) days after the concrete is placed. The contractor shall assume all risk connected with placing concrete in cold weather, and any unsatisfactory work will be rejected. Recording thermometers shall be supplied by the contractor as required by the Engineer.

G. Hot Weather Placing: When hot weather conditions exist which would seriously impair the quality and strength of concrete, place the concrete as follows:

1. Maintain concrete temperature at time of placement below 90 degrees F. Use chilled mixing water or chopped ice to control concrete temperature, provided the water equivalent of the ice is calculated to the total amount of water.

2. Cover reinforcing steel with water-soaked burlap if the steel becomes too hot. Steel temperature shall not exceed the ambient air temperature immediately prior to placement of concrete.

3. Wet forms thoroughly prior to placement of concrete.

4. Use set-control admixtures in the mix subject to approval of the Engineer.

3.05 PROTECTION AND CORRECTIVE WORK

A. Workmen shall not walk on concrete during placing or finishing with any earth or foreign matter footgear.

B. All freshly placed concrete shall be protected from damage or injury due to water, falling objects, persons or anything that might mar or injure the finish surface of the concrete. Any surfaces that are damaged shall be removed and replaced with fresh concrete at the expense of the Contractor.

C. Care shall be taken in the removal of the forms not to damage the surface of the concrete. Immediately after the forms are removed, all damaged or imperfect work shall be patched. If in the opinion of the Engineer, the patching does not restore the work to the quality specified, the Contractor shall remove and rebuild the work at his expense.

D. Where concrete or concrete work does not conform to these specifications and where patching is not approved by the Engineer or low strength concrete is not permitted to remain in place, procedures and plans covering all work to be rebuilt shall be submitted by the Contractor to the Engineer before removal and rebuilding is begun. The cost of such plans, as well as the cost of removal and rebuilding shall be at the Contractor's expense.

3.06 FINISHING

Floors, including slabs on ground, shall be finished as follows:

A. The surfaces of all concrete shall be worked with a wood float in a manner which will compact the concrete and produce a surface free of depressions or inequalities of any kind. Test for grade (of level) and correct by removing excess or adding and compacting additional concrete.

B. All interior floor slabs shall receive steel trowel finish as follows: After screeding, slab shall be wood floated to a smooth, plane surface. When concrete has hardened, to prevent excess fines from working to surface, steel trowel to a smooth surface free

from defects. A second steel troweling shall be done producing a plane, hard, dense, finished surface. Interior slabs shall also receive a hardening and dust proofing treatment of a colorless aqueous solution of zinc or magnesium fluosilicate applied in strict accordance with manufacturer's recommendations.

C. Troweling shall not begin until all surface water has disappeared. The drying of the surface moisture before troweling must proceed naturally and must not be hastened by sacking or dusting on of dry sand and cement.

D. After exterior floors, platforms and steps requiring a broom finish are struck off smooth with a wood float and received a trowel finish, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use a fiber bristle broom.

D. Exposed concrete surfaces shall be finished as follows:

1. The exterior surfaces of all concrete shall be thoroughly worked during the placing operation, by the use of a concrete spade of approved type. The working shall force all coarse aggregate from the faces, and work mortar against the forms to produce a smooth finish, free from water and air pockets, or honeycomb. As soon as the concrete has set sufficiently to permit, the forms shall be carefully removed and all depressions resulting from removal of the metal spacers, and all other holes and rough places, shall be carefully pointed with a mortar composed of one part cement and two parts sand. The surface film of all such pointed surfaces shall be carefully removed before setting occurs. The cement in the mortar used for pointing and filling holes shall be of the same brand as the cement incorporated in the concrete work.

2. Surface shall be rubbed smooth with carborundum brick or other abrasive within 36 hours after forms are removed. Surfaces shall be wetted and rubbed until a uniform color and texture is produced. No cement grout or slush shall be used other than the cement paste drawn from the green concrete itself by the rubbing process.

G. Unless otherwise directed the following schedule shall be used for concrete finishing:

Sidewalks:	Rough (Broomed)
Exposed Exterior Walls:	Medium (Rubbed)
Interior Structure Walls:	Fine (Rubbed)
Additional Wall Finish:	ThoroCoat applied per manufacturer’s recommendations
Slabs - Interior:	Smooth (Troweled)
Slabs - Exterior:	Medium (Fine broomed)

Coordinate the required finish with the Engineer prior to application.

3.07 CURING

A. Curing Materials

1. Liquid curing and sealing compounds shall conform to ASTM C 309, Type 1.

2. Sheet materials shall conform to ASTM C 171.

3. Burlap cloth made from jute and weighing approximately 9 oz. per sq. yd for moist curing shall conform to AASHTO M 182 and shall use two layers.

4. Compounds shall be a combination sealer-hardener and dust-proofer.

B. Procedure

Freshly placed concrete shall be protected from wash caused by rain and flowing water. Concrete shall not be allowed to dry out from the time it is placed until seven (7) days thereafter. Curing shall be accomplished by the use of an approved membrane compound to seal the water in the concrete except for surfaces which are to receive future concrete, or mortar. The membrane shall be of a type which will retain ninety-seven (97%) percent of the moisture at a temperature of 135 degree F., with a relative humidity of thirty percent (30%) in the first twenty-four (24) hours. It shall be applied in accordance with the manufacturer's recommendations and in sufficient thickness to effectively hold the water in the concrete, and must have a record of successful use for at least two years.

3.08 JOINTS

A. Construction Joints:

1. Construction joints will not be permitted except as may be shown on the Drawings and on the Contractor's approved placement schedule.

2. If construction joints necessary for the progress of the Work are not shown on the Drawings, show them in complete detail on the Shop Drawings.

3. Provide keyways at least 1-1/2" deep where shown on the plans.

B. Isolation joints in slabs on grade:

Provide isolation joints in slabs on grade at points of contact between slabs on grade and vertical surfaces where indicated.

3.09 WATER TIGHTNESS

All structures for holding or carrying water, or pits below grade shall be watertight. Where the order of work requires "cold" joints (slab/wall intersections etc.), an approved, rigid waterstop shall be secured to the form work and remain imbedded in the concrete to form a watertight joint with the adjacent pour. Waterstop shall be expandable center bulb type 6 in. wide x 1/4 in. thick minimum unless otherwise specifically shown on the Plans.

3.10 TESTING OF CONCRETE

A. Testing of concrete will be done under the direction of a laboratory approved by the Engineer. Tests to be paid for by the Contractor.

B. Samples for strength tests will be taken not less than one per day nor less than once per one hundred (100) cubic yards and on less yardage when required by the Engineer. The tests shall be made in accordance with the procedure set forth in A.S.T.M. C172 for "Standard Method of Making and Storing Compression Test Specimens of Concrete in the Field", and C-39 for "Standard Methods of Test for Compressive Strength Concrete." Tests shall be made by a recognized laboratory approved by the Engineer.

Three certified copies of test results are to be furnished the Engineer with each test. Each test shall consist of at least four specimens, two for field control and two for laboratory control. Each set of four cylinders shall have a numerical designation and each cylinder an alphabetical sub-designation. Thus the first set of four cylinders shall be numbered 1A, 1B, 1C, and 1D.

C. If the evaluation of the compressive test indicates the concrete has failed to meet the specified strength, core tests shall be made of the in-place concrete. The location and number of such tests to be at the Engineers direction. Tests shall be paid for by the Contractor.

D. If the core tests fail to verify the strength specified, the Engineer shall effect one of the following procedures:

1. Have the Contractor remove and reconstruct that portion of the structure found to be defective.

2. Accept the concrete in place and issue a change order as set forth in the General Conditions of these specifications.

E. Tests to determine the entrained air content will be made at the job site. Frequency of

testing shall be at the Engineer's discretion as necessary to ensure proper air content. The testing apparatus shall be furnished by the Contractor, concrete supplier or testing laboratory at no cost to the Owner, and testing will be performed by the Contractor in the presence of the Engineer.

END SECTION

SECTION 03200
CONCRETE REINFORCEMENT

1.00 DESCRIPTION

A. Work Included: Provide complete, in place, all steel required for reinforcement of cast-in-place concrete as shown on the drawings.

1.01 SUBMITTALS

A. Shop Drawings: Submit complete shop drawings of all material proposed to be furnished and installed under this Section.

1. Show schedules, stirrup spacing, diagrams of bent bars and arrangement and assemblies.

2. Make Shop Drawings in accordance with ACI 315.

B. Mill Certificates: Accompanying the Shop Drawings, submit steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.02 PRODUCT HANDLING

A. Delivery: Deliver reinforcement to the job site bundled, tagged and marked. Use tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Storage: Store reinforcement above the surface of the ground on wooden platforms or other supports in a manner which will prevent damage and accumulation of dirt and excessive rust. The surface of the ground beneath all stored reinforcement shall be covered with plastic sheeting to further assure isolation from dirt and dust.

2.00 MATERIALS

A. Reinforcing bars: Comply with ASTM A615-Latest Revision.

B. Welded wire fabric: Comply with ASTM A185-Latest Revision.

C. Supports for reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place:

1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick and other unacceptable materials.

2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support legs.

3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized or plastic protected legs.

2.01 FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI Manual. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work.

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2. Bend or kinks not indicated on Drawings or final Shop Drawings.

3. Bars with reduced cross-section due to excessive rusting or other cause.

3.01 INSPECTION

Examine the foundation, formwork and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General

1. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified.

2. Clean reinforcement to remove loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.

3. Position, support and secure reinforcement against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.

4. Place reinforcement to obtain the minimum coverage for concrete protection. Arrange, space and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

5. Install welded wire fabrics in as long lengths as practicable. Lap adjoining pieces at least one full mesh.

6. Provide sufficient numbers of supports and of strength to carry reinforcements. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

B. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tieing. See splice schedule on Drawings. Bars marked continuous shall be lapped as required by splice schedule, and at corners, corner bars shall be provided.

3.03 BAR COVER

Reinforcing bars shall be fabricated, tied and supported to ensure a protective concrete cover as shown on the structural drawings.

END OF SECTION

DIVISION 9 – FINISHES

SECTION 09900
STOTHERM® EIF SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Materials and installation of an EIF System.

1.02 DESIGN REQUIREMENTS

A. Wind Load

1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
2. Design for wind load in conformance with code requirements.

B. Moisture Control

1. Prevent the accumulation of water behind the EIF system, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly.

    a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, and at the base of the wall.

    b. Air Leakage Prevention—provide continuity of Air Barrier System at foundation, roof, windows, doors and other penetrations through the system with connecting and compatible Air Barrier components to minimize conservation and leakage caused by air movement.

    c. Vapor Diffusion and Condensation-- perform a dew point analysis of the wall assembly to determine the potential for accumulation of moisture in the wall assembly as a result of water vapor diffusion and condensation. Adjust insulation thickness and/or other wall assembly components accordingly to minimize the risk of condensation. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

C. Impact Resistance

1. Provide ultra-high impact resistance to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than "Standard" on contract drawings.

D. Color Selection

1. Select finish coat with a light reflectance value of 20 or greater. (The use of dark colors is not recommended with EIF Systems that incorporate expanded polystyrene [EPS]. EPS has a service temperature limitation of approximately 160° F [71°C]).

E. Joints

1. Design minimum 3/4 inch (19 mm) wide expansion joints in the EIFS where they exist in the substrate or supporting construction, where the EIFS adjoins dissimilar construction or materials, at changes in building height, and at floor lines in multi-level wood frame construction.
2. Design minimum 1/2 inch (13 mm) wide sealant joints at all penetrations through the EIFS (windows, doors, etc.).
3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, "Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish System (EIFS) Joints," and that meets minimum 50% elongation after conditioning.

F. Grade Condition

1. Do not specify EIFS below grade (unless designed for use below grade and permitted by code) or for use on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure.

G. Trim, Projecting Architectural Features and Reveals

1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of EIFS on weather exposed sloped surfaces. Limit projecting features to easily

accessible areas and limit total area to facilitate maintenance and minimize maintenance. Refer to Sto details 1.04a and 1.04b.

2. Do not use EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto detail 1.61.

H. Insulation Thickness

1. Minimum EPS insulation thickness is 1 inch (25 mm).
2. Maximum EPS insulation thickness is 12 inches (305 mm) when installed in accordance with ICC-ES ESR 1720.

I. Fire Protection

1. Where a fire-resistance rating is required by code use EIFS over rated assembly
(EIFS is considered not to add or detract from the fire-resistance of the rated assembly).
2. Refer to manufacturer's applicable code compliance report for other limitations that may apply.

1.03 QUALITY ASSURANCE

A. Manufacturer requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA).
2. System manufacturer for a minimum of twenty (25) years.
3. Manufacturing facilities ISO 9001-2000 certified Quality System.

B. Contractor requirements

1. Engaged in application of EIFS for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of Sto materials and possessing a certificate of completion of the on-line Sto application test.
3. Employ skilled mechanics who are experienced and knowledgeable in EIFS application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.

C. Insulation board manufacturer requirements

1. Recognized by Sto as capable of producing insulation board to meet system requirements, and hold a valid licensing agreement with Sto.
2. Listed by an approved agency.
3. Label insulation board with information required by Sto, the approved listing agency and the applicable building code.

D. Inspections

1. Provide independent third party inspection where required by code or contract documents.
2. Conduct inspections in accordance with code requirements and contract documents.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

C. Protect portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.05 COORDINATION/SCHEDULING

(The work in this section requires close coordination with related sections and trades)

A. Provide site grading such that EIFS terminates above finished grade a minimum of 6 inches (152 mm) or as required by code.

B. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall and provide sill flashing.

C. Install window and door head flashing immediately after windows and doors are installed.

D. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

E. Install copings and sealant immediately after installation of the EIF system and when EIFS coatings are dry.

F. Attach penetrations through EIFS to structural support and provide water tight

seal at penetrations

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide EIFS System and accessories from single source manufacturer or approved supplier.

B. The following are acceptable manufacturers (no substitutions).

1. Sto Corp. – StoTherm EIF System
   a. Contact: Sto Strategic Accounts – 1-888-786-3437

2.02 ADHESIVE (select one)

A. Sto Primer/Adhesive-B---one-component polymer modified cement based, factory blend, adhesive with less than 33 percent portland cement content by weight.

B. Sto BTS® Plus—one-component, polymer-modified, cement based adhesive.

C. Sto BTS® Silo—one-component, polymer-modified, cement based high build adhesive designed for use with StoSilo spray equipment.

D. Sto BTS® Xtra—lightweight, one component, polymer-modified, cement based high build adhesive.

2.03 INSULATION BOARD

A. Nominal 1.0 lb/ft^3 (16 kg/m^3) Expanded Polystyrene (EPS) Insulation Board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements.
Note: Two layers of 2-inch EPS foam shall be used. During the application of the second layer, the EPS board joints shall NOT align with the board joints of the first layer (refer to Sto Detail TS 1, dated Feb 2011).

2.04 BASE COAT *(select one)*

A. Sto Primer/Adhesive-B---one-component polymer modified cement based factory blend, base coat with less than 33 percent Portland cement content by weight.

B. Sto BTS® Plus—one-component polymer modified cement based high build base coat with less than 33 percent portland cement content by weight and capable of achieving minimum 1/16 inch (1.6 mm) thickness in one pass.

C. Sto BTS® Silo—one-component, polymer-modified, cement based high build adhesive designed for use with StoSilo spray equipment.

D. Sto BTS® Xtra—light weight, one component, polymer modified, cement based high build factory blend base coat.

2.05 REINFORCING MESHES

A. Standard Mesh

1. Sto Mesh--nominal 4.5 oz./yd^2 (153 g/m^2), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials (*achieves Standard Impact Classificatio*n).

B. Ultra-High Impact Mesh

1. Sto Armor Mat--nominal 15 oz./yd^2 (509 g/m^2), ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials (*for use to a minimum height of 6'-0" above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Achieves Ultra-High Impact Classificatio*n *when applied beneath Sto Mesh*).

2.06 PRIMER *(optional component)(select one)*

A. Sto Primer Sand - acrylic based tintable primer for roller application.

B. Sto Primer Smooth - acrylic based tintable primer for roller or spray application.

2.07 FINISH COAT

A. Sto Essence DPR Finish - acrylic based textured wall coating with graded marble aggregate and dirt pick up resistant technology.

B. Add Alternate: Stolit® Lotusan® - Acrylic based textured wall coating with the Lotus-Effect®, pronounced self-cleaning performance. Color and texture as selected by engineer and/or owner.

2.08 JOB MIXED INGREDIENTS

A. Water--Clean and potable.
B. Portland cement – ASTM C 150 Type I, Type II or Type I-II

PART 3 EXECUTION

3.01 INSTALLATION

A. Install EIFS in compliance with manufacturer's published instructions.

3.02 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them.
B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry.

END OF SECTION

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13050
FABRIC BAFFLE CURTAIN

PART 1 – GENERAL

1.01 WORK INCLUDED

1.01.1 This specification covers the design, fabrication, and erection of tension-fabric baffle systems composed of NSF 61 compliant geo-membrane 8130 XR-3-PW as manufactured by the Seaman Corporation of Wooster, Ohio for the storage tank as shown on the contract drawings and specified herein.

1.01.2 The tank contractor shall furnish all labor, materials, and equipment required to design, fabricate, deliver and install the tensioned-fabric baffle system.

1.02 SHOP DRAWINGS AND SUBMITTALS

1.02.1 Before executing any of the work in this section, prints or drawings shall be submitted to the ENGINEER showing dimensions, sizes, thickness, gauges, materials, finishes, joints, attachment, anchorage, and erection procedures.

1.03 EXPERIENCE REQUIREMENTS

1.03.1 The baffle fabricator shall have furnished and had in satisfactory service for a period of not less than 5 years, at least 10 baffle systems with dimensions and quantities similar to the one specified for this project. The fabricator shall submit evidence of such with his submittal.

1.04 GUARANTEE

1.04.1 The baffle system shall be guaranteed for a period of 5 years from final acceptance against defective materials and workmanship.

1.05 WARRANTY

1.05.1 The geo-membrane manufacturer shall confirm in writing, that the material to be furnished will be free of defects in materials and workmanship at the time of the sale, and against deterioration due to effects of ozone, ultraviolet or other normal weathering on a pro-rated basis for up to 10 years from the date of completed installation. Manufacturer shall furnish a sample warranty for review and approval prior to shipment.

PART 2 – PRODUCTS

2.01 DESIGN REQUIREMENTS

2.01.1 The baffles shall confirm to the specified dimensions and shall be designed for installation in potable water with chlorine and ammonia present in the tank. The baffle system shall be suitable for expected water levels with daily fluctuations and shall have adequate strength to resist 0.5 inch of water depth difference across the baffle.

2.01.2 The baffles shall be erected and anchored to the floor, walls, and roof as shown in the plans to provide a flow path for maximum contact time for potable water in the tank.

2.02 FABRIC

2.02.1 The fabric shall be listed by NSF61 as being acceptable for use in potable water. The fabric shall have a knitted polymer coated polyester fabric with a 6.5 oz. /sq. yd. minimum weight.

2.02.2 The fabric shall be of good appearance and free of all defects such as holes, tears, blisters and any other defects that may affect its serviceability.

2.02.3 The coated fabric shall not be less than 30 mils thickness with a +10 percent allowable variation. There shall be not less than 7 mils thickness of polymer coating over the base fabric.

2.02.4 The polyester fabric shall be non-wicking.

2.02.5 The coated fabric shall be UV stable (either black or black/white) in order to possess maximum UV resistance when exposed to the atmosphere for extended periods of time.

2.02.6 The fabric shall meet or exceed the following minimum physical properties:

8130 XR®-3PW fabric	**Standard**	**Metric**
Base Fabric Type	Polyester	

Base Fabric Weight (nominal)	6.5 oz/yd^2	220 g/m^2
Thickness ASTM D 751	30.0 mils min	0.75 mm min
Weight ASTM D 751	30.0 ± 2 oz/yd^2	1020 ± 70 g/m^2
Tear Strength ASTM D 751, Trapezoid Tear	35/35 lb min	155/155 N min
Breaking Yield Strength ASTM D 751, Grab Tensile Procedure A	550/550 lb min	2450/2450 N min
Low Temperature ASTM D 2136, 4 hr - 1/8" mandrel	Pass @ -30°F	Pass @ -35° C
Dimensional Stability ASTM D 1204, 212°F - 1 hr	1.5% max each direction	1.5% max each direction
Adhesion Heat Sealed Seam ASTM D 751, Dielectric Weld	35 lb/2 in min	150 N/5 cm min
Dead Load Seam Shear Strength ASTM D 751, 4 hr test	2 in seam, 1 in strip 210 lb @ 70°F 105 lb @ 160°F	5 cm seam, 2.5 cm strip 935 N @ 21°C 465 N @ 70°C
Bursting Strength ASTM D 751, Ball Tip	650 lb min 800 lb typical	2890 N min 3560 N typical
Hydrostatic Resistance ASTM D 751, Method A	800 psi min	540 N/sq cm min
Blocking Resistance ASTM D 751, 180°F/82°C	#2 Rating max	
Adhesion - Ply ASTM D 413, Type A	15 lb/min or Film Tearing Bond	65 N/2.5 cm min or Film Tearing Bond
Bonded Seam Strength ASTM D 751, Grab Test Method, Procedure A	550 lb min	2450 N min
Abrasion Resistance ASTM D 3389, H-18 Wheel 1000 g load	2000 cycles (min) before fabric exposure 50 mg/100 cycles max weight loss	
Weathering Resistance ASTM G 153 (Carbon-Arc)	8000 hrs (min) - No appreciable changes or stiffening or cracking of coating	

Water Absorption ASTM D 471, Section 12 7 Days	0.025 kg/m^2 max @ 70°F/21°C 0.14 kg/m^2 max @ 212°F/100°C	
Wicking ASTM D 751	1/8 in max	0.3 cm max
Puncture Resistance ASTM D 4833	250 lb min	1110 N min
Coefficient Of Thermal Expansion/Contraction ASTM D 696	8 x 10^{-6} in/in/°F max	1.4 x 10^{-5} cm/cm/°C max

Seaming: Thermal welding methods are recommended.
No Sewing, glues, or solvents are suggested.

2.03 FASTENERS AND HARDWARE

2.03.1 All bolts, washers, nuts, and expansion anchors shall be type 316 stainless steel, minimum 3/8-inch diameter.

2.03.2 Batten connection shall be shall be type 316 stainless steel or fiberglass flat bar, minimum ¼-inch thickness by 2 inches wide.

2.03.3 Floor and Wall connection shall be type 316 stainless steel or fiberglass angle, minimum ¼-inch thickness by 2 inches wide by 2 inches wide.

2.03.4 Suspension and Tension for the top and open ends of the curtain(s) shall be type 316 stainless steel 3/16" diameter cable with type 316 stainless steel 3/16" cable clamps and thimbles.

PART 3 – EXECUTION

3.01 COORDINATION

3.01.1 The baffle manufacturer shall coordinate with the Engineer and the tank manufacturer concerning loading on the reservoir, attachment details, and the sequence of construction. Installation details are shown on the plans are provided as a guide for the contractor and baffle manufacturer. The baffle and tank contractor shall provide installation design.

3.01.2 The tank contractor shall provide thickened areas beneath the membrane slab as required for securing the base of the baffle walls.

3.02 PREPARATION AND FABRICATION

3.02.1 Prior to factory seaming, all roll goods shall be inspected. All factory seams shall be made by thermal fusion methods. All factory seams shall have a minimum scrim-to-scrim overlap of one and one-half inches (1-1/2") when fabricated. Fabricated seams found to have less than the specified minimum overlap shall be repaired by adding an overlap or cap strip that provides the minimum specified overlap or will be rejected. All seams shall be made so that thermal fusion bond extends fully along the width of the sheet so that no loose edges are present.

3.02.2 Prior to installation, all unnecessary material and equipment shall be removed from the tank and the floor slab installation areas shall be swept clean.

3.03 INSPECTION

3.03.1 All sheets and seams shall be 100% visually inspected during fabrication. No defective seams or exposed scrim will be allowed. All indicated repairs shall be made by the geomembrane fabricator before the panels are packaged for shipment.

3.03.2 In addition to visual inspection, a 48-inch (1.2m) weld sample shall be made with each factory seam welding unit used in this work at the beginning of every work shift and every four hours of production thereafter. Sample shall be taken from a seam specifically made for quality testing and not taken from the fabricated panel itself. Test specimens shall be cut at quarter points from each 48-inch seam sample (a total of three places) and tested for seam strength and peel adhesion. The shear seam strength shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. The peel adhesion shall be tested in accordance with ASTM D 4437 as modified in Annex A of ANSI/NSF 54.

3.03.2.1 A log shall be maintained showing the date, time, panel number and test results. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the material and/or seams as appropriate. The Fabricator shall provide the test results to the Owner or Engineer upon request.

3.03.3 Upon completion of baffle wall installation, contractor shall visually inspect the baffle walls for damage from ground level. Any repairs shall be made with newly manufactured material cut with rounded corners extending 4-inches in each direction from the damaged area. The entire repair shall be completely welded to the baffle wall.

3.04 INSTALLATION

3.04.1 CONTRACTOR shall field verify dimensions and provide the field dimensions to the baffle curtain fabricator <u>prior to fabrication of the baffle curtains.</u>

3.04.2 All work shall be fabricated and erected in accordance with the approved submittal drawings. For those baffles requiring widths greater than the coated fabric available from the manufacturer, a thermal fusion heat seam nominal 2 inches wide shall be used at those locations to join multiple widths of fabric together. The strength of the seam shall be as great as or greater than the parent material in shear strength.

3.04.3 Baffle shall be secured to the floor and walls with type 316 stainless steel or fiberglass angles with type 316 stainless steel expansion anchors. All baffle penetrations shall be punched. Provide 3/8-inch polypropylene rope in the 4" wide, double hem on the perimeter of the baffle curtain(s). The 3/8-inch polypropylene rope inside the 4" wide hem shall be behind the stainless steel plates at floor and wall locations.

3.04.4 Provide stainless stainless steel or fiberglass angle plates or flat plates sandwiching the baffle curtain on the top edge and open end of the baffle wall with 3/8-inch bolts for attaching the baffle to the top and the open end wall of the tank as shown on the drawings.

3.04.5 Provide fiberglass or stainless steel ¼" x 2" x 2" x 2" angle plates to be attached to the ceiling and the open end wall of the tank for securing the type 316 stainless steel 3/16" diameter cable from the tank wall to the top edge or open end of the baffle curtain to tension or suspend the baffle curtain. The type 316 stainless steel 3/16" diameter cable shall be secured using type 316 stainless steel 3/16" cable clamps.

3.04.6 Hardware and fasteners shall be made of type 316 stainless steel.

3.05 START-UP AND TRAINING

Not applicable.

END OF SECTION

SECTION 13200
PRE-STRESSED CONCRETE STORAGE TANK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section specifies the design and construction of an AWWA D110 Type II, wire-wound prestressed concrete storage tank with galvanized steel diaphragm complete including all reinforcing, concrete work, accessories, disinfection and testing directly related to the tank.

B. The tank contractor is responsible for furnishing all labor, materials, tools and equipment necessary to design and construct the prestressed concrete storage tank as indicated on the drawings and as described in this specification.

1.2 RELATED SECTIONS

A. Section 02200 – Earthwork and Excavation.

B. Section 15062 – Ductile Iron Pipe and Fittings.

C. Appendix A – Geotechnical Report.

1.3 REFERENCES

A. ACI 117-10 Specification for Tolerances for Concrete Construction and Materials

B. ACI 301/301M-10 – Specifications for Structural Concrete for Buildings.

C. ACI 305R-10 – Guide to Hot Weather Concreting.

D. ACI 306R-10 – Guide to Cold Weather Concreting.

E. ACI 347R-04 – Guide to Formwork for Concrete.

F. ACI 350/350R-06 – Code Requirements for Environmental Engineering Concrete Structures and Commentary.

G. ACI 350.3-06 – Seismic Design of Liquid-Containing Concrete Structures and Commentary.

H. ACI 372R-03 – Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures.

I. ACI 506R-05 – Guide to Shotcrete.

J. ACI 506.2-95 – Specification for Materials, Proportioning, and Application of Shotcrete.

K. ACI SP4: Formwork for Concrete.

L. ANSI/AWWA C652-11 – Disinfection of Water Storage Facilities.

M. ANSI/AWWA D110-04 – Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks.

N. ASCE Standard 7-10 – Minimum Design Loads for Buildings and Other Structures.

O. ASTM A416/A416M-12a – Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

P. ASTM A615/A615M-12 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

Q. ASTM A653/653M-11 – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by Hot Dip Process.

R. ASTM A821/A821M-10 – Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks.

S. ASTM A882/A882M-04(2010) – Standard Specification for Filled Epoxy-Coated Seven-Wire Prestressing Strand.

T. ASTM A884/A884M-12 – Standard Specification for Epoxy Coated Steel Wire and Welded Wire Reinforcement.

U. ASTM A1064/A1064M-12 – Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

V. ASTM C31/C31M-12 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.

W. ASTM C33/C33M-13 – Standard Specification for Concrete Aggregates.

X. ASTM C39/C39M-12a – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

Y. ASTM C143/C143M-12 – Standard Test Method for Slump of Hydraulic-Cement.

Z. ASTM C172/C172M-10 – Standard Practice for Sampling Freshly Mixed Concrete.

AA. ASTM C231/C231M-10 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

BB. ASTM C881/C881M-10 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

CC. ASTM D1056-07 – Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

DD. ASTM F593-13 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

EE. "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard" by P.K. Malhotra, Structural Engineering International, IASBSE, 3/2006 pp 222-225.

1.4 SUBMITTALS

A. Prequalification Data: Provide prequalification data prior to the bid in accordance with Section 1.5 B. of this specification.

B. Shop Drawings: Provide shop drawings with a minimum size of 18" x 24" with a complete plan, elevation, and sectional views showing critical dimensions as follows:

1. Size, location and number of all reinforcing bars.
2. Thickness of all parts of the tank structure including floor, core wall, dome, and covercoat.
3. Prestressing schedule including number and placement of prestressing wires on the tank wall and total applied force per foot of wall height.
4. Location and details of all accessories required.

C. Concrete Data: Submit concrete design mixes including ingredient proportions, minimum cementitious content, and water/cementitious ratio in accordance with Section 2.2 and 2.3 of this specification.

D. Design Data: Submit structural calculations for the tank, signed and sealed by a professional engineer in accordance with Section 1.5 A.3 of this specification.

E. Coating Data: Submit color charts for review by the engineer and owner. Once a color is chosen, submit actual drawdown samples for final approval prior to application of coating.

F. Test Reports: Submit concrete strength reports for 7-day and 28-day breaks taken in accordance with the requirements of Section 3.3 A.1.

G. Warranty Document: Submit warranty document in Owner's name in accordance with Section 1.6 A. of this specification.

H. Cleaning and Disinfection Plan: Submit a cleaning and disinfection plan which complies with Section 3.4 of this specification.

I. Project Record Documents: Record actual location layout and final configuration of tank and accessories on shop drawings and submit to engineer after construction of the tank is complete.

1.5 QUALITY ASSURANCE

A. Qualifications and Experience:

1. Tank Construction Company: Shall be a firm with a minimum of three years of experience in the design and construction of ANSI/AWWA D110 Type II wire-wound, circular prestressed concrete tanks to ensure the owner that it has the organization, technical skill, quality control, reliability, and financial stability to build and guarantee the tank in accordance with the quality required by these specifications. The tank construction company shall have built with its own resources and have under warranty, a minimum of ten (10) dome-covered prestressed concrete tanks of equal or greater size than that required for this project which meet these specifications and are now providing satisfactory service.
2. Construction: The entire tank, including all portions of the floor, wall, and roof shall be built by the tank construction company, using its own trained personnel and equipment.
3. Design: All design work for the tank shall be performed by a professional engineer with no less than five years of experience in the design and construction of ANSI/AWWA D110 Type II wire-wound, circular prestressed concrete tanks. The professional engineer shall be a full-time staff member of the tank construction company and shall be licensed to work in the state where the project is located.
4. The diaphragm design and epoxy injection procedure shall have been used in the ten tanks required in Section 1.5 A.1 of this specification.

B. Prequalification:

1. All tank construction companies must be prequalified and meet the criteria stated in Section 1.5 A.1 of this specification to be considered an acceptable tank builder.
2. A complete prequalification package shall be submitted to the Engineer for consideration 14 days prior to the date set for receipt of bids. The prequalification submittal shall include the following items:
   a. Complete construction drawings showing the principal sizes, thicknesses, reinforcing size and spacing for all structural members including: floor, wall, dome shell and dome edge.
   b. Complete details of other structural appurtenances as required by the project drawings showing principal sizes, thickness and reinforcing sizes and spacing.
   c. Complete design calculations which address applicable loads provided in Section 1.7 B. of this specification.
   d. Complete experience record for the tanks used to meet the experience requirement of Section 1.5 A. of this specification that have been designed and built in the tank construction company's own name and shall include only those tanks that are under the company's warranty. The record shall include the size of the tank, name, address and telephone number of the Owner, the year of construction and the name and telephone number of the Engineer for the project.
   e. Company employee experience in prestressed concrete tanks of the type specified herein for the construction superintendent, foreman, and three most experienced tank builders. Experience shall be with the bidder during the three previous years.
   f. Construction schedule which details the duration for tank construction.
   g. Financial statements prepared by a Certified Public Accountant.

3. The following are preapproved as acceptable tank construction companies:
   a. The Crom Corporation, Gainesville, Florida.
   b. Precon Corporation, Newberry, Florida

1.6 WARRANTY

A. Provide a warranty document for workmanship and materials on the complete structural portion of the tank for a five-year period from the date of acceptance of the work. In case leakage or other defects appear within the five-year period, the tank construction company shall promptly repair the tank at its own expense upon written notice by the Owner that such defects have been found. Leakage is defined as a stream flow of liquid appearing on the exterior of the tank, the source of which is from the inside of the tank. The tank construction company shall not be responsible for, nor liable for, any subsurface condition. This warranty shall

not apply to any accessory, equipment or product that is not a structural part of the tank and is manufactured by a company other than the tank construction company.

1.7 DESIGN CRITERIA

A. The design shall be in conformance with applicable portions of American Concrete Institute (ACI) 372R Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures, ANSI/AWWA D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks, and currently accepted engineering principles and practices for the design of such structures.

B. The following loadings shall be utilized in the design:

1. Capacity: 4,000,000 Gallons
2. Dimensions: 170’ Inside Diameter
   Water Depth=as shown on drawings
3. Fluid Loads: Shall be the weight of all liquid when the reservoir is filled to capacity. The unit weight of the liquid material shall be 62.4 lbs/ft^3.
4. Roof Live Loads: Consideration shall be given to all applicable roof design loads in accordance with ANSI/AWWA D110, Section 3.3 and ASCE 7. The minimum roof live load for the structure shall be the greater of 12 or local snow load for Conyers, Ga.
5. Dead Loads: Consideration shall be given to all permanent imposed loads including concrete and steel.
6. Seismic Loads:
   a. Seismic forces and moments resulting from water sloshing and seismic accelerations of the tank dome, wall, and water loads shall be calculated in accordance with ACI 350.3 or ANSI/AWWA D110.
   b. If sufficient freeboard height is not provided to prevent uplift forces due to sloshing, the impulsive participation shall be increased due to the constrained motion of liquid, and the tank roof and its connection shall be designed to resist the uplift forces in accordance with P.K. Malhotra's "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard".
7. Soil Pressure: Earth loads shall be determined by rational methods of soil mechanics. Soil pressure shall not be used in the design of the core wall to counteract hydraulic loads or provide residual compression in the wall.
8. Differential Backfill Loads: Forces from differential backfill loads shall be considered in the design and shall be based on the at-rest coefficient. Passive resistance shall not be used to resist differential backfill loads.
9. Wind Loads: Wind loads shall be considered in the design in accordance with ASCE 7.

C. Floor: The design of the floor for the prestressed concrete tank shall conform to the following:

1. Concrete membrane floors shall be a minimum of 4" thick and have a minimum thickness of 8" of concrete over all pipe encasements and around sumps.
2. A minimum percentage of 0.60% reinforcing steel shall be used in the membrane floor. The minimum percentage shall apply to all thickened sections and shall extend a minimum of 2 ft into the adjacent membrane floor.

D. Core wall:

1. The wire-wound, prestressed concrete tank core wall shall be designed as a thin shell cylindrical element using shotcrete and an embedded, mechanically bonded, galvanized steel shell diaphragm.
2. The design of the core wall shall take into account appropriate edge restraint. To compensate for bending moments, shrinkage, differential drying, and temperature stresses, the following minimum reinforcing steel shall be incorporated into the design:
   a. The top 2 ft of core wall shall have not less than 1% circumferential reinforcing.
   b. The bottom 3 ft of core wall shall have not less than 1% circumferential reinforcing.
   c. Inside Face:
      (1) The inside face of the core wall shall utilize the diaphragm as effective reinforcing.
      (2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
   d. Outside Face:
      (1) Vertical reinforcing steel in the outside face of the core wall shall be: minimum of #4 bars at 12" center to center.
      (2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
3. The minimum core wall thickness shall be 3½".
4. Reinforcing steel used in the core wall shall be designed using a maximum allowable design tensile stress, f_s, of 18,000 psi.
5. Allowable compressive stress in the core wall due to initial prestressing force, f_{gi}, shall be:
   a. 1250 psi + 75t psi/in. with 0.5 f'_{gi} maximum or less (where f'_{gi} is defined as compressive strength at time initial prestressing force is applied and *t* is the thickness of the core wall in inches).
   b. Maximum of 2250 psi.
6. Allowable compressive stress in the core wall due to final prestressing force, f_g, shall be:
   a. 1250 psi + 75t psi/in. with 0.45 f'_g maximum (where f'_g is defined as compressive strength required for final prestressing force and *t* is the thickness of the core wall in inches).
   b. Maximum of 2025 psi.

E. Dome:

1. The dome roof shall be constructed of reinforced concrete and shall be circumferentially prestressed.
2. Dome shell reinforcement shall consist of reinforcing bars or welded wire fabric, not galvanized. Bolsters for wire fabric and reinforcing bars shall be plastic. Wire ties shall be galvanized.
3. The dome ring girder shall be prestressed with sufficient wire to withstand the dome dead load and design live loads. The ring girder shall have cross section suitable to accept the applied prestressing forces.
4. The high water level in the tank shall be permitted to encroach on the dome shell no higher than the upper horizontal plane of the dome ring girder.
5. Overflow outlets or the overflow pipe shall be capable of providing an overflow open area three times the area of the largest influent pipe.
6. Overflow outlets plus the dome ventilator shall be capable of providing an open area three times the area of the largest pipe.
7. The dome shall be designed as a free-span, spherical thin shell with one-tenth rise in accordance with the following:
   a. Typical Dome Design: The typical dome thickness and steel reinforcement shall meet the requirements of ANSI/AWWA D110.
   b. In all cases, the thickness of the dome shall be no less than 3".
   c. Dome Edge Design: The dome edge and upper wall shall be designed to resist the moments, thrusts, and shears that occur in this region due to dome and wall prestressing and loading conditions. The design of the edge region shall conform to the following:

      (1) Dome Edge Thickness:

         (a) A determination of the buckle diameter shall be made, as defined by:

$$d_b = 2.5 \cdot \sqrt{r_d \cdot t_d}$$ rounded up to the next foot

Where: d_b = buckle diameter in feet

r_d = dome radius in feet

t_d = typical dome thickness in feet

         (b) Dome edge thickening shall begin at a radial location on the dome, defined as s_2 which is at least one buckle diameter away from the tank wall.

         (c) A springline haunch shall be provided, which extends radially from the inside face of the tank wall to radial location s_1 which is

defined as:

$$s_1 = 0.6 \cdot \sqrt{1.5 \cdot r_d \cdot t_d}$$ rounded up to the next foot

Where: s_1 = distance from inside face of wall to haunch in feet
s_2 = distance from inside face of wall to typical dome thickness in feet.

This springline haunch shall begin at the inside face of the tank wall with a springline thickness as required by paragraph (f) below and shall end at radial location s_1 with the following thickness:

$$t_{d1} = 1.33 \cdot t_d$$

Where: t_{d1} = minimum thickness at s_1 in feet
t_d = typical dome thickness in feet at one buckle diameter from tank wall

(d) Beginning at s_1 and continuing to s_2 the dome shell shall have a uniform straight line taper.

(e) Parameters (b), (c), and (d) above are not required for domes where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.

(f) Sufficient concrete thickness at the springline of the dome shall be provided so that no more than 2 ft of the springline haunch is considered in calculating the effective dome edge ring cross sectional area. Compressive stress in this area shall not exceed 1000 psi when subjected to initial prestressing, offset by dead load only.

(2) Dome Edge Steel Reinforcement:

(a) Throughout the dome edge, the percentage of steel reinforcement, both radially and circumferentially, shall be no less than 0.25% of the gross cross sectional area of concrete.

(b) Along the dome edge, steel reinforcement shall be distributed between the upper and lower layers unless finite element analysis calculations indicate that tensile stress does not exist in the concrete along the bottom face of the dome edge. In that case, only top bars are required radially and circumferentially. In addition, radial and circumferential reinforcing bars will not be required along the bottom face of the dome edge where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.

(c) Where reinforcing bars are required in the bottom layer, they shall be placed near the tank wall to insure adequate development at the

intersection between dome and wall.

(d) In all cases, the percentage of circumferential steel reinforcement in the effective dome ring shall be no less than one percent of the gross cross sectional area of concrete. The effective dome ring is defined as ¼ of the haunch length not to exceed 2 ft'.

(e) Where bottom dome edge steel reinforcement is required, vertical steel reinforcement along the inside face of the tank wall shall be no less than 0.5% of the cross sectional area of wall shotcrete.

F. Prestressing:

1. Circumferential prestressing of the tank shall be achieved by the application of cold-drawn, high-carbon steel wire placed under high tension.
2. A substantial allowance shall be made for prestressing losses due to shrinkage and plastic flow in the shotcrete and due to relaxation in the prestressing steel.
3. The prestressing design shall conform to the following minimum requirements:
   a. Working stress for the tank wall, fs, shall be a maximum of 115,000 psi.
   b. Working stress for the dome ring, fsd, shall be a maximum of 120,000 psi.
   c. The allowable design tensile stress in the prestressing wire before losses, fsi shall be 145,600 psi or no greater than 0.63 fu, where fu is defined as the ultimate strength of the wire.
   d. Areas to be prestressed will contain no fewer than 10 wires per foot of wall for 8 gauge and 8 wires per foot of wall for 6 gauge.
   e. A maximum of 24 wires per layer per foot for 8 gauge and 20 wires per layer per foot for 6 gauge will be allowed.

G. Wall Openings:

1. When it is necessary for a pipe to pass through the tank wall, the invert of such pipe or sleeve shall be no less than 18" above the floor slab. The prestressing wires required at the pipe elevation shall be distributed into circumferential bands immediately above and below the opening to maintain the required prestressing force while leaving an unbanded strip around the entire tank.
2. Unbanded strips shall have a vertical dimension of no more than 36" unless an axi-symmetric shell analysis is performed to account for compressive forces plus shear and moments caused by displacement of the prestressing wires into adjacent bands.

PART 2 PRODUCTS

2.1 PERFORMANCE

A. Performance of the materials used in the tank construction shall conform to the minimum requirements of this specification.

B. Substitutions to the materials in this specification may only be made if submitted in writing and approved by the engineer.

2.2 CONCRETE

A. Concrete shall conform to ACI 301/301M.

B. All concrete shall utilize Type I/II Portland cement.

C. A maximum of 25% of cementitious material may be fly ash.

D. Admixtures other than air-entraining and water reducing admixtures will not be permitted unless approved by the engineer.

E. Coarse and fine aggregate shall meet the requirements of ASTM C33/C33M.

F. Concrete mixes used in the construction of the tank shall conform to the following:

Mix	Compressive Strength (psi)	Minimum Cement Content (lbs)	Maximum Aggregate Size (in)	Maximum W/C Ratio	Air Content (%)	Slump (in)
Floor	4000	560	¾	0.45		4"+/- 1"
Dome	4000	600	⅜	0.45		4"+/- 1"

2.3 SHOTCRETE

A. Shotcrete shall conform to the requirements of ACI 506.2 except as modified herein.

B. All shotcrete mixes shall utilize Type I/II cement.

C. A maximum of 25% of cementitious material may be fly ash.

D. All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.

E. Admixtures will not contain more than trace amounts of chlorides, fluorides, sulfides or nitrates.

F. Fine aggregate shall meet the requirements of ASTM C33/C33M.

G. Shotcrete mixes used in the tank construction shall conform to the following:

Mix	Compressive Strength (psi)	Maximum W/C Ratio	Air Content (%)	Slump (in)	Fiber Reinforcement (lbs/cyd)
Core Wall	4000	0.42		4"+/-1"	-
Covercoat	4000	0.42		4"+/-1"	

2.4 PRESTRESSED REINFORCEMENT

A. The prestressing wire shall conform to the requirements of ASTM A821/A821M, Type B.

B. The prestressing wire size shall be 0.162" (8 gauge), 0.192" (6 gauge) or larger, but no larger than 0.250".

C. The ultimate tensile strength, fu shall be, 231,000 psi or greater for 8 gauge wire, 222,000 psi or greater for 6 gauge.

D. Splices for horizontal prestressed reinforcement shall be ferrous material compatible with the prestressing reinforcement and shall develop the full strength of the wire.

2.5 NON-PRESTRESSED REINFORCEMENT

A. Non-prestressed mild reinforcing steel shall be new billet steel meeting the requirements of ASTM A615/A615M with a minimum yield strength, f_y, of 60,000 psi.

B. Welded wire reinforcing shall be plain wire conforming to the requirements of ASTM A1064/A1064M with a minimum yield strength, f_y, of 65,000 psi.

2.6 GALVANIZED STEEL DIAPHRAGM

A. The galvanized steel diaphragm used in the construction of the core wall shall be 26 gauge with a minimum thickness of 0.017 in. conforming to the requirements of ASTM A653/A653M. Weight of zinc coating shall be not less than G90 of Table 1 of ASTM A653/A653M.

B. The diaphragm shall be formed with re-entrant angles and erected so that a mechanical key is created between the shotcrete and diaphragm.

C. The diaphragm shall be continuous to within 3 in. of the top and bottom of the wall. Horizontal joints or splices will not be permitted.

D. All vertical joints in the diaphragm shall be rolled seamed, crimped and sealed watertight using epoxy injection.

E. In all tanks designed to use a waterstop at the floor/wall joint, the steel shell diaphragm shall be epoxy bonded to the waterstop.

2.7 PVC WATERSTOPS, BEARING PADS AND SPONGE FILLER

A. Plastic waterstops shall be extruded from an elastomeric plastic material of which the base resin is virgin polyvinyl chloride.

B. The profile and size of the waterstop shall be suitable for the hydrostatic pressure and movements to which it is exposed.

C. Bearing pads used in floor/wall joints shall consist of neoprene, natural rubber or polyvinyl chloride.

D. Sponge filler at the floor/wall joint shall be closed-cell neoprene.

2.8 EPOXY

A. Epoxy Sealants:

1. Epoxy shall conform to the requirements of ASTM C881/C881M.
2. Epoxy used for sealing the diaphragm shall be Type III, Grade 1, and shall be 100% solids, moisture insensitive, low modulus epoxy.
3. Epoxy used for placing the waterstop shall be Type II, Grade 2, and shall be 100% solids, moisture insensitive, low exotherm epoxy.
4. When pumped, maximum viscosity of the epoxy shall be 10 poises at 77°F.
5. The epoxy sealants used in the tank construction shall be suitable for bonding to concrete, shotcrete, PVC and steel.

B. Bonding Epoxy:

1. Epoxy resins used for enhancing the bond between fresh concrete and hardened concrete shall conform to the requirements of ASTM C881/C881M.
2. Epoxy resins shall be a two-component, 100% solids, moisture-insensitive epoxy and shall be Type II, Grade 2.

2.9 SEISMIC RESTRAINT CABLES

A. When required by design, seismic restraint cables shall be seven-wire strand conforming to ASTM A416/A416M.

B. The strand shall be protected with a fusion-bonded, grit-impregnated epoxy coating conforming to ASTM A882/A882M.

C. The minimum yield strength of the seven-wire strand shall be 270,000 psi.

2.10 TANK ACCESSORIES

A. Minimum of one, 1' 5" x 4' 4" rectangular Type 316 stainless steel wall manhole for access to the interior of the tank. The cover shall also be of Type 316 stainless steel. The wall manhole shall be designed to resist hydraulic loading without excessive deflection.

B. Exterior ladder shall be fabricated from 6061-T6 and 6063-T6 aluminum and shall conform with all applicable OSHA standards. The ladder shall have an aluminum safety cage and lockable security gate and/or a safety climbing device as required to meet applicable OSHA standards.

C. Aluminum handrail shall be fabricated from 6061-T6 aluminum and shall conform with all applicable OSHA standards.

D. Interior ladder shall be fabricated from fiberglass shall conform with all applicable OSHA standards. The ladder shall have a safety climbing device manufactured from Type 316 stainless steel as required to meet applicable OSHA standards.

E. Roof hatch cover, roof ventilator, and liquid level indicator shall be fabricated from fiberglass.

F. Through-wall pipe sleeves shall be Type 316 stainless steel sleeves with neoprene modular seal units.

G. Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

2.11 COATINGS

A. See Finishes- Section 09900 Stothem EIF Systems.

PART 3 EXECUTION

3.1 EXAMINATION

A. All subgrade elevations shall be verified prior to starting tank construction.

3.2 INSTALLATION

A. Floor:

1. The subgrade shall be prepared by fine grading to ensure proper placement of reinforcing steel with proper bottom cover.
2. A 6-mil polyethylene vapor-barrier shall be placed after subgrade preparation has been completed.
3. Form and screed boards shall be of proper thickness and sufficiently braced to ensure that the floor is constructed within proper thickness tolerances.
4. Plate bolsters shall be used to support reinforcing steel supported directly on the subgrade to ensure positive control of placement of reinforcing steel.
5. The floor shall be vibratory screeded to effect consolidation of concrete and proper encasement of floor reinforcing steel.
6. The floor shall be water cured for a minimum of 7 days after casting.
7. The floor shall receive a light broom finish.

B. Core Wall:

1. The wall shall be constructed utilizing diaphragm and shotcrete with each conforming to the following:

   a. Diaphragm Erection:
      (1) The diaphragm shall be protected against damage before, during, and after erection. Nail or other holes shall not be made in the diaphragm for erection except in the top 3 inches. Holes shall not be made in the diaphragm except for inserting wall pipes or sleeves, reinforcing steel, bolts, or other special appurtenances. Such penetrations shall be sealed with an epoxy sealant which complies with Section 2.8 Epoxy.
   b. Shotcrete:
      (1) All shotcrete shall be applied by or under direct supervision of experienced nozzlemen certified by the American Concrete Institute (ACI) as outlined in ACI certification publication CP-60.
      (2) Each shotcrete layer shall be broomed prior to final set to effect satisfactory bonding of the following layer.
      (3) No shotcrete shall be applied to reinforcing steel or diaphragm that is encrusted with overspray.
      (4) No less than ⅛" thick shotcrete shall separate reinforcing steel and prestressing wire.
      (5) The diaphragm shall be encased and protected with no less than 1" of shotcrete in all locations.
      (6) The interior shotcrete shall receive a light broom finish.

c. Curing:
   (1) Interior and exterior portions of the shotcrete wall shall be water cured for a minimum of 7 days or until prestressing is completed.

C. Epoxy Injection:

1. Epoxy injection shall be carried out from bottom to top of wall using a pressure pumping procedure.
2. Epoxy injection shall proceed only after the diaphragm has been fully encased, inside and outside, with shotcrete.

D. Dome:

1. All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric.
2. All surfaces at the joint between the wall and the dome shall be coated with bonding epoxy which complies with Section 2.8 Epoxy.
3. Plastic bolsters shall be used to support reinforcing steel and welded wire reinforcement to ensure positive control on placement of steel.
4. The exterior surface of the dome shall receive a light broom finish.
5. The dome shall be water cured for a minimum 7 days after casting or until dome band prestressing is completed.

E. Prestressing:

1. The initial tension in each wire shall be read and recorded to verify that the total aggregate force is no less than that required by the design. Averaging or estimating the force of the wire on the wall shall not be considered satisfactory evidence of correct placement of prestressing wires.
2. Placement of the prestressing steel wire shall be in a continuous and uniform helix of such pitch as to provide in each lineal foot of core wall height an initial force and unit compressive force equal to that shown on the design drawings. Splicing of the wire shall be permitted only when completing the application of a full coil of wire or when removing a defective section of wire.
3. Shotcrete shall be used to completely encase each individual wire and to protect it from corrosion. To facilitate this encasement, the clear space between adjacent wires is to be no less than one wire diameter.
4. Prestressing shall be accomplished by a machine capable of continuously inducing a uniform initial tension in the wire before it is positioned on the tank wall. Tension in the wire shall be generated by methods not dependent on cold working or re-drawing of the wire. In determining compliance with design requirements, the aggregate force of all tensioned wires per foot of wall shall be considered rather than the force per individual wire, and such aggregate force shall be no less than that required by the design and as shown on approved drawings.

5. The tank construction company shall supply equipment at the construction site to measure tension in the wire after it is positioned on the tank wall. The stress measuring equipment shall include: electronic direct reading stressometer accurate to within 2%, calibrated dynamometers and a test stand to verify the accuracy of the equipment.
6. After circumferential prestressing wires have been placed, they shall be protected by encasement in shotcrete. This encasement shall completely encapsulate each wire and permanently bond the wire to the tank wall.
7. When multiple layers of wire are required, shotcrete cover between layers shall be no less than ⅛" thick.

F. Covercoat:

1. After all circumferential prestressing wires have been placed, a shotcrete cover having a thickness of no less than 1" shall be placed over the prestressing wires.
2. Horizontal sections of the wall shall form true circles without flat areas, excessive bumps or hollows.
3. The covercoat shall receive a sliced trowel finish.

G. Wall Openings:

1. All wall pipes, sleeves and manholes passing through the wall shall be sealed to the diaphragm by epoxy injection.

H. Coatings:

1. All coatings shall be applied a minimum of 28 days after final application of concrete or shotcrete.
2. All application procedures for coatings shall be in accordance with manufacturer's recommendations.
3. See Finishes- Section 09900 Stothem EIF Systems.

3.3 FIELD QUALITY CONTROL

A. Inspection and Testing:

1. Concrete and Shotcrete Testing:

a. Compression Tests:
(1) Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. At least one set of test

specimens shall be made for each 50 yards of concrete/shotcrete placed. Each set of test specimens shall be a minimum of 5 cylinders.

(2) Compression test specimens for concrete/shotcrete shall conform to ASTM C172/C172M for sampling and ASTM C31/C31M for making and curing test cylinders. Test specimens shall be 6-inch diameter by 12-inch high or 4-inch diameter by 8-inch high cylinders.

(3) Compression test shall be performed in accordance with ASTM C39/C39M. Two test cylinders will be tested at 7 days and two at 28 days. The remaining cylinder will be held to verify test results, if needed.

b. Air Content Tests (concrete only):

(1) Air content tests shall conform to ASTM C231/C231M (Pressure Method for Air Content).

(2) Tests for air content shall be made prior to concrete placement and whenever compression test specimens are made.

c. Slump Tests (concrete only):

(1) Slump tests shall be made in accordance with ASTM C143/C143M.

(2) Slump tests shall be made whenever compression test specimens are made.

2. Hydrostatic Testing:

a. The tank shall be tested for watertightness upon completion.

b. The testing for watertightness shall be completed as follows:

(1) Fill the tank with water to the maximum water level and let it stand for a minimum of 24 hours.

(2) Inspect the exterior of the tank wall and footing for damp spots. Damp spots shall be defined as spots where moisture can be picked up on a dry hand, the source of which is from inside the tank.

(3) Leakage through the wall or wall-base joint shall be repaired and the tank shall be retested using the above procedure.

3.4 CLEANING AND DISINFECTION

A. The interior of the tank shall be cleaned to remove debris, construction items, and equipment prior to testing and disinfection.

B. The following disinfection procedure shall be used to disinfect storage tanks used for potable water:

1. Method 2 or 3 will be used for disinfection of the tank in accordance with ANSI/AWWA C652.
2. When Method 3 is used, the disinfection plan required by Section 1.4 H. shall address any compatibility issues with the form of chlorine used for

disinfecting the storage tank with the type of disinfectant used in the normal production of the water used to fill the tank.

END OF SECTION

SECTION 13550
ELECTRIC MOTOR ACTUATORS FOR VALVES

PART 1 - GENERAL

A. Description

This section includes materials and installation of electric motor actuators for valves.

B. Submittals

1. Submit shop drawings in accordance with the General Conditions, Section 1 and the following.

2. Submit manufacturer's catalog data showing motor actuator parts and materials of construction, referenced by AISI, ASTM, SAE, or CDA specification and grade. Show motor actuator dimensions and weights. Show coatings.

3. Show the maximum torque required to open and close each motor-actuated valve.

4. Submit certified factory performance test records.

5. Submit motor data including nameplate data, insulation type, duty rating, and torque output at duty rating.

6. Submit electrical schematic drawings and wiring diagrams showing physical locations of components.

7. The manufacturer’s inspection, field testing and evaluation of the existing valves where actuators are to be installed.

C. Manufacturer's Services

Provide equipment manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

1. One (1) labor day at each site (for a total of two (2) labor days) to check the installation and advise during start-up, testing, and adjustment of the equipment.

PART 2 - MATERIALS

A. Manufacturers

1. Acceptable Manufacturers:
   - A. EIM
     1. M2CP Actuator (Series 2000)
   - B. Rotork Controls, Inc.
     2. IQ3 (quarter-turn).
   - C. Limitorque Corporation:
     3. Accutronix

2. All actuators on the project shall be of one manufacturer.

B. Motors for Electric Actuators

1. Motors shall be 120V/single phase or 480 volt/3 phase as called for on the drawings; specifically designed for high torque, low inertia duty. Motors for on/off, open/close actuators shall be designed and rated for 15-minute duty or 60 starts per hour at 104°F. Motors and starters for modulating actuators shall be designed for 30-minute duty or 600 starts per hour at 104°F.

2. Output capacity shall be sufficient to open or close the valve against the maximum differential pressure when the voltage is 10% above or below normal at the specified service conditions. Motors shall have Class F insulation. Provide motor with torque output (at duty rating) that exceeds the requirements of paragraph E below including safety factor.

3. Provide an electrical and mechanical disconnection of the motor without draining the lubricant from the actuator gear case.

C. Actuator Torque Requirements

1. Actuators being installed on existing valves shall include the manufacturer's inspection, field testing and evaluation of the existing valve in order to apply the applicable torque requirements in order to properly actuate the existing valves.

2. The rated output torque of the motor actuator shall be at least 1.5 times the maximum torque required to open or close the valve at any position including seating and unseating conditions when subjected to the most severe operating condition including any mechanical friction and/or other restrictive conditions that are inherent in the valve assembly. Do not include hammer-blow effect in sizing the actuator to comply with this torque requirement. Coordinate with the

valve manufacturer to assure that the motor actuator stall torque output does not exceed the torque limits of the valve operating stem or shaft.

3. Maximum torque shall include seating or unseating torque, bearing torque, dynamic torque, and hydrostatic torque. Assume that the differential pressure across the valve is equal to the pressure or head rating of the valve.

4. Assume a maximum pipeline fluid velocity of 7 fps with the valve fully open, unless a higher velocity is specified in the detailed valve specification.

D. Design of Electric Motor Actuators

1. Actuators shall comply with AWWA C542, except as modified herein. Output capacity of motors shall be sufficient to open or close the valve against the maximum differential pressure when the voltage is 10% above or below normal at the specified service conditions. Provide motor with torque output (at duty rating) that exceeds the requirements of the following paragraphs including safety factor.

2. Provide a reversing starter, three overloads (one in each ungrounded leg) or two motor thermal cutouts, 120-volt control power transformer, local-off- remote selector switch, stop-open-close push buttons, and open and closed indicator lights. Provide magnetic starters in actuators for open/close operation. Provide dry contact for remote indication of the actuator mode of operation. The contact shall be closed when the local-off-remote selector switch is in the remote position and the internal control power exists.

3. Provide a separate (remote) NEMA 4X enclosure with local/remote selector switch, stop-open-close push buttons, and open and closed indicator lights for motor actuators in height over 6 feet 6 inches above floor, or deck, in lieu of integral controls. A separate (remote) NEMA 4X enclosure with local/remote selector switch, stop-open-close push buttons, and open and closed indicator lights for all motor actuators positioned outside the limits of walkways, accessible areas or positioned over open water shall be provided.

4. Do not use external conduit for wiring any components within the actuator.

5. Gear actuators shall be totally enclosed and factory-grease packed or oil- bath lubricated. The power gearing shall consist of helical gears of heat- treated steel. Worm gears shall be alloy bronze accurately cut with a hobbing machine. Worm shall be hardened steel alloy. Design gears for 24- hour continuous service with an AGMA rating of 1.50.

6. Position switches shall be integrally geared to the actuator and be adjustable and

capable of actuation at any point between fully opened and fully closed positions. The position switches shall operate while the actuator is either in manual or in motor operation or when main power is not present. Provide motor actuators with position switches capable of being separately used to provide remote indication of end of travel in each direction and to stop motion at the end of travel in each direction.

7. Provide two individually adjustable torque switches to protect the valve and motor against overload in the opening and closing directions. Capable of interrupting control circuit in both opening and closing when valve torque overload occurs. To prevent hammering, the torque switch shall not reclose until the valve is made to travel in the opposite direction. Permits visible verification of switch position without disassembly.

8. Provide a manually operated handwheel that shall not rotate during electrical operation. In the event electrical power is interrupted, handwheel operation shall be activated by a hand lever attached to the mechanism. While the valve is being operated manually, the motor shall not rotate. Upon restoration of electrical power, the handwheel shall automatically disengage. Design the handwheel diameter such that hand operation will not damage the valve.

9. The position switch and torque switch contacts shall be capable of interrupting at least 0.2-ampere inductive load at 125-volt dc or 6-ampere inductive load at 120-volt ac.

10. Provide a lost motion device for open/close operation to permit the motor to reach full speed before the load is applied. Provide lost motion action for manual operation also. Do not provide lost motion device for modulating applications.

11. "Latching" shall be provided to inhibit high torque during unseating or starting in mid-travel against high inertia loads. The actuator electrical diagram shall be identical, regardless of whether the valve is to operate on torque or position limit. Provide the actuator with means to non-intrusively calibrate torque or position and interrogate the status and performance of the actuator.

12. Motor shall de-energize in the event of a stall when attempting to unseat a jammed valve.

13. The actuator shall be capable of functioning in an ambient temperature ranging from -33°C (22°F) to 70°C (140°F), up to 100% relative humidity.

14. Provide minimum 10-watt space heater mounted in the actuator housing to prevent condensation and maintain the temperature in the actuator housing 5 degrees above the ambient temperature in the structure.

15. Provide a time delay to prevent instant reversal of the actuator motor.

16. Provide terminal connections for external remote controls fed from an internal 24-volt or 120-volt supply.

17. Provide two separate 3/4-inch conduit connections for control and power wiring.

18. Design the actuator using the following "Service Conditions."

A. Design the actuator to move valves from fully closed to fully open = 30-55 seconds

B. Maximum Differential Pressure = 40 psi

E. Local Actuator Control

1. Integral to the actuator shall be local controls for Open, Close, and Stop, and a local/remote selector Switch:

   a. Open/Stop/Close Push Buttons

   b. Local/Off/Remote Selector Switch

2. All the necessary wiring, indication relays and terminals shall be provided in the actuator to accommodate the remote mounted push button control functions. Provide terminal connections for external remote controls fed from an internal 120-volt AC supply.

3. The following Control, Status and Alarm indication shall be available locally at the actuator:

Controls:	**Status:**	**Alarms:**
1. Open/Stop/Close	1. Motor Running Open Direction	1. Actuator Alarm
2. Desired Valve Position Control	2. Motor Running Closed Direction	2. Valve Alarm
	3. Fully Open	3. Battery Low Alarm, if required
	4. Fully Closed	
	5. Percentage Open	

4. The actuator must provide a local display of the position of the valve, even when the power supply is not present. The display shall be able to be rotated in 90 degree increments so as to provide easy viewing regardless of

mounting position.

5. The actuator shall include a digital position indicator with a display from fully open to fully closed in 1% increments with +/- ½% accuracy. Red, green, and yellow lights corresponding to Open, Closed, and Intermediate positions shall be included on the actuator. The digital display shall be maintained even when the power to the actuator is isolated.

6. The local display should be large enough to be viewed from a distance of six feet (6') when the actuator is powered up.

7. Provide a diagnostic module, which will store and enable download of historical actuator data to permit analysis of changes in actuator or valve performance. A software tool for a PDA or laptop shall be provided to allow configuration and diagnostic information to be reviewed, analyzed and reconfigured.

8. Diagnostic status screens must be provided to show multiple functions. Emergency Shut Down shall be selectable; Last-position, Full Open, Full Closed.

F. Actuator Communication

1. Capabilities shall be provided to position the valve (or gate) locally via the Local/Off/Remote selector switch and Open/Stop/Close push buttons.

2. For on/off service, when in remote, the actuator shall accept one remote signal to open the valve or gate and a second remote signal to close the valve or gate.

3. Discrete outputs to SCADA shall be provided for all limit and torque switches, and for Local/Off/Remote switch in Remote position, as required by the Drawings.

G. Wiring and Terminals

1. Internal wiring shall be tropical grade insulated stranded cable of appropriate size for the control and three-phase power. Each wire shall be clearly identified at each end. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable.

2. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal. The terminal compartment of the actuator shall be provided with a minimum of four threaded cable entries.

3. Control logic circuit boards and relay boards must be mounted on plastic mounts

to comply with double insulated standards.

4. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating:

   a. Serial Number

   b. External Voltage Values

   c. Wiring Diagram Number

   d. Terminal Layout

   This must be suitable for the contractor to inscribe cable core identification beside terminal numbers.

PART 3 - EXECUTION

A. Factory Performance Testing of Motor Actuator

Test each actuator prior to shipment in accordance with C542, Section 5.3. The application torque shall be maximum torque required to open or close the valve at position including seating and unseating conditions.

B. Storage and Temporary Installation Before Start-Up

If actuators are stored or installed outside or in areas subject to temperatures below 40°F or are exposed to the weather prior to permanent installation, provide the manufacturer's recommended procedures for extended storage. Provide temporary covers over the actuator electrical components. Exercise each actuator from its fully open to fully closed position at least once every seven days. Inspect electrical contacts before start-up.

C. Attaching Electric Actuators

The valve manufacturer shall mount the electric motor actuator and accessories on each valve and stroke the valve prior to shipment. Adjust limit switch positions and torque switches.

D. Painting and Coating

Provide factory applied powder coating for electric motor actuators. The coating system

shall be suitable for an ASTM B117 salt spray test for a minimum of 1,500 hours.

E. Field Installation

Install the valve and actuator as indicated in the drawings in accordance with the manufacturer's instructions. Keep units dry, closed, and sealed to prevent internal moisture damage during construction. Provide additional hangers and supports for actuators which are not mounted vertically over the valve or which may impose an eccentric load on the piping system.

F. Field Testing of Motor Actuators

1. Test motor actuators as installed by measuring the current drawn (in amperes) by each motor for unseating, seating, and running conditions. The measured current shall not exceed the current measurement recorded during the factory performance test.

2. If the measured current drawn exceeds the above value, provide a larger motor or gear drive or adjust the actuator so that the measured amperage does not exceed the value.

3. Assure that limit switches are placed at their correct settings. Open and close valves twice and assure that limit switches function.

G. Warranty

1. As called for in the General Conditions.

H. Certification

1. Provide a written certification from the equipment manufacturer that the equipment has been properly installed according to the plans, specifications and manufacturer’s specifications, and that the equipment is operating normally. Make all necessary corrections and adjustments at no additional cost to the Owner.

END OF SECTION

DIVISION 15 – MECHANICAL

SECTION 15062
DUCTILE IRON PIPE AND FITTINGS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and install, in the locations inside, and under buildings and structures as shown on the Drawings, all ductile iron piping, cast or ductile iron fittings, and appurtenances as specified herein.

B. General Design: The equipment and materials specified herein is intended to be standard types of ductile iron pipe and cast or ductile iron fittings for use in transporting sewage, sludges, water, and reclaimed water. All materials that contact drinking water or drinking water chemicals shall comply with AWWA Standards and NSF Standard 61.

1.2 QUALITY ASSURANCE

A. Qualifications: All of the ductile iron pipe and cast or ductile iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

B. Standards

1. ANSI A 21.50/AWWA C150
2. ANSI A-21/AWWA C151
3. ANSI A-21/AWWA C104
4. ANSI A-21.10/AWWA C110
5. ANSI A-21.53/AWWA C153
6. ANSI A-21.5/AWWA C105
7. AWWA C600
8. AWWA C651

C. Factory Tests: The manufacturer shall perform the factory tests described in ANSI A-21.51/AWWA C151.

D. Quality Control

1. The manufacturer shall establish the necessary quality control and inspection practice to ensure compliance with the referenced standards.

2. In addition to the manufacturer's quality control procedures, the Owner may select an independent testing laboratory to inspect the material at the foundry for compliance with these specifications. The cost of foundry inspection requested by

the Owner will be paid for by the Owner.

E. Equipment Manufacturers

1. American Cast Iron Pile Co.
2. U.S. Pipe and Foundry
3. Griffin
4. McWane
5. Or equal

1.3 SUBMITTALS

A. Materials and Shop Drawings

1. Submit shop drawings, including pipeline layouts, within and under buildings and structures. Shop drawings shall include dimensioning, methods and locations of supports and all other pertinent technical specifications. Shop drawings shall be prepared by the pipe manufacturer. Shop drawings for piping within and under buildings and structures shall be submitted within 30 days of Execution of Contract.

B. Operating Instructions: Submit Operation and Maintenance Manuals in accordance with Division One.

C. Manufacturer's Certification: Submit certification of compliance with the following, sworn by a corporate officer of the manufacturer and witnessed by a notary:

1. Factory tests and results

2. Dimensions and weights of fittings per respective AWWA Standard.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with the manufacturer's recommendations.

B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage to the pipe or fittings and their respective coatings. Pipe or fittings shall not be rolled off the carrier or dropped. Unloading shall be done by lifting with a forklift or crane. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective.

PART 2 –PRODUCTS

2.1 MATERIALS

A. Ductile Iron Pipe

1. Standards: ANSI A-21.50, AWWA C150, and ANSI A-21.51, AWWA C151

2. Thickness

a. Below ground piping: Pipes shall be the following minimum thickness

class unless otherwise noted or specified:

1) All size diameter Class 150

3. Joints

a. Push-on (below ground piping):

1) Standards: ANSI A21.11/AWWA C111
2) Class: The working pressure of the joint shall be equal to or exceed the rated working pressure of the pipe.
3) Gaskets: SBR (Styrene Butadine Rubber)

b. Flanged (above ground or inside below ground vaults):

1) Standards: ANSI A21.15, ANSI B16.1
2) Class: 125 lb factory applied screwed long hub flanges, plain faced without projection.
3) Gaskets
   (a) Spans less than 10 feet: full face 1/8-inch neoprene rubber
   (b) Spans greater than 10 feet: Toroseal gaskets as manufactured by American Cast Iron Pipe or equal.

c. Restrained Joints

1) "Manufactured": "Flex-Ring" or "Lok-Ring" restrained joint system as manufactured by American Ductile Iron Pipe, "Super Lock" as manufactured by Clow-McWane, Inc., or equal.
2) "Mechanical" Restraining Devices: Meg-a-Lug system as manufactured by EBBA Iron or equal (at fittings or as indicated on the drawings).
3) Class: 150psi (minimum) design pressure rating.
4) Refer to drawings for locations of restrained joints.

d. Joint Accessories

1) Mechanical joint bolts, washers and nuts: Ductile iron or Corten steel.
2) Flanged joint bolts, washers and nuts:
   (a) Above Ground: Hot dipped galvanized, Grade B, ASTM A-307
   (b) Below Ground: 304 stainless steel

e. Pipe Length (below ground installation): 20 feet maximum nominal length.

B. Fittings

1. Materials: Ductile iron or grey cast iron, AWWA C110

2. Pressure Class
   a. Mechanical Joint, Restrained Joint: Minimum 150 psi pressure rating.

   b. Flanged Joint: Class 125, plain

3. Compact Fittings: ANSI/AWWA A21.53/C153 (4-inch through 24-inch diameter only)

C. Wall Penetrations

1. Wall Pipes

   a. Material: Ductile iron or cast iron

   b. Type: Welded-on wall collar/water stop located in the center of the wall.

   c. Design: Full thrust at 250 psi transmitted to the structure wall. Tapped mechanical joint wall pipes may be used to facilitate concrete form work.

2. Wall Sleeves

   a. Material: Galvanized Schedule 40 Steel Pipe, ASTM A120

   b. Design: as manufactured by Thunderline Corporation, "Link Seal" or equal.

2.2 COATINGS, MARKING AND LININGS

A. Exterior Coatings

1. Below ground or in a casing pipe

   a. Type: Asphaltic coating, 1.0 mil DFT

   b. Markings: (continuous 2-inch wide stripe within top 90 degrees of pipe - minimum drying time 30 minutes before backfill). All ductile iron pipe shall be marked with a continuous stripe located within the top 90 degrees of the pipe. Said stripe shall be a minimum 2 inches in width and shall be oil based paint, blue in color for potable water, green for wastewater, and purple for reuse. Backfill shall not be placed for 30 minutes following paint application. At the Contractor's option, the pipe may be stripe-marked prior to pipe installation as follows:

Up to 8-inch diameter:	(2) 2-inch wide @ 180°
10 to 16-inch diameter:	(3) 2-inch wide @ 120°
18 to 24-inch diameter:	(4) 2-inch wide @ 90°
30 to 54-inch diameter:	(6) 2-inch wide @ 60°

Alternately, all ductile iron pipe may be marked along the crown of the pipe with an adhesive Underground Utility marking tape. Said tape shall be a

minimum 6 inches wide with a minimum 4.0 mil overall thickness inert plastic film formulated for extended use underground. Tape shall be specified and supplied in accordance with the A.P.W.A. national color code and shall be imprinted with the appropriate legend to define the type of utility line it protects.

c:	Color:	Potable water:	blue
		Wastewater:	green
		Reclaimed water:	purple

2. Above Ground

a. Not subject to non-potable water submergence or splashing: see Division 9.

b. Subject to non-potable water submergence of splashing: see Division 9.

c. Color: see Division 9.

B. Interior Lining (applied by pipe manufacturer)

1. Wastewater (use as indicated on the Drawings)

a. Epoxy Interior Lining (Wastewater): Ductile iron pipe, fittings, and specials shall be lined with Protecto 401 Ceramic Epoxy, a high build multi- component amine cured Novalac epoxy lining, containing at least 20 percent by volume of ceramic quartz pigment, manufactured by Indurall Coatings, Inc., Birmingham, Alabama, or approved equal. The interiors of the ductile iron pipe, fittings, and specials shall receive 40 mils dry film thickness (DFT) of the ceramic epoxy protective lining. Storage, surface preparation, application, and safety precautions shall strictly follow manufacturer's instructions.

b. Cement-Motor Interior Lining (Reuse and Potable Water): Ductile iron pipe, fittings, and specials shall be cement lined in accordance with ANSI/AWWA C104, current revision, "Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water." The cement lining shall have standard thickness.

2. Reuse Water: Cement mortar lining with a seal coat of asphaltic material in accordance with ANSI/AWWA A21.4/C104.

3. Potable Water: Cement-mortar lining for ductile iron pipe and ductile and gray iron fittings for water service is in accordance with ANSI/AWWA C104/A21.4, and is listed by ANSI/NSF Standard 61 for potable water contact.

C. Polyethylene Encasement (required for all below ground piping, fittings, and appurtenances located less than 10 feet from a gas main and as indicated on the Drawings):

1. Standard: ANSI A21.5/AWWA C105, 8 mil minimum thickness.

2. Color: Color coded per paragraph A.1 above.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Standards: AWWA C600-87

B. Underground Ductile Iron Pipe and Fittings

1. Bedding for Ductile Iron Pipe: Minimum bedding requirements shall be Type 4 as defined in ANSI/AWWA C600, latest revision. Provide proper bedding required, in accordance with thickness class of pipe being laid and depth of cover. Proper pipe

laying conditions shall be in accordance with ANSI/AWWA C150and C151,latest revisions, and ANSI/AWWA C600, latest revision.

2. Placement

a. Alignment: In accordance with lines and grades shown on the Drawings. Deflection of joints shall not exceed 75 percent of that recommended by the manufacturer.

b. Polyethylene encasement: Provide polyethylene wrap around piping, fittings and appurtenances located less than 10 feet from a gas main and as indicated on the Drawings.

3. Cutting: When required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of the pipe to be used with a push-on bell shall be beveled.

4. Joints

a. Joint Placement

1) Push on joints: Pipe shall be laid with the bell ends facing upstream. The gasket shall be inserted and the joint surfaces cleaned and lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.

2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the “Notes on Method of Installation” under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

C. Above ground and interior ductile iron pipe and fittings

1. Pipe Supports

a. General: All piping shall be properly supported with hangers, supports, base elbows and tees, concrete piers and pads as shown on the Drawings. All pipe and appurtenances connected to equipment shall be supported to prevent any strain from being imposed on the equipment.

b. Support spacing: 8 feet on centers and at each fitting, and where shown on the Drawings.

c. Hangers for horizontal piping

1) Material: heavy malleable iron
2) Type: Adjustable, swivel, split ring or adjustable swivel, pipe-roll

d. Hangers for vertical piping

1) Material: Wrought iron
2) Type: Clamp

2. Placement

a. Alignment: In accordance with lines and grades shown on the Drawings. Each section of pipe shall be cleaned thoroughly prior to installation.

3. Flanged Joints: Joints shall be fitted so that the contact faces bear uniformly on the gasket.

D. Thrust Restraint

1. General: Thrust restraint shall be accomplished by restrained joints.

2. Length of Restrained Joints: In accordance with the drawings.

3.2 CLEANING

A. General: At the conclusion of the work, the Contractor shall thoroughly clean the new pipe lines by flushing with water or other means to remove all dirt, stones, or other material which may have entered the line during the construction period.

B. Correction of Non-Conforming Work: All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the Owner. Non-conforming work shall be defined as failure to adhere to any specific or implied directive of this Project Manual and/or the drawings, including but not limited to pipe not laid straight, true to the lines and grades as shown on the drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, visible or detectable leakage and failure to pass any specified test or inspection.

3.3 FIELD TESTING

A. General: At least ten (10) days prior to beginning testing, the Contractor shall submit a testing plan to the Engineer for review.

B. Gravity Piping

1. The Contractor shall perform low pressure air test on all gravity piping.

2. Standard: UNI-B-6-79, "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe, as published by UNI-Bell Plastic Pipe Association.

3. Test Section: Between adjacent manholes, not to exceed 400 feet.

4. Test Pressure: 4.0 psig greater than the average back pressure of any groundwater above the pipe invert, but not greater than 9.0 psig.

5. Preparation

   a. Before testing, the Contractor shall determine groundwater level and adjust the test pressure accordingly.

   b. Before testing, the Contractor shall flush all gravity lines to obtain free flow through each line.

6. Low Pressure Test Procedure

   a. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches the specified test pressure.

   b. When temperatures have been equalized and pressure stabilized at the specified test pressure, the air supply shall be shut off.

   c. If the time shown in the Table elapses before the air pressure drops 1.0 psig, the section undergoing the test shall have passed.

d. Should the section fail to meet test requirements, the Contractor shall determine the sources of leakage, make necessary repairs and repeat the test until the test section passes.

7. Closed Circuit Television Inspection: (by Contractor)

a. Internal video inspection for the gravity sewer shall be performed by the Contractor to check for alignment and deflection. The television inspection shall also be used to check for cracked, broken or otherwise defective pipe, and overall pipe integrity.

b. The video internal inspection will be performed in two stages. The first inspection will be within 30 days after the installation of the gravity sewer pipe, provided the road base is in place and the manhole rings and covers are to grade. The requirement of road base being in place shall be waived if the top of the sewer is 12 feet below the finished grade. In such cases, the video inspection shall be performed once the trench has been compacted up to the road base. The second inspection of the gravity sewer pipe will be before the end of the one-year warranty period.

c. If the first or second video inspection reveals cracked, broken, or defective pipe, or pipe misalignment resulting in vertical sags in excess of 1-1/2" and in the case of PVC pipe a ring defection in excess of 5 percent, the Contractor shall be required to repair or replace the pipeline. Successful passage of both the low pressure air exfiltration test and video inspection is required before acceptance by the Owner.

d. Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to the Engineer for approval. Pressure grouting of pipe or manholes shall not be considered as an acceptable method of repair.

END OF SECTION