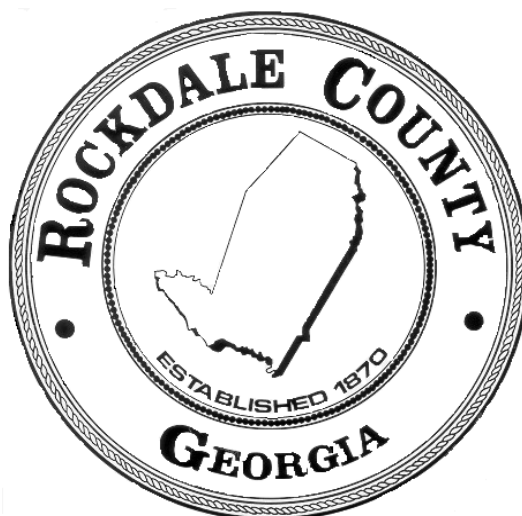


ROCKDALE COUNTY, GEORGIA

February 18, 2026

HONEY CREEK AND SCOTT CREEK PUMP STATIONS AND FORCE MAINS

**INVITATION TO BID
No. 25-35**



**ROCKDALE COUNTY FINANCE DEPARTMENT
PROCUREMENT DIVISION
958 MILSTEAD AVENUE
CONYERS, GA 30012
770-278-7552**

INTRODUCTION:

This is an Invitation to Bid (ITB) for the **Rockdale Water Resources – Honey Creek and Scott Creek Pump Stations and Force Mains** in Rockdale County. Instructions for preparation and submission of a bid are contained in this packet. Bids must be typed or printed in ink.

The Contractor will furnish all products, tools, construction equipment, skill, and labor of every description necessary to carry out and to complete in a good, firm, substantial workmanlike manner for **Honey Creek and Scott Creek Pump Station sand Force Mains** in accordance with the County's Request for Proposal No. 25-35, incorporated herein by reference, (hereinafter called "Work"), and Contractor's proposal dated _____ (input date), attached hereto and made a part hereof, (hereinafter called "Proposal"). Contractor shall provide, at their expense, all vehicles and equipment necessary to provide this work.

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, and 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 ITB and all questions arising subsequent to award are to be addressed to the Purchasing Division via email to Adrienne Brown, at Adrienne.m.brown@rockdalecountyga.gov.

Rockdale County Finance Department
Purchasing Division
Attn: Adrienne Brown
958 Milstead Avenue
Conyers, GA 30012
Phone: (770) 278-7557

E-mail: Adrienne.m.brown@rockdalecountyga.gov

To maintain a "level playing field", and to assure that all bidders receive the same information, bidders 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 bidder.

BID COPIES FOR EVALUATION:

One (1) USB Flash Drive in Adobe PDF format will be required for review purposes. Flash Drives that are blank or have incorrect information on them will not be acceptable and may be justification for disqualification. Check your Flash Drive(s) to ensure that they have the appropriate material on it before submitting. No hard copies will be accepted.

The ITB number must be clearly written on the outside of the envelope. **Incomplete, incorrect, unsealed, unmarked, or improperly submitted bids may be rejected.**

CONTRACT TERM:

The Contract Term will be 730 calendar days from the Notice to Proceed (NTP).

DUE DATE:

Sealed bids 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, April 2, 2026**. Bids received after this time will not be accepted. Bidders are not required to attend bid opening.

PRE-BID CONFERENCE:

There will be a **MANDATORY** Pre-Bid Conference held at **(Dirt entrance to Wastewater Plant) 4100 Troupe Smith Rd., at 10:00 a.m., local time, Wednesday, March 18, 2026**. Prime bidders who arrive more than 5 minutes after the start of the meeting (as stated in the solicitation and by the Procurement representative's watch) or after the discussion portion of the meeting (whichever comes first) may not be permitted to submit a bid on the project. Any questions and/or misunderstandings that may arise from this ITB may be asked and answered at the pre-bid conference; however, oral responses are not authoritative. Bidders are encouraged to review the ITB before attending the pre-bid conference. Questions received after the pre-bid conference must be submitted in writing to Adrienne.m.brown@rockdalecountyga.gov. *Any contractor who intends to submit a Bid is required to attend this meeting.*

QUESTIONS AND CLARIFICATIONS:

All questions and/or requests for clarifications concerning this ITB must be submitted to the Purchasing Division via email to adrienne.m.brown@rockdalecountyga.gov or at the above address no later than **2:00 p.m., local time, on Thursday, March 26, 2026**. It shall be the Bidders responsibility to seek clarification as early as possible prior to the due date and time. 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, under Bid Opportunities. Questions or requests for clarifications received after this deadline will not receive a response.

ADDENDA:

Answers to questions submitted that materially change the conditions and specifications of this ITB will be issued in an addendum and posted to the County's website at www.rockdalecountyga.gov under Bid Opportunities. Any discussions or documents will be considered non-binding unless incorporated and issued in an addendum.

It is the bidder's responsibility to check the Rockdale County website at www.rockdalecountyga.gov, under Bid Opportunities for any addenda that may be issued, prior to submitting a bid for this ITB.

WARRANTY AND / OR GUARANTY:

The bidder will state below or will furnish a separate letter attachment which fully explains the condition of Warranty and/or Guaranty. If no Warranty and/or Guaranty is applicable, it must be so stated. NOTE: Failure to respond to the requirement of this paragraph may result in the bid being non-responsive.

FOREIGN PRODUCTS:

Rockdale County prefers to buy items produced and/or manufactured in the United States of America; however, foreign products may be considered provided it is so stated. Bidder certifies that item(s) offered on this bid is/are manufactured/produced in the United States.

Yes _____ No _____

If "No" state place: _____

UTILITY CONTRACTOR'S LICENSE

As required by O.C.G.A. § 43-14-8.2, *et seq.*, a Bidder responding to this Invitation to Bid must provide a copy of its Georgia Utility Contractor's License. The Georgia Utility Contractor's License must be issued in the name of the Bidder. All licenses must be current, valid, and issued in compliance with applicable law. Failure to provide this license with the Bid may result in the proposed Bid being deemed non-responsive.

QUALIFICATIONS OF OFFERORS:

Bidders must have a current business license from their home office jurisdiction and provide a copy of that license with the submittal of their bid response. Rockdale County vendors doing business in Rockdale County must have a current Rockdale County Business License.

Bids 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.

Bidders are to submit at least **three (3) references** from projects with similar experience using the materials and process in this Invitation to Bid.

ROCK CLAUSE

If in the process of excavating for any work related to this Contract, the Contractor hits rock that is deemed by the Contractor to be above and beyond expected, Contractor shall stop work immediately and notify the Owner in writing. Work will proceed on an agreed hourly charged basis.

Contractor shall promptly, and before the conditions are disturbed, give a written notice to owners on encountering unforeseeable conditions adversely affecting the work. Owners shall investigate the site conditions promptly after receiving notice. If the conditions cause an increase in cost to contractor or the time required for performing any part of the work and were not reasonably foreseeable by an experienced contractor, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

DEBRIEFINGS:

In lieu of Post-Award debriefings, Rockdale County will provide the final evaluation Score Sheet. The Score Sheet will include the scores for all firms who responded and will typically be provided with a PDF file and e-mailed.

SILENCE OF SPECIFICATIONS

The apparent silence of these specifications and any supplemental specifications as to any details, or the omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail and that only materials of first quality and correct type, size and design are to be used. All workmanship is to be first quality. All interpretations of this specification shall be made upon the basis of this statement, with County interpretation to prevail.

OPTION TO AUDIT

Successful bidder will be required to maintain complete records during the life of the contract and for a period of one year after completion of the contract. Such records are to be made available to the County if officially requested, to be audited by a designated County auditing staff. In such audits reveal overcharges and/or undercharges, such will be adjusted, and compensation made by either party to correct charges.

TORT IMMUNITY:

No officer, employee, or agent of the County acting within the scope of his/her employment or function shall be held personally liable in tort or named as a defendant in any action for injury or damage suffered because of any act, event, or failure to act.

SUBMITTAL COST AND CONFIDENTIALITY

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.

OPEN RECORDS

The contents of the bids will not be made public until after an award and contract has been executed.

AWARD OF CONTRACT:

The Rockdale County Procurement Office and/or Evaluation Committee make 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. Rockdale County reserves the right to make no awards, multiple awards, one award for all items; or whatever the County deems to be in its best interest.

QUANTITIES:

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

SELECTION PROCESS:

The Rockdale County Procurement Office and/or Evaluation Committee make 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 Purchasing Department 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 bid represents the best value after evaluation in accordance with the factors listed below. Rockdale County Board of Commissioners may reject any or all bids if such action is in the county's interest.

Rockdale County may evaluate bids and award a contract without discussions with offerors. Therefore, the offeror's initial bid 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.

INSURANCE:

Before starting any work, the successful contractor must furnish to Rockdale County certificate(s) of insurance from companies doing business in Georgia. The Company shall maintain in full force and effect the following insurance during the term of the Agreement:

<u>Coverages:</u>	<u>Limits of Liability:</u>
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
General Liability	\$1,000,000.00
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 must contain policy number, policy limits, and policy expiration date of all policies. The Invitation to Bid (ITB) number and project name must be inserted in the Description of Operations section of the certificate.

Certificates are to be issued to:
 Rockdale County, Georgia
 958 Milstead Avenue
 Conyers, GA 30012

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 120 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.

All sureties of bonds for Rockdale County must be licensed to do business in the State of Georgia and must be listed on the Department of Treasury Federal Register.

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.

ILLEGAL IMMIGRATION REFORM AND ENFORCEMENT ACT OF 2011

Vendors submitting a Qualification package in response to this ITB must complete the Contractor Affidavit under O.C.G.A. §13-10-91(b)(1) which is provided with the ITB 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.

LOCAL VENDOR PREFERENCE POLICY

The Rockdale County Board of Commissioners adopted a Local Vendor Preference Policy on March 26, 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 Invitations to Bid. A copy of the Policy may be downloaded from the County website at www.rockdalecountyga.gov, Government, Finance, Finance Policies. Local vendors interested in being considered for the Local Vendor Preference must submit an Affidavit of Eligibility with their bid response. The form is attached to these bid documents.

The Local Vendor Preference Policy will apply to this ITB.

EQUAL BUSINESS OPPORTUNITY POLICY:

This ITB qualifies for Rockdale County Government EBO program. For questions regarding the EBO program, please contact Adrienne Brown at adrienne.m.brown@rockdalecountyga.gov or 770-278-7557.

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, under Bid Opportunities, and scrolling down to the bottom of the page.

LIQUIDATED DAMAGES

Time is of the essence and is an essential element of this Contract, and the Contractor shall pay to the County, not as a penalty, but as liquidated damages, the sum of \$100.00 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 County and the Contractor due to the uncertainty and impossibility of making a determination as to the actual and consequential damages incurred by the County 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.

PIGGYBACKING

Rockdale County encourages and agrees to the successful bidder extending the pricing, terms and conditions of this solicitation or resultant contract to other governmental entities at the discretion of the successful bidder.

GENERAL INFORMATION:**RECEIPT OF BID:**

No bids 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 bid not properly addressed and identified.

WITHDRAWAL OF BID:

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

REJECTION OF BID:

Rockdale County may reject any and all bids and must reject a bid 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 bid in the proposing procedure. Rockdale County shall be the sole judge as to which bid 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 bidders.

STATEMENT OF EXPERIENCE AND QUALIFICATIONS:

The bidder 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 bidder is not satisfactory, the bid of such bidder may be rejected. The successful bidder 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 bid, the bidder represents and warrants that such bid is genuine and not sham or collusive or made in the interest or in behalf of any person not therein named, that the bidder has not directly or indirectly induced or solicited any other bidder to put in a sham bid, or any other person, firm or corporation to refrain from proposing and that the bidder has not in any manner sought by collusion to secure to that bidder any advantage over any other bidder.

INTEREST OF:

By submitting a bid, the bidder 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 bid or in the contract which may be made under it, or in any expected profits to arise therefrom.

DOCUMENTS DEEMED PART OF THE CONTRACT:

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

GOVERNING LAWS:

This contract is made under and shall be governed and construed in accordance with the laws of the State of Georgia.

ERRORS AND OMISSIONS:

The vendor shall not take advantage of any errors or omissions in this Bid Request and shall promptly notify Rockdale County of any omissions or errors found in this document.

STANDARD INSTRUCTIONS:

1. The instructions contained herein shall be construed as a part of any bid invitation and/or specifications issued by Rockdale County and must be followed by each bidder.
2. The written specifications contained in this bid shall not be changed or superseded except by written addendum from Rockdale County. Failure to comply with the written specifications for this bid 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 bid price.
4. The following number, ITB No. **25-35**, must be written clearly on the outside of USB Flash Drive proposal envelope in order to avoid prior opening in error.
5. All USB Flash Drive 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. USB Flash Drive 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 bids submitted shall be valid and may not be withdrawn for a period of 120 days from the due date.
7. The Proposal Form submitted on the USB Flash Drive **must be the first page** and include the name of the business, mailing address, the name, title and signature of the person submitting the proposal.
8. Rockdale County reserves the right to accept a bid that is not the lowest price if, in the County's judgment, such bid is in the best interest of the County and the public. The County reserves the right to reject any and all bids.
9. Telephone, Emailed or Facsimile bids 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.

Federal I.D. #58-6000882
Sales Tax Exempt #308750008
11. If applicable, completed questionnaires must be signed manually. Rockdale County reserves the right to accept or reject any bid on the basis of incomplete or inaccurate answers to the questionnaire.
12. If applicable, warranty information shall be provided.
13. Bidders shall state delivery time after receiving order.
14. Bidders shall identify any subcontractors and include an explanation of the service or product that they may provide.

BID SPECIFICATIONS:

The specifications are as follows and on the attached pages:

The Construction of the Honey Creek and Scott Creek Pump Stations and Force Mains

The work to be performed under this Contract consists of furnishing and installing all labor, equipment, tools, materials, and incidentals required for construction of Honey Creek and Scott Creek Pump Stations, Force Mains and Gravity Sewers, as set forth in the Bid Table, as shown on the Drawings and as specified herein.

BID TABLE – ITB No. 25-35

Instructions: Type or clearly print all prices. Any modifications to items, quantities, or units will result in rejection of the bid. This form **MUST** be submitted with Bid.

BID TABLE FOR ROCKDALE WATER RESOURCES HONEY CREEK & SCOTT CREEK PUMP STATIONS & FORCE MAINS

Bid Item #	Item Description	Est. Qty.	Unit	Unit Price	Total Amount
1	PUMP STATION NO.1 (HONEY CREEK) COMPLETE	1	LS	\$	\$
2	PUMP STATION NO. 2 (SCOTT CREEK) COMPLETE	1	LS	\$	\$
3	8" DIP GRAVITY SEWER (0' – 6' CUT)	23	LF	\$	\$
4	8" DIP FORCE MAIN SEWER (0' – 6' CUT)	187	LF	\$	\$
5	8" HDPE FORCE MAIN SEWER (0' – 6' CUT)	6,284	LF	\$	\$
6	8" HDPE FORCE MAIN SEWER (6' – 12' CUT)	8,428	LF	\$	\$
7	10" PVC GRAVITY SEWER (0' – 6' CUT)	350	LF	\$	\$
8	10" PVC GRAVITY SEWER (6' – 12' CUT)	151	LF	\$	\$
9	10" DIP GRAVITY SEWER (6' – 12' CUT)	64	LF	\$	\$
10	12" DIP GRAVITY SEWER (0' – 6' CUT)	165	LF	\$	\$
11	12" HDPE FORCE MAIN SEWER (0' – 6' CUT)	11,197	LF	\$	\$
12	12" HDPE FORCE MAIN SEWER (6' – 12' CUT)	8,877	LF	\$	\$
13	8" DIP TO HDPE TRANSITION COUPLING	1	EA	\$	\$
14	8" HDPE TO DIP TRANSITION COUPLING	1	EA	\$	\$
15	12" DIP TO HDPE TRANSITION COUPLING	1	EA	\$	\$
16	COMBINATION VACUUM/AIR RELEASE VALVE ASSEMBLY	12	EA	\$	\$
17	4' DIAMETER STANDARD MANHOLE (0' – 6' DEPTH)	6	EA	\$	\$
18	4' DIAMETER EXTRA DEPTH MANHOLE (6' – 12' DEPTH)	19	VF	\$	\$
19	4' DIAMETER EXTRA DEPTH MANHOLE (12' + DEPTH)	2	VF	\$	\$
20	FLOWABLE FILL (ABANDON EXISTING 10" & 12" SEWER MAIN IN PLACE)	15	CY	\$	\$
21	ABANDON (GRAVEL 57 STONE FILL) EXISTING STANDARD MANHOLES	10	CY	\$	\$
22	SERVICE WATER METER RELOCATION	24	EA	\$	\$

23	TRENCH ROCK EXCAVATION & REMOVAL	4,000	CY	\$	\$
24	GRAVEL DRIVEWAY REPLACEMENT	615	SY	\$	\$
25	CONCRETE PAVEMENT REPLACEMENT	3,040	SY	\$	\$
26	ASPHALT DRIVEWAY PAVEMENT REPLACEMENT	950	SY	\$	\$
27	ASPHALT ROADWAY PAVEMENT REPLACEMENT	3,375	SY	\$	\$
28	REMOVE & REPLACE FENCE	50	LF	\$	\$
29	REMOVE & REPLACE RAILROAD CROSS TIES	2	EA	\$	\$
30	CONNECT TO & RECONSTRUCT INVERT EXISTING MANHOLE	3	EA	\$	\$
31	REMOVE & REPLACE EXISTING MAILBOXES	2	EA	\$	\$
32	REMOVE & REPLACE EXISTING STREET SIGN	1	EA	\$	\$
33	SEWER FORCE MAIN MARKER SIGN	2	EA	\$	\$
34	REMOVE AND REPLACE CURB/GUTTER	400	LF	\$	\$
35	EROSION & SEDIMENT CONTROL	1	LS	\$	\$
36	16" STEEL CASING (STA 348+05 TO STA 348+45)	40	LF	\$	\$
37	REMOVE & REPLACE EXISTING GUARDRAIL	2	EA	\$	\$
38	LANDSCAPING ALLOWANCE	1	EA	\$150,000	\$150,000
39	MOBILIZATION	1	LS	\$	\$
40	MAINTENANCE OF TRAFFIC	1	LS	\$	\$
41	CONTINGENCY ALLOWANCE (10% OF ITEMS 1-40 TOTAL)	1	LS	\$	\$
TOTAL BASE BID AMOUNT (ITEMS 1 THROUGH 41, NUMERALS ONLY)				\$	
TOTAL BASE BID AMOUNT (ITEMS 1 THROUGH 41, WORDS ONLY)					

Representative's Signature: _____ Date: _____

BID FORM – ITB No. 25-35

Instructions: Complete all **THREE** parts of this bid form. This form **MUST** be submitted with your bid.

PART I: Bid Summary

Complete the information below.

TOTAL LUMP SUM AMOUNT	\$
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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”		
“4”		
“5”		
“6”		

PART III: Vendor Information:

Vendor 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/She is _____ (owner, partner officer, representative, or agent) of _____, the Vendor that has submitted the attached ITB;

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

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

(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 ITB in connection with the Contract for which the attached ITB 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 ITB 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 ITB 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 _____, 202__

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 ITB;

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

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

(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 ITB in connection with the Contract for which the attached ITB 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 ITB 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 ITB 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 _____, 202__.

Name _____

Title _____

My commission expires (Date)

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

The undersigned contractor ("Contractor") executes this Affidavit to comply with O.C.G.A. § 13-10-91 related to any contract to which Contractor is a party that is subject to O.C.G.A. § 13-10-91 and hereby verifies its compliance with O.C.G.A. § 13-10-91, attesting as follows:

- a) The Contractor has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program;
- b) The Contractor will continue to use the federal work authorization program throughout the contract period, including any renewal or extension thereof;
- c) The Contractor will notify the public employer in the event the Contractor ceases to utilize the federal work authorization program during the contract period, including renewals or extensions thereof;
- d) The Contractor understands that ceasing to utilize the federal work authorization program constitutes a material breach of Contract;
- e) The Contractor will contract for the 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(a), (b), and (c);
- f) The Contractor acknowledges and agrees that this Affidavit shall be incorporated into any contract(s) subject to the provisions of O.C.G.A. § 13-10-91 for the project listed below to which Contractor is a party after the date hereof without further action or consent by Contractor; and
- g) Contractor acknowledges its responsibility to submit copies of any affidavits, drivers' licenses, and identification cards required pursuant to O.C.G.A. § 13-10-91 to the public employer within five business days of receipt.

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 _____, _____, 20____ 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 _____, 20_____.

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 _____, ___, 202__ 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 _____, 202__.

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 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 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-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 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 _____, __, 202__ 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 _____, 202__.

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 _____, 202__.

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.

BID BOND FORM

KNOW ALL MEN BY THESE PRESENTS, that we, _____ (hereinafter called the Principal) and _____ (hereinafter called the Surety), a corporation chartered and existing under the laws of the State of _____ with its principal offices in the City of _____ and listed in the Federal Register and licensed to write surety bonds in the State of Georgia, are held and firmly bound unto Rockdale County, Georgia, in the full and just sum of _____ Dollars (\$ _____) good and lawful money of the United States of America, to be paid upon demand of Rockdale County, Georgia, to which payment well and truly to be made we bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally and firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted to Rockdale County, Georgia, a Bid for ITB No. _____ - _____.

WHEREAS, the Principal desires to file this Bond in accordance with law to accompany this Bid. NOW, THEREFORE, the conditions of this obligation are such that if the Bid be accepted within one hundred and twenty (120) days of the Bid opening, the Principal shall execute a Contract in accordance with the Bid and upon the terms, conditions, and prices set forth therein, and in the form and manner required by Rockdale County, Georgia, and within ten (10) days from the date of Notice of Award of the Contract, execute a sufficient and satisfactory Performance Bond equals to 100% of the Contract Price and Payment Bond equals to 100% of the Contract Price, payable to Rockdale County, Georgia, in form and with security satisfactory to Rockdale County and furnish satisfactory proof of the insurance required, then this obligation to be void; otherwise, to be and remain in full force and virtue 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 Rockdale County, Georgia, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 202__.

PRINCIPAL

By: _____ (SEAL)
Signature of Principal

Print Name and Title of Authorized Signer

Print Name of Principal Business

ATTEST:

Corporate Secretary

SURETY

By: _____ (SEAL)
Signature of Surety (by Power of Attorney)

Print Name and Title of Authorized Signer

Print Name of Surety Business

WITNESS:

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
 _____ (\$ _____) for construction of Rockdale County, Georgia, **ITB#** :
 _____ as more fully appears in a written Contract Agreement bearing the date of _____, 2026, 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 _____
 __, 2026, executed in two (2) counterparts.

CONTRACTOR - PRINCIPAL:

By: _____

Name: _____

(Please Print)

Title: _____

Address: _____

Phone: _____

ATTEST:

Name: _____

(Please Print)

Title: _____

(SEAL)

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: _____

(SEAL)

WITNESS:

Name: _____

(Please Print)

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:

By: _____

Name: _____

(Please Print)

Title: _____

Address: _____

Phone: _____

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 _____, 2026, for construction of Rockdale County, Georgia **ITB#** _____ : _____ (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) 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.
- (c) 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 _____, 2026, executed in two (2) counterparts.

CONTRACTOR - PRINCIPAL:

By: _____

Name: _____

(Please Print)

Title: _____

Address: _____

Phone: _____

ATTEST:

Name: _____

(Please Print)

Title: _____

(SEAL)

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: _____

(SEAL)

WITNESS:

Name: _____

(Please Print)

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:

By: _____

Name: _____

(Please Print)

Title: _____

Address: _____

Phone: _____

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

- 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).

- 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

- What is the Contractor's current bonding capacity? _____
- What is the value of the Contractor's work currently under contract? _____

IV. COMPANY EXPERIENCE – SIMILAR PROJECTS

- 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:

Reference/Project #1:

Name and Address: _____

Date of Construction/Project: _____

Type of Construction/Project: _____

Contract Price: _____

Owner contact info: _____

Architect/Engineer contact info: _____

(if applicable) _____

Reference/Project #2:Name and Address: _____

Date of Construction/Project: _____

Type of Construction/Project: _____

Contract Price: _____

Owner contact info: _____

_____Architect/Engineer contact info: _____
(if applicable) _____**Reference/Project #3:**Name and Address: _____

Date of Construction/Project: _____

Type of Construction/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:



ROCKDALE COUNTY LOCAL VENDOR PREFERENCE

AFFIDAVIT OF ELIGIBILITY

Complete all areas below. Incomplete forms may be rejected.

1. LEGAL NAME OF FIRM: _____

Mailing Address: _____

Physical Address (if different): _____

2. Year your business was established in Rockdale County: _____

3. Business License:

License Number: _____ County _____

4. For transactions which require sales tax, provide the following Reseller information:

Reseller Permit Number: — — — — —

Enter the Company Name and Address as it appears on permit:

5. Does your business have more than one office in the State of Georgia?

Yes _____ No _____

If Yes, specify the office location considered as the point-of-sale for sales tax purposes:

6. Was the local business required to pay business and/or real property tax for the most recent tax year?

Yes _____ No _____

If Yes, did the local business pay any of this tax to Rockdale County?

Yes _____ No _____

Under penalty of perjury, the undersigned states that the foregoing statements are true and correct. The undersigned also acknowledges that any person, firm, corporation, or entity intentionally submitting false information to the County in an attempt to qualify for local preference shall be prohibited from bidding on Rockdale County products and services for a period of one (1) year.

Authorized Signature: _____

Date: _____

Printed Name & Title: _____

Phone: _____

(PAGE 1 OF 6)

**AGREEMENT FOR THE CONSTRUCTION OF
THE HONEY CREEK AND SCOTT CREEK
PUMP STATIONS AND FORCE MAINS**

This Agreement entered into on this _____ day of _____, 2026, between ROCKDALE COUNTY, GEORGIA, a political subdivision of the State of Georgia, whose address is 962 Milstead Avenue, Conyers, Georgia 30012, (hereinafter referred to as the "County") and (CONTRACTOR'S NAME), a [DESCRIPTION OF CONTRACTOR'S BUSINESS TYPE], whose address is [CONTRACTOR'S ADDRESS] (hereinafter referred to as "Contractor").

WHEREAS, the County desires to engage the services of Contractor for the construction of the (PROJECT NAME); and

WHEREAS, Contractor is qualified to perform this service and desires to render this service to the County as provided herein.

NOW THEREFORE, the County engages the services of Contractor for and in consideration of the mutual promises contained in this Agreement and the parties agree as follows:

10. Services Provided by Contractor.

The Contractor will furnish all products, tools, construction equipment, skill and labor of every description necessary to carry out and to complete in a good, firm, substantial workmanlike manner the construction of the [PROJECT NAME] as described in the County's Invitation to Bid (ITB) [ITB#] incorporated herein by reference, (hereinafter called "Work"), and Contractor's bid dated [DATE], attached hereto and made a part hereof (hereinafter called "Bid"). Contractor shall provide, at their expense, all vehicles and equipment necessary to provide this Work. The Work shall be performed at the direction of the Stormwater Utility's General Engineering Manager or their designee and consistent with all Federal, State and local laws.

The Contract Documents, Bid Documents, Invitation to Bid, and drawings are considered essential parts of the Agreement, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all labor necessary to complete the Work in an acceptable manner, ready for use, or operation by the County.

11. Fees and Compensation.

- (a) **Contract Price:** The Contract Price shall not exceed [CONTRACT AMOUNT] and shall be the total amount payable by the County to the Contractor for the performance of the Work set forth in the Contract Documents, unless amended as agreed upon by both parties in writing as detailed in Section 6 of this Agreement. The County shall provide payment within__ () days of receiving said invoice.

It is understood that the Contractor shall provide and pay for all products, labor (including labor performed after regular working hours, on Saturdays or Sundays, or on legal holidays), tools, construction equipment, supervision, and all other services and facilities of any nature whatsoever necessary to execute, complete, place into operation, and deliver the Work.

The Contractor shall be responsible for any additional expenses incurred by the County 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) **Payments Withheld:** The County may decline to approve an application for payment, in whole or in part, as may be necessary to protect the County 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.

- (c) Retention: The County 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 County will reduce the retainage to 5 percent of the value of Work completed, including stored materials 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 County 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. 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 County.

12. Effective Dates of Agreement.

The effective date of this Agreement shall be the date said Agreement is signed by the Chairman of the Rockdale County Board of Commissioners (the "Board"). The terms of this Agreement shall be __ () months from the effective date, unless terminated by either party as detailed in section 13 of this Agreement.

The Contractor shall begin the Work no later than thirty (30) days after issuance of the Notice to Proceed and shall complete the Work no later than _____ () days after issuance of the Notice to Proceed, unless a time extension is authorized in writing by the Project Manager.

Time is of the essence and is an essential element of this Contract, and the Contractor shall pay to the County, not as a penalty, but as liquidated damages, the sum of \$_____ 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 County and the Contractor due to the uncertainty and impossibility of making a determination as to the actual and consequential damages incurred by the County 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.

13. Rejection of Work and Materials.

All products furnished and all Work completed will be inspected by the County. All products furnished and all Work completed that is not in accordance with the Contract Documents 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 County 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.

14. 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 the Work. The Contractor shall employ and maintain on the Work a qualified supervisor or superintendent who shall be 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 County 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 County, immediately remove any superintendent, foreman or workman whom the County may consider

incompetent or undesirable.

15. Changes in the Contract.

The County 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.

16. Insurance.

The Contractor shall not commence any work under this Contract until all insurance, as stipulated in the Invitation to Bid, has been obtained and such insurance has been approved by the County, 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.

17. Interruption of Facility Operations.

The Contractor shall provide the County with written notice at least three 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, a complete identification of all those processes, equipment and operations to be affected and all other information the County may require. The Contractor shall provide any equipment, piping, auxiliary power or other means necessary to sustain facility operations.

18. 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) as amended. 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 County 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 County, 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 the impact of adverse weather.

10. Protection of the Environment.

- (d) 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. This shall include but not be limited to air,

water & noise pollution during torch cutting, grinding, burning, and grading operations.

- (e) 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.
- (f) The Contractor is responsible for maintenance of all erosion control measures, final removal of all temporary BMP's, and irrigation of all permanent vegetative measures until fully established.

25. Protection, Location and Relocation of Utilities.

The Contractor shall notify utility owners of the new work in accordance with Georgia Law by calling the Utilities Protection Center (UPC) at 800-282-7411, 72 hours before work is to begin. 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 County may have the Work performed and charge the cost thereof to the Contractor.

Prior to the construction or installation of any new Work, the Contractor shall excavate all existing utilities within the vicinity of the Work to their actual vertical and horizontal location. In order to avoid conflicts between existing and new Work, the Contractor shall either relocate the existing utility on a temporary or permanent basis or shall take whatever means necessary to protect the existing facilities or utilities during the installation of new Work.

26. Indemnification.

In addition to its agreement to obtain and maintain insurance as set forth herein, the Contractor agrees to indemnify and hold harmless the County, its officers, agents, and employees, from any and all claims against the County, its officers, agents and employees, which arise out of any act or omission of the Contractor or any of the Contractor's officers, agents and/or employees, and any and all claims which result from any condition created or maintained by the Contractor or anyone employed by the Contractor or any of their officers, agents or employees, which condition does not specify to be created or maintained by this Contract.

27. Termination of Agreement.

In the event either party elects to terminate this Agreement for whatever reason deemed appropriate, written notice shall be provided and termination shall be effective 15 days from receipt of written notice.

28. Notice.

Any notice or other communication required or permitted to be given under this Agreement must be in writing and must be mailed by overnight delivery or certified mail, postage prepaid, so that the notifying party can prove delivery of notice and the date thereof, and addressed as follows:

To the County:

Rockdale County, Georgia
Rockdale Water Resources
Attn: [PROJECT MANAGER]
P.O. Box 1495
Conyers, Georgia 30012

To the Contractor:

[COMPANY NAME]
Attn: [REPRESENTATIVE]
[ADDRESS 1]
[ADDRESS 2]
[CITY, STATE, ZIP CODE]

The addresses stated in this paragraph may be changed by the respective parties upon a documented notice delivered in advance, pursuant to this paragraph.

29. Assignment.

The Contractor shall have no right to transfer or assign its interest in this Agreement without the prior written consent of an authorized representative of the County.

30. Corporate Authority.

Contractor represents to the County that this Agreement, the transaction contemplated in this Agreement, and the execution and delivery hereof, have been duly authorized by all necessary corporate proceedings and actions,

including, without limitation, the action on the part of the directors. The individual executing this Agreement on behalf of Contractor warrants that he or she is authorized to do so and that this Agreement constitutes the legally binding obligation of the corporation.

31. Waiver.

No action taken pursuant to this Agreement shall be deemed to constitute a waiver by the party taking such action of compliance with any representation, warranty, covenant or agreement in this Agreement. The waiver by any party of a breach of any provision or condition contained in this Agreement shall not operate or be construed as a waiver of any subsequent breach or of any other conditions.

32. Severability.

If any provision of this Agreement or application to any party or circumstances shall be determined by any court of competent jurisdiction to be unenforceable to any extent, the remainder of this Agreement or the application of such provision to such person or circumstances, other than those as to which it is so determined invalid or unenforceable, shall not be affected thereby, and each provision hereof shall be valid and shall be enforced to the fullest extent permitted by law.

33. Interpretation.

Should any provision of this Agreement require a judicial interpretation, the parties agree that the body interpreting or construing this Agreement will not apply the assumption that the terms of this Agreement will be more strictly construed against one party by reason of the rule of legal construction that an instrument is to be construed more strictly against the party which itself or through its agents prepared the Agreement. The parties acknowledge and agree that they and their agents have each participated equally in the negotiation and preparation of this Agreement.

34. Venue & Jurisdiction.

The County and the Contractor, by entering into this Promissory Note, hereby agree that the courts of Rockdale County, Georgia shall have jurisdiction to hear and determine any claims or disputes between them pertaining directly or indirectly to this Agreement. Contractor expressly submits and consents in advance to such jurisdiction in any action or proceeding commenced in said courts. The choice of forum set forth in this section shall not be deemed to preclude the bringing of any action by the County or the enforcement by the County of any judgment obtained in such forum in any other appropriate jurisdiction. Further, the Contractor hereby waives the right to assert the defense of forum non-convenient and the right to challenge the venue of any court proceeding.

35. Governing Law.

This Agreement shall be construed and interpreted according to the provisions of the laws of the State of Georgia.

36. Binding Effect.

This Agreement shall be binding upon the Contractor and its successors and permitted assigns.

37. Further Assurances.

The Contractor agrees to execute, acknowledge, seal and deliver, after the date of this Agreement, without additional consideration, such further assurances, instruments and documents, and to take such further actions, as the County may reasonably request in order to fulfill the intent of this Agreement and the transactions contemplated by this Agreement.

38. Entire Agreement.

This Agreement, its attachments and essential documents (as provided in I above) represent the entire understanding of the parties with regard to the subject matter of this Agreement. There are no oral agreements, understandings, or representations made by any party to this Agreement that are outside of this Agreement and are not expressly stated in it. No supplement, modification, or amendment of this Agreement will be binding unless executed in writing by all parties.

By signing this Agreement, the parties acknowledge that they have read each and every page of this Agreement before signing same and that they understand and assent to all the terms thereof. In addition, by signing this Agreement, the parties acknowledge that they are entering into this Agreement freely and voluntarily and under no

compulsion or duress.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals on the date and year first above written.

[CONTRACTOR'S NAME]

ROCKDALE COUNTY, GEORGIA
BOARD OF COMMISSIONERS

By: _____

By: _____
JaNice Van Ness, Chair & CEO

Witness:

Attest:

By: _____

By: _____
Jennifer Rutledge, Director/County Clerk

Approved as to Form:

By: _____
M Qader A. Baig, County Attorney



ROCKDALE COUNTY GOVERNMENT
EQUAL BUSINESS OPPORTUNITY PROGRAM

Rockdale County Government Equal Business Opportunity (“EBO”) Program ordinance promotes opportunities for Historically Underutilized Businesses (“HUBs”) and Small Business Enterprises (“SBEs”) and protects all contracting applicants from unlawful discrimination. Under the EBO ordinance, bids for any project totaling \$100,000 or more in value must demonstrate good faith efforts to make work available to HUBs and SBEs. The ordinance is aspirational and seeks to maximize contracting opportunities for HUBs and SBEs. Specific outreach and reporting requirements are detailed in the EBO Ordinance and accompanying EBO policy document adopted by the Rockdale County Board of Commissioners, both of which are attached here.

In accordance with the terms of the EBO ordinance, all contracting shall be awarded without regard to race, religion, color, creed, national origin, sex, age, or handicapping condition. No portion of the EBO ordinance requires contractors or subcontractors to make purchases of materials or equipment from HUBs who do not submit the lowest responsible, responsive bid.

Please refer to the attached EBO ordinance and EBO policy document for further details.

**ROCKDALE COUNTY GOVERNMENT
EBO PROGRAM
CONTRACT COMPLIANCE REQUIREMENTS**

**AFFIDAVIT – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION PLAN
(UTILIZATION PLAN)**

The Utilization Plan is designed to enhance the utilization of a Historically Underutilized Business (HUB) or a Small Business Enterprise (SBE) by a bidder/proposer, contractor, or vendor. The bidder/proposer **must** outline a plan of action to encourage and achieve diversity and equality in the available procurement and contracting opportunities with bid/proposal.

DETERMINATION OF GOOD FAITH

The Prime Contractor must demonstrate that they have made reasonable, good faith efforts to ensure that certified firms have had a full and fair opportunity to compete and win subcontracts on this project. The Prime Contractor is required to include all outreach attempts that would demonstrate a “Good Faith Effort” in the solicitation of sub-consultants/subcontractors.

Documentation of efforts made by the Prime Contractor regarding this project should be documented using the Subcontractor Contact Form.

AFFIDAVIT – CONTRACTOR ONLY USAGE

A contractor that performs all the work under a contract with its own workforce may submit an affidavit.

UTILIZATION REPORTING (Post Award)

The successful bidder/proposer will be required to report **all** payments to subcontractors, sub-consultants, and suppliers (if applicable) by the 15th day of the month to the EBO Administrator.

**ROCKDALE COUNTY GOVERNMENT
AFFIDAVIT - SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION**

This form **must be** completed and **submitted with the bid/proposal**. All prime bidders/proposers **must** submit this form which lists all intended subcontractors/suppliers who will be utilized under the scope of work/services.

Prime Bidder/Proposer Company Name _____

ITB/RFP Name & Number: _____

1. My firm, as **Prime Bidder/Proposer** on this scope of work/service(s) is **NOT** ☐, is ☐ a Historically Underutilized Business or Small Business Enterprise.

Indicate below the portion of work, including, percentage of bid/proposal amount that your firm will carry out directly as the Prime Contractor:

\$ _____ Or _____ %

2. This information below must be completed and submitted with the bid/proposal if a **joint venture (JV)** approach is to be undertaken. Please provide JV breakdown information below and attach a copy of the executed Joint Venture Agreement.

JV Partner(s) information:

<u>Business Name</u>		<u>Business Name</u>	
(a.)		(b.)	
% of JV		% of JV	
HUB or SBE Certified (Y or N)		HUB or SBE Certified (Y or N)	
Certified Agency		Certified Agency	
Date Certified		Date Certified	

3. Lists all Sub-Contractor/suppliers participating on the project and provide a description of the work to be executed.

Total Dollar Value of Certified Subcontractors: (\$)

Total Percentage of Certified Subcontractors: (%)

**AFFIDAVIT - SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION
(continued)**

CERTIFICATION: The undersigned certifies that he/she has read, understands, and agrees to be bound by the Bid/Proposer provisions. The undersigned further certifies that he/she is legally authorized by the Bidder/Proposer to make the statement and representation and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder/Proposer knowing them to be false, or if there is a failure of the intentions, objectives and commitments set forth herein, then in any such event the Contractor's acts or failure to act, as the case may be, shall constitute a material breach of the contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and in lieu of, any other rights and remedies the County may have for other defaults under the contract.

By submitting this form, it is understood that every firm listed as a subcontractor has been properly notified and will participate.

Signature:_____ **Title:**_____

Business or Corporate Name:_____

Address:_____

Telephone: () _____

Fax Number: () _____

Email Address:_____

ROCKDALE COUNTY GOVERNMENT UTILIZATION REPORT – Post Award

The awarded vendor(s) are required to report all payments to the prime contractor, subcontractors, and sub-consultants (if applicable) during the project by the 15th day of the month to the EBO Administrator.

Subcontractor or Supplier information

ITB or RFP #	Name	Contact Name	Contact Email Address	Contact Phone	Payment amount	Date of payment	Payment Method

Issues:

Vendor Name: _____

Printed Signature: _____

Date: _____

Title _____

INTERNAL USE ONLY	
Verified	_____
-	
Any Issues	_____
Verified by	_____

ROCKDALE COUNTY GOVERNMENT Subcontractor Contact Form Good Faith Effort - Must also include evidence of all good faith efforts that were implemented, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment and selection of Historically Underutilized Businesses or Small Business Enterprises.								
Subcontractor/Supplier	Business Address	Contact Name	Contact Email Address	Contact Phone	Scope of Work Solicited for Project	HUB or SBE Certification Designation	Result of Contact	Date of Contact

Company Name: _____
Project # & Title: _____

Printed Signature: _____
Date: _____

Title _____

INTERNAL USE ONLY	
Date information verified	_____
Any Issues	_____
Verified by	_____

AN ORDINANCE AMENDING DIVISION 3 OF ARTICLE VI OF CHAPTER 2 OF THE CODE OF ROCKDALE COUNTY, GEORGIA PROVIDING AUTHORIZATION FOR AN EQUAL OPPORTUNITY PROGRAM FOR ROCKDALE COUNTY

WHEREAS, it is the policy of Rockdale County to encourage maximization of contracting opportunities with Historically Underutilized Businesses;

WHEREAS, the Rockdale County Board of Commissioners promulgates this ordinance as the official policy of Rockdale County.

NOW, THEREFORE BE IT ORDAINED by the Board of Commissioners of Rockdale County, Georgia, and it is, hereby, ordained by the authority of same, as follows:

That Division 3 of Article VI of Chapter 2 of the Code of Rockdale County, Georgia be amended, to create, as follows:

“Section 2-221. Equal Business Opportunity Program”

A. As used in this section:

1. The term “Contracting Authority” means any board, commission, body, or subdivisions of Rockdale County that exercises any authority to award a contract through a formal bidding process.
2. The term “Historically Underutilized Businesses” means a firm that is an independent and continuing enterprise for profit:
 - a. In which at least fifty-one percent (51%) is owned by one or more minority persons or socially and economically disadvantaged individuals, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
 - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.
3. The term “minority person” means a person who is a citizen or lawful permanent resident of the United States and who is:
 - a. Black, that is, a person having origins in any of the black racial groups in Africa;
 - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;

- c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, or the Pacific Islands;
 - d. Native American, that is, a person having origins in any of the original Indian peoples of North America; or
 - e. Female.
 - 4. The term "socially and economically disadvantaged individual" means a person who is a citizen or lawful permanent resident of the United States and who is:
 - a. A veteran of the armed forces of the United States;
 - b. Physically or mentally disabled in a manner that substantially limits one or more of the major life activities of a person; or
 - c. Capable of demonstrating some other form of economic or social disadvantage, as articulated in 13 CFR § 124.104.
 - 5. The term "Small Business Enterprises" means a firm that is an independent and continuing enterprise for profit for which the gross revenues or number of employees, inclusive of any affiliates as defined by 13 CFR 121.103, does not exceed the size standard for its industry as defined by 13 CFR 121.201 (as further explained in 13 CFR 121.104 through 121.107), and is certified as such.
- B. It is the policy of Rockdale County to encourage maximization of contracting opportunities with Historically Underutilized Businesses.
 - C. All Contracting Authorities shall strive to maximize contracting opportunities with Historically Underutilized Businesses. Where feasible, preference should be given to such businesses that are in Rockdale County or that employ a majority of their workforce in Rockdale County.
 - D. All Contracting Authorities shall establish prior to solicitation of bids for any project totaling \$100,000 or more, the good faith efforts that it will take to make it feasible for Historically Underutilized Businesses to submit successful bids or proposals for the contract. Each first-tier subcontractor shall comply with the requirements applicable to contractors under this subsection.
 - E. Each bidder for a contract from a Contracting Authority shall identify on its bid the Historically Underutilized Businesses that it will use in fulfilling the contract and an affidavit listing the good faith efforts it has made pursuant to Subsection (G) of this section and the total dollar value of the bid that will be performed by the Historically Underutilized Businesses. A contractor that performs all the work under a contract with its own workforce may submit an affidavit to that effect in lieu of the affidavit otherwise required under this subsection. The apparent lowest responsible, responsive bidder shall also file the following:

1. Within the time specified in the bid documents, either:
 - a. An affidavit that includes a description of the portion of work to be executed by Historically Underutilized Businesses, expressed as a percentage of the total contract price, which is equal to, or more than the applicable goal of contracts being awarded to Historically Underutilized Businesses annually, as set in Section III of the accompanying policy and procedures document. An affidavit under this sub-subdivision shall give rise to a presumption that the bidder has made the required good faith or effort; or
 - b. ~~Documentation of its good faith effort to meet the goal.~~ The documentation must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.
2. Within 30 days after awarding the contract, a list of all identified subcontractors that the contractor will use on the project.

Failure to file a required affidavit or documentation that demonstrates that the contractor made the required good faith effort is grounds for rejection of the bid.

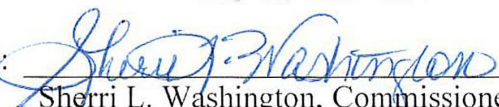
- F. No subcontractor who is identified and listed pursuant to Subsection (E) of this section may be replaced with a different subcontractor except:
 1. If the subcontractor's bid is later determined by the contractor to be nonresponsive or nonresponsive, or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or
 2. With the approval of the Contracting Authority for good cause.
- G. Before awarding a contract, the Contracting Authority shall do the following:
 1. Develop and implement a Historically Underutilized Business participation outreach plan to identify Historically Underutilized Businesses that can perform necessary services and to implement outreach efforts to encourage Historically Underutilized Business participation in these projects.
 2. At least 10 days prior to the scheduled day of bid opening, notify Historically Underutilized Businesses that have requested notices from the Contracting Authority and Historically Underutilized Businesses that otherwise indicated to the County an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
 - a. A description of the work for which the bid is being solicited.
 - b. The date, time, and location where bids are to be submitted.

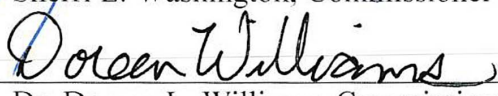
- c. The name of the individual within the public entity who will be available to answer questions about the project.
 - d. Where bid documents may be reviewed.
 - e. Any special requirements that may exist.
3. Utilize other media, as appropriate, likely to inform potential Historically Underutilized Businesses of the bid being sought.
- H. The Contracting Authority may designate certain procurement projects or contracts as available for bid and award only to certified Small Business Enterprises. The small business reserve designation for a particular project is discretionary on the part of the Contracting Authority and should be applied only where there is a reasonable expectation that there will be at least three responsible and responsive bids for certified Small Business Enterprises and that the award will be made at a fair market price/value. To obtain a small business reserve program project, the bidding Small Business Enterprise must self-perform a significant percentage of the contracted work (a minimum of 50 percent).
 - I. All Contracting Authorities shall award contracts without regard to race, religion, color, creed, national origin, sex, age, or disability status. Nothing in this section shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from Historically Underutilized Business who do not submit the lowest responsible, responsive bid or bids.
 - J. Each Contracting Authority shall submit to the Board an annual report demonstrating compliance with this code section.
 - K. Nothing herein shall apply to any contracts solicited or awarded before the passage of this code section.
 - L. For any projects involving the use of federal funds, no term of this ordinance shall apply if it conflicts with the requirements imposed under federal law for that project.
 - M. If any provision or clause of this code section or application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this code section which can be given effect without the invalid provision or application, and to this end the provisions of this code section are declared to be severable.
 - N. The terms of this ordinance shall expire five years from the date of its enactment if not renewed by the Rockdale County Board of Commissioners.

Adopted this 27th day of August, 2024.

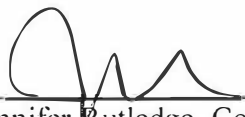
Rockdale County, Georgia
Board of Commissioners

By: 
Osborn Nesbitt, Sr., Chairman

By: 
Sherri L. Washington, Commissioner Post I

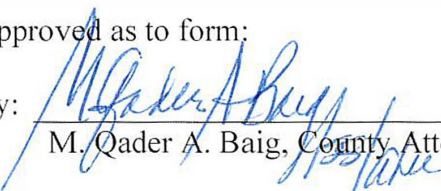
By: 
Dr. Doreen L. Williams, Commissioner Post II

Attest:

By: 
Jennifer Rutledge, County Clerk

First Reading: 8/27/2024
Second Reading: waived

Approved as to form:

By: 
M. Qader A. Baig, County Attorney

EQUAL BUSINESS OPPORTUNITY

This document provides guidelines for implementation of the County's Equal Business Opportunity ordinance, which encourages maximization of contracting opportunities with Historically Underutilized Businesses.

I. PURPOSE

The purpose of these policies and procedures is to provide guidelines for implementation of the Rockdale County Equal Business Opportunity ("EBO") ordinance. [Ord. No. 0-2024-11]

II. DEFINITIONS

All terms used herein shall have the definitions provided in the EBO ordinance.

III. EBO MAXIMIZATION GOAL

To maximize contracting opportunities with Historically Underutilized Businesses, Contracting Authorities shall strive for a goal of at least fifteen percent (15%) of contracts being awarded to Historically Underutilized Businesses annually. This goal shall be measured by the total value of work for each County project, including projects done by a private entity on a facility to be leased or purchased by the County.

IV. ADMINISTRATION

- A. Administration of the EBO ordinance shall be done by the Finance department of Rockdale County (the "EBO Administrator").
- B. Prior to solicitation of bids for any project totaling \$100,000 or more, the EBO Administrator must have its Historically Underutilized Business participation outreach plans.
- C. Following solicitation of bids for any project totaling \$100,000 or more, the the EBO Administrator must have on file a report of its compliance with the Historically Underutilized Business participation outreach plan submitted pursuant to subsection B.
- D. The EBO Administrator shall prepare an annual report to the Rockdale County Board of Commissioners detailing all contracts solicited and all contracts awarded pursuant to the EBO ordinance. This report shall include the value of all contracts awarded to Historically Underutilized Businesses or Small Business Enterprises as both prime contractors and subcontractors.

V. CERTIFICATION

- A. To demonstrate a firm's qualifications as a Historically Underutilized Business, Rockdale County will accept:

1. Certification from the State of Georgia, City of Atlanta, or any local, state, or federal government agency;
2. Certification from any private party accredited to provide business certification; or
3. Self-certification as sworn to in a notarized statement or affidavit under penalty of perjury, with any accompanying documentation.

VI. OUTREACH ACTIVITIES

A. Outreach activities that can be part of a Historically Underutilized Business participation outreach plans include, but are not limited to, the following: _____

1. Attending trade fairs;
2. Hosting business workshops;
3. Hosting pre-bid conferences;
4. Advertising; and
5. Any other activities reasonably likely to increase participation in the bidding process by Historically Underutilized Businesses.

VII. GOOD FAITH EFFORTS

A. The Contracting Authority shall require bidders to undertake the following good faith efforts, where applicable:

1. Contacting Historically Underutilized Businesses that reasonably could have been expected to submit a quote and that were known to the Contracting Authority lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.
2. Making the plans, specifications and requirements available for review by prospective Historically Underutilized Businesses or providing these documents to them at least 10 days before the bid or proposals are due.
3. Breaking down or combining elements of work into economically feasible units to facilitate participation by Historically Underutilized Businesses.
4. Working with organizations for Historically Underutilized Businesses that provide assistance in recruitment of Historically Underutilized Businesses.
5. Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
6. Negotiating in good faith with interested Historically Underutilized Businesses and not rejecting them as unqualified without sound reasons based on their capabilities.

Any rejection of a Historically Underutilized Businesses based on lack of qualification should have the reasons documented in writing.

7. Providing assistance to an otherwise qualified Historically Underutilized Businesses in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting Historically Underutilized Businesses in obtaining the same unit pricing as the bidder's suppliers to help Historically Underutilized Businesses in establishing credit.
8. Negotiating joint venture and partnership arrangements with Historically ~~Underutilized~~ Businesses to increase opportunities for Historically Underutilized Businesses to participate in County projects when possible.
9. Providing quick pay agreements and policies to enable Historically Underutilized Business contractors and suppliers to meet cash-flow demands.

VIII. SUBCONTRACTING

Every contract awarded pursuant to the process outlines in the EBO ordinance shall include a provision requiring all first-tier subcontractors to comply with the requirements applicable to contractors under the EBO ordinance.

IX. INCORPORATION

A bidder's commitment to abide by the terms of the EBO ordinance, and the good faith efforts it intends to undertake, shall be incorporated into the terms of any contract awarded to that bidder.

X. SMALL BUSINESS ENTERPRISE

A. A Small Business Enterprise may be certified in the following ways:

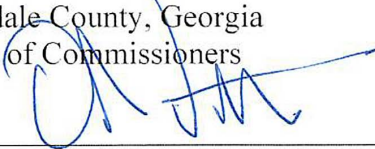
1. a filed letter or other documentation from the United States Small Business Administration that establishes that the firm is certified as an 8(a) firm, small business enterprise, small disadvantaged business enterprise, or HUBZone firm;
2. a letter or other documentation from the City of Atlanta, MARTA, or Georgia Department of Transportation (GDOT) that establishes that the firm is certified as a DBE; or
3. small business certification from a certifying agency within Georgia that applies the small business size standards consistent with or less than the applicable revenue and employment size standards for small businesses established by the United States Small Business Administration and meets other county criteria related to SBE certification.

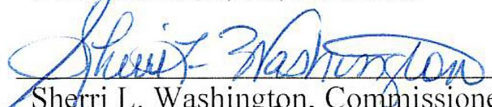
XI. REPORTING

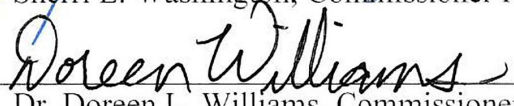
- A. The EBO Administrator shall be responsible to provide an annual report to the Contracting Authority which shall include the following:
1. A listing of all contracts awarded in in the prior year, including the dollar value of each contract for both prime contractors and subcontractors;
 2. For each contract listed, the efforts taken, if any, to award the contract to a Historically Underutilized Business or Small Business Enterprise;
 3. Whether each contract was ultimately awarded to a Historically Underutilized Business or Small Business Enterprise; and
 4. The value of all contracts awarded to Historically Underutilized Businesses or Small Business Enterprises as both prime contractors and subcontractors.
- B. Each contractor must report payments made to the Historically Underutilized Business subcontractors to the County on a monthly basis by no later than the 15th of the month.

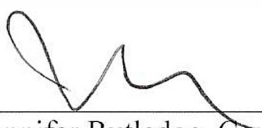
Approved this 27th day of August, 2024.

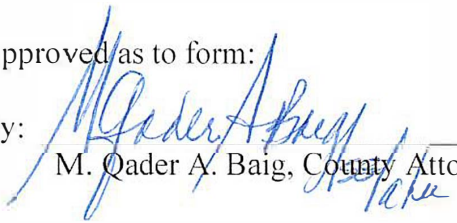
Rockdale County, Georgia
Board of Commissioners

By: 
Osborn Nesbitt, Sr., Chairman

By: 
Sherri L. Washington, Commissioner Post I

By: 
Dr. Doreen L. Williams, Commissioner Post II

Attest: 
By: _____
Jennifer Rutledge, County Clerk

Approved as to form:
By: 
M. Qader A. Baig, County Attorney

SUBCONTRACTORS

Instructions: Type or clearly print all information.

NAME, ADDRESS, & PHONE NUMBER OF SUBCONTRACTOR	SUBCONTRACT WORK ITEM	DOLLAR VALUE OF SUBCONTRACT WORK
1.		
2.		
3.		
4.		
5.		
6.		

Representative's Signature: _____ Date: _____

BIDDER'S CHECKLIST

_____ **Bid Bond in the Amount of 5% of the Total Bid Amount**

Note: Performance Bond, Payment Bond, and Proof of Insurance coverage are required after contract award.

_____ **ONE (1) FLASH DRIVE (containing a copy in Adobe PDF format) of the following documents: all documents shall be fully completed, signed, and dated:**

_____ **Bid Form (See Page 15)**

_____ **Bid Item Table (See Page 16-17)**

_____ **All Applicable Affidavit Forms (See Pages 18-23)**

_____ **Local Vendor Preference Policy (If Applicable) - (See Page 35)**

_____ **References -OR- Contractor's Qualifications Statement & Questionnaire (See Pages 31-32)**

_____ **Subcontractors (See Page 33)**

_____ **Any Proposed Deviations from the Required Specifications, Including Necessary Explanations and Conditions**

_____ **Equal Business Opportunity Forms**

_____ **Proof of Business License**

_____ **Proof of Georgia General Contractor or Utility Contractor License**

_____ **Proof of GDOT Prequalification**

The purpose of this checklist is to remind bidders of the documents generally required for the bid submittal. It is the bidder's responsibility to include additional documents requested in the bid that may not be shown on the checklist, if applicable.

TOC

TABLE OF CONTENTS**TECHNICAL SPECIFICATIONS****Division 1 - General Requirements**

01040	SUMMARY OF WORK
01055	CONSTRUCTION STAKING
01060	CODES AND STANDARDS
01150	MEASUREMENT AND PAYMENT
01300	SUBMITTALS
01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01570	TRAFFIC REGULATION
01610	TRANSPORTATION AND HANDLING
01620	STORAGE AND PROTECTION
01625	GENERAL EQUIPMENT AND REQUIREMENTS
01700	CONTRACT CLOSEOUT
01710	CLEANING
01720	RECORD DOCUMENTS
01740	WARRANTIES AND BONDS
02000	GENERAL CONSTRUCTION REQUIREMENTS

Division 2 - Sitework

02125	EROSION CONTROL FOR INFRASTRUCTURE PROJECTS
02227	ROCK REMOVAL-BLASTING
02440	CHAIN LINK FENCE AND GATES
02575	REMOVING AND REPLACING PAVEMENT
02602	SANITARY SEWER MATERIALS
02612	SANITARY SEWER CONSTRUCTION
02660	MAGNETIC FLOW METER
02667	TESTING OF PRESSURE PIPELINES
02936	GRASSING

Division 3 – Concrete

03100	CONCRETE FORMWORK
03200	REINFORCING STEEL
03250	CONCRETE ACCESSORIES
03290	JOINTS IN CONCRETE
03300	CAST IN PLACE CONCRETE
03370	CONCRETE CURING
03420	PRECAST REINFORCED CONCRETE STRUCTURES
03600	GROUT

Division 4 – Miscellaneous

05500	MISCELLANEOUS METALS
09900	PAINTING
11245	SUBMERSIBLE PUMPS
11450	JIB CRANE
16231	GENERATOR AND ATS

ATTACHMENTS:

- HONEY CREEK AND SCOTT CREEK PUMP STATION AND FORCE MAINS- DRAWING
SHEETS: G-00 THROUGH G-03
C-01 THROUGH C-75
E1.0 -E4.3
- ROCKDALE COUNTY WATER RESOURCES GEOTECHNICAL
EXPLORATION REPORT DATE: MAY 5, 2022

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 County, EDEC and EDT.
 - 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 \$100.00 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. Three (3) hard copies and one (1) original hard copy and one (1) Flash Drive in Adobe PDF format will be required for review purposes. 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. ITB# 2-35 Honey Creek and Scott Creek Pump Stations & Force Mains
- D. 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, Conyers, GA 30012, Attn: Adrienne Brown.
- E. Any and all Bids not meeting the aforementioned criteria for Bid submittal, may be declared non-responsive, and subsequently returned to the Bidder.

- F. 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 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

- A. 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 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.

1.06 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.

1.07 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.

1.08 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.

1.09 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.

1.10 NOTICE OF SPECIAL CONDITIONS

- A. 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.

1.11 OBLIGATION OF BIDDER

- A. 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.

1.12 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 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 _____, 2024.

(Corporate Secretary) _____ (SEAL)

END OF SECTION

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 SAMPLE CONTRACT

(PAGE 1 OF 6) AGREEMENT FOR THE CONSTRUCTION OF THE HONEY CREEK AND SCOTT CREEK PUMP STATIONS AND FORCE MAINS

This Agreement entered into on this _____ day of _____, 2026, between ROCKDALE COUNTY, GEORGIA, a political subdivision of the State of Georgia, whose address is 962 Milstead Avenue, Conyers, Georgia 30012, (hereinafter referred to as the "County") and (CONTRACTOR'S NAME), a [DESCRIPTION OF CONTRACTOR'S BUSINESS TYPE], whose address is [CONTRACTOR'S ADDRESS] (hereinafter referred to as "Contractor").

WHEREAS, the County desires to engage the services of Contractor for the construction of the (PROJECT NAME); and

WHEREAS, Contractor is qualified to perform this service and desires to render this service to the County as provided herein.

NOW THEREFORE, the County engages the services of Contractor for and in consideration of the mutual promises contained in this Agreement and the parties agree as follows:

1. Services Provided by Contractor.

The Contractor will furnish all products, tools, construction equipment, skill and labor of every description necessary to carry out and to complete in a good, firm, substantial workmanlike manner the construction of the [PROJECT NAME] as described in the County's Invitation to Bid (ITB) [ITB#] incorporated herein by reference, (hereinafter called "Work"), and Contractor's bid dated [DATE], attached hereto and made a part hereof (hereinafter called "Bid"). Contractor shall provide, at their expense, all vehicles and equipment necessary to provide this Work. The Work shall be performed at the direction of the Stormwater Utility's General Engineering Manager or their designee and consistent with all Federal, State and local laws.

The Contract Documents, Bid Documents, Invitation to Bid, and drawings are considered essential parts of the Agreement, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all labor necessary to complete the Work in an acceptable manner, ready for use, or operation by the County.

2. Fees and Compensation.

- (a) Contract Price: The Contract Price shall not exceed [CONTRACT AMOUNT] and shall be the total amount payable by the County to the Contractor for the performance of the Work set forth in the Contract Documents, unless amended as agreed upon by both parties in writing as detailed in Section 6 of this Agreement. The County shall provide payment within__ () days of receiving said invoice.

It is understood that the Contractor shall provide and pay for all products, labor (including labor performed after regular working hours, on Saturdays or Sundays, or on legal holidays), tools, construction equipment, supervision, and all other services and facilities of any nature whatsoever necessary to execute, complete, place into operation, and deliver the Work.

The Contractor shall be responsible for any additional expenses incurred by the County 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.

**00500 - SAMPLE
CONTRACT (PAGE 2 OF 6)**

- (b) Payments Withheld: The County may decline to approve an application for payment, in whole or in part, as may be necessary to protect the County 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.

- (c) Retention: The County 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 County will reduce the retainage to 5 percent of the value of Work completed, including stored materials 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 County 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. 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 County.

3. Effective Dates of Agreement.

The effective date of this Agreement shall be the date said Agreement is signed by the Chairman of the Rockdale County Board of Commissioners (the "Board"). The terms of this Agreement shall be __ () months from the effective date, unless terminated by either party as detailed in section 13 of this Agreement.

The Contractor shall begin the Work no later than thirty (30) days after issuance of the Notice to Proceed and shall complete the Work no later than _____ () days after issuance of the Notice to Proceed, unless a time extension is authorized in writing by the Project Manager.

Time is of the essence and is an essential element of this Contract, and the Contractor shall pay to the County, not as a penalty, but as liquidated damages, the sum of \$ _____ 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 County and the Contractor due to the uncertainty and impossibility of making a determination as to the actual and consequential damages incurred by the County 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.

4. Rejection of Work and Materials.

All products furnished and all Work completed will be inspected by the County. All products furnished and all Work completed that is not in accordance with the Contract Documents 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 County 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.

**00500 - SAMPLE CONTRACT
(PAGE 3 OF 6)**

5. 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 the Work. The Contractor shall employ and maintain on the Work a qualified supervisor or superintendent who shall be 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 County 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 County, immediately remove any superintendent, foreman or workman whom the County may consider incompetent or undesirable.

6. Changes in the Contract.

The County 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.

7. Insurance.

The Contractor shall not commence any work under this Contract until all insurance, as stipulated in the Invitation to Bid, has been obtained and such insurance has been approved by the County, 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.

8. Interruption of Facility Operations.

The Contractor shall provide the County with written notice at least three 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, a complete identification of all those processes, equipment and operations to be affected and all other information the County may require. The Contractor shall provide any equipment, piping, auxiliary power or other means necessary to sustain facility operations.

9. 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) as amended. The Contractor shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection.

**00500 - SAMPLE
CONTRACT (PAGE 4 OF 6)**

- (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 County 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 County, 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 the impact of adverse weather.

10. 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. This shall include but not be limited to air, water & noise pollution during torch cutting, grinding, burning, and grading 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.
- (c) The Contractor is responsible for maintenance of all erosion control measures, final removal of all temporary BMP's, and irrigation of all permanent vegetative measures until fully established.

11. Protection, Location and Relocation of Utilities.

The Contractor shall notify utility owners of the new work in accordance with Georgia Law by calling the Utilities Protection Center (UPC) at 800-282-7411, 72 hours before work is to begin. 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 County may have the Work performed and charge the cost thereof to the Contractor.

Prior to the construction or installation of any new Work, the Contractor shall excavate all existing utilities within the vicinity of the Work to their actual vertical and horizontal location. In order to avoid conflicts between existing and new Work, the Contractor shall either relocate the existing utility on a temporary or permanent basis or shall take whatever means necessary to protect the existing facilities or utilities during the installation of new Work.

12. Indemnification.

In addition to its agreement to obtain and maintain insurance as set forth herein, the Contractor agrees to indemnify and hold harmless the County, its officers, agents, and employees, from any and all claims against the County, its officers, agents and employees, which arise out of any act or omission of the Contractor or any of the Contractor's officers, agents and/or employees, and any and all claims which result from any condition created or maintained by the Contractor or anyone employed by the Contractor or any of their officers, agents or employees, which condition does not specify to be created or maintained by this Contract.

13. Termination of Agreement.

In the event either party elects to terminate this Agreement for whatever reason deemed appropriate, written notice shall be provided and termination shall be effective 15 days from receipt of written notice.

**00500 - SAMPLE
CONTRACT (PAGE 5 OF 6)**

14. Notice.

Any notice or other communication required or permitted to be given under this Agreement must be in writing and must be mailed by overnight delivery or certified mail, postage prepaid, so that the notifying party can prove delivery of notice and the date thereof, and addressed as follows:

To the County:

Rockdale County, Georgia
Rockdale Water Resources
Attn: [PROJECT MANAGER]
P.O. Box 1495
Conyers, Georgia 30012

To the Contractor:

[COMPANY NAME]
Attn: [REPRESENTATIVE]
[ADDRESS 1]
[ADDRESS 2]
[CITY, STATE, ZIP CODE]

The addresses stated in this paragraph may be changed by the respective parties upon a documented notice delivered in advance, pursuant to this paragraph.

15. Assignment.

The Contractor shall have no right to transfer or assign its interest in this Agreement without the prior written consent of an authorized representative of the County.

16. Corporate Authority.

Contractor represents to the County that this Agreement, the transaction contemplated in this Agreement, and the execution and delivery hereof, have been duly authorized by all necessary corporate proceedings and actions, including, without limitation, the action on the part of the directors. The individual executing this Agreement on behalf of Contractor warrants that he or she is authorized to do so and that this Agreement constitutes the legally binding obligation of the corporation.

17. Waiver.

No action taken pursuant to this Agreement shall be deemed to constitute a waiver by the party taking such action of compliance with any representation, warranty, covenant or agreement in this Agreement. The waiver by any party of a breach of any provision or condition contained in this Agreement shall not operate or be construed as a waiver of any subsequent breach or of any other conditions.

18. Severability.

If any provision of this Agreement or application to any party or circumstances shall be determined by any court of competent jurisdiction to be unenforceable to any extent, the remainder of this Agreement or the application of such provision to such person or circumstances, other than those as to which it is so determined invalid or unenforceable, shall not be affected thereby, and each provision hereof shall be valid and shall be enforced to the fullest extent permitted by law.

19. Interpretation.

Should any provision of this Agreement require a judicial interpretation, the parties agree that the body interpreting or construing this Agreement will not apply the assumption that the terms of this Agreement will be more strictly construed against one party by reason of the rule of legal construction that an instrument is to be construed more strictly against the party which itself or through its agents prepared the Agreement. The parties acknowledge and agree that they and their agents have each participated equally in the negotiation and preparation of this Agreement.

**00500 - SAMPLE CONTRACT
(PAGE 6 OF 6)**

20. Venue & Jurisdiction.

The County and the Contractor, by entering into this Promissory Note, hereby agree that the courts of Rockdale County, Georgia shall have jurisdiction to hear and determine any claims or disputes between them pertaining directly or indirectly to this Agreement. Contractor expressly submits and consents in advance to such jurisdiction in any action or proceeding commenced in said courts. The choice of forum set forth in this section shall not be deemed to preclude the bringing of any action by the County or the enforcement by the County of any judgment obtained in such forum in any other appropriate jurisdiction. Further, the Contractor hereby waives the right to assert the defense of forum non-convenient and the right to challenge the venue of any court proceeding.

21. Governing Law.

This Agreement shall be construed and interpreted according to the provisions of the laws of the State of Georgia.

22. Binding Effect.

This Agreement shall be binding upon the Contractor and its successors and permitted assigns.

23. Further Assurances.

The Contractor agrees to execute, acknowledge, seal and deliver, after the date of this Agreement, without additional consideration, such further assurances, instruments and documents, and to take such further actions, as the County may reasonably request in order to fulfill the intent of this Agreement and the transactions contemplated by this Agreement.

24. Entire Agreement.

This Agreement, its attachments and essential documents (as provided in I above) represent the entire understanding of the parties with regard to the subject matter of this Agreement. There are no oral agreements, understandings, or representations made by any party to this Agreement that are outside of this Agreement and are not expressly stated in it. No supplement, modification, or amendment of this Agreement will be binding unless executed in writing by all parties.

By signing this Agreement, the parties acknowledge that they have read each and every page of this Agreement before signing same and that they understand and assent to all the terms thereof. In addition, by signing this Agreement, the parties acknowledge that they are entering into this Agreement freely and voluntarily and under no compulsion or duress.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals on the date and year first above written.

[CONTRACTOR'S NAME]

ROCKDALE COUNTY, GEORGIA
BOARD OF COMMISSIONERS

By: _____

By: _____
JaNice Van Ness, Chair & CEO

Witness:

Attest:

By: _____

By: _____
Jennifer Rutledge, Director/County Clerk

Approved as to Form:

By: _____
M Qader A. Baig, County Attorney

END OF SECTION

SECTION 00700
GENERAL CONDITIONS

TABLE OF CONTENTS

<u>Article</u>	<u>Title</u>
	General
1	Notice of Award
2	Execution of Contract Documents
3	Contract Security
4	Insurance
5	Indemnification
6	Notice to Proceed
7	Termination of Work for Default
8	Termination for Convenience of the Owner
9	Assignments
10	Subcontracting
11	Authority of the PM/CM
12	Separate Contracts
13	Laws and Regulations
14	Taxes
15	Notice and Service Thereof
16	Patents
17	Land and Rights-of-Way
18	Products
19	Supervision of Work
20	Interruption of Facility Operations
21	Protection of Work, Property and Persons
22	Protection of the Environment
23	Protection, Location and Relocation of Utilities
24	Schedules, Reports and Records
25	Drawings and Specifications
26	Surveys
27	Testing, Inspection and Rejection of Work
28	Contract Time and Liquidated Damages
29	Changes in the Contract
30	Payments and Completion

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 to 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.
- (c) 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.
- (d) 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.

- (e) 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.
- (f) 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 the 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,

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 the 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. 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 always have available 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 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 cutsheets.

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.
- (d) **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 ensure 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 a 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 in operation on the changed work.

In addition to the actual costs in items (aa) through (cc) above, there will be, for the Contractor 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 the 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", have 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 of 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 120 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 120 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 ensure 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 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:

Interruption of any plant operations 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 interruption. The Contractor shall pay all fines that may be imposed on the Owner for any interruptions 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
 - c) Contractor is not successful in restoring the activity to an on-schedule status, the Contractor shall:
 - i. Carry out the activity with the scheduled crew on an overtime basis until the activity is complete or back on schedule.
 - ii. Increase the crew size or add shifts so the activity can be completed as scheduled.

- iii. 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 lien 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

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

Division 1 - General Requirements

01040	SUMMARY OF WORK
01055	CONSTRUCTION STAKING
01060	CODES AND STANDARDS
01150	MEASUREMENT AND PAYMENT
01300	SUBMITTALS
01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01570	TRAFFIC REGULATION
01610	TRANSPORTATION AND HANDLING
01620	STORAGE AND PROTECTION
01625	GENERAL EQUIPMENT AND REQUIREMENTS
01700	CONTRACT CLOSEOUT
01710	CLEANING
01720	RECORD DOCUMENTS
01740	WARRANTIES AND BONDS
02000	GENERAL CONSTRUCTION REQUIREMENTS

Division 2 - Sitework

02125	EROSION CONTROL FOR INFRASTRUCTURE PROJECTS
02227	ROCK REMOVAL-BLASTING
02440	CHAIN LINK FENCE AND GATES
02575	REMOVING AND REPLACING PAVEMENT
02602	SANITARY SEWER MATERIALS
02612	SANITARY SEWER CONSTRUCTION
02660	MAGNETIC FLOW METER
02667	TESTING OF PRESSURE PIPELINES
02936	GRASSING

Division 3 – Concrete

03100	CONCRETE FORMWORK
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03200	REINFORCING STEEL
03250	CONCRETE ACCESSORIES
03290	JOINTS IN CONCRETE
03300	CAST IN PLACE CONCRETE
03370	CONCRETE CURING
03420	PRECAST REINFORCED CONCRETE STRUCTURES
03600	GROUT

Division 4 – Miscellaneous

05500	MISCELLANEOUS METALS
09900	PAINTING
11245	SUBMERSIBLE PUMPS
11450	JIB CRANE
16231	GENERATOR AND ATS

ATTACHMENTS:

- HONEY CREEK AND SCOTT CREEK PUMP STATION AND FORCE MAINS- 80% DESIGN PLANS
DRAWING SHEETS: G-00 THROUGH G-03
C-01 THROUGH C-47
- ROCKDALE COUNTY WATER RESOURCES GEOTECHNICAL
EXPLORATION REPORT DATE: MAY 5, 2022

SECTION 01040 SUMMARY OF WORK

1 GENERAL

1.1 DEFINITIONS

- A. Definitions for common terms used in these documents are provided in Article 1, General Conditions/Supplemental Conditions.

1.2 SUMMARY

- A. The work to be performed under this Contract consists of furnishing and installing all labor, equipment, tools, materials, and incidentals required for construction of Honey Creek and Scott Creek Pump Stations, Force Mains and Gravity Sewers, as set forth in the Bid Form, as shown on the Drawings and as specified herein.
- B. All work shall be as specified and in accordance with federal, state, local rules, and regulations. If there is a conflict with any section of these specifications and the rules and regulations, the Engineer shall determine which will govern.

1.3 SCOPE OF WORK

A. HONEY CREEK PUMP STATION AND FORCE MAIN

The Honey Creek pump station is located at 4163 Troupe Smith Road, Southwest, Conyers, Georgia. This location is at the Honey Creek WWTP which is operational. The Contractor shall coordinate work with the Plant's contract operator ESG. The work at the Honey Creek Pump Station is shown on the Drawings and may consist of all or some of the following:

1. Site preparation including clearing and grubbing, grading, and erosion, sedimentation and pollution control.
2. Preparation of subgrades and foundation support, including the removal of unsuitable materials.
3. Provide and Install:
 - a. Precast wet well, valve vault, flow meter vault, and surge relief valve vault.
 - b. Submersible pumps (3) package and discharge piping, appurtenances and valves.
 - c. Force main and Sanitary Sewer piping.
 - d. Standby diesel generator and generator pad.
 - e. Electrical and control system.
 - f. Yard hydrant, piping and structures.
 - g. Electrical utility pole with transformer and service connection to Electrical Utility Company.
 - h. Traffic control during construction.
 - i. Jib Crane with Motorized trolley hoist.
 - j. Concrete slab and equipment foundations
 - k. Concrete ramp
 - l. Demolish and remove existing concrete structure
 - m. All associated miscellaneous work, including site grading, site restoration and cleanup.
4. Site improvements including fencing, site pad, driveway, and lighting.
5. The Contractor shall furnish and install all labor, materials, equipment, and incidentals which are reasonable and properly inferable and necessary for the

proper completion of the work, whether specifically indicated in the Contract Documents or not.

6. The Contractor shall perform the work complete, in place and ready for continuous service and shall include repairs, replacements and restoration required as a result of all damages that occur as a result of construction under this contract.
7. The contractor shall coordinate hatch selection and placement with pump manufacturer.

B. SCOTT CREEK PUMP STATION AND FORCE MAIN

The Scott Creek pump station is located on Highway 212 Southwest, Conyers, Georgia. This location is at the Scott Creek WWTP which is operational. The Contractor shall coordinate work with the Plant's contract operator ESG. The work at the Scott Creek Pump Station is shown on the Drawings and may consist of all or some of the following:

1. Site preparation including clearing and grubbing, grading, and erosion, sedimentation and pollution control.
2. Preparation of subgrades and foundation support, including the removal of unsuitable materials.
3. Provide and Install:
 - a. Precast wet well, valve vault, flow meter vault, and surge relief valve vault.
 - b. Submersible pumps (2) package and discharge piping, appurtenances and valves.
 - c. Force main and Sanitary Sewer piping.
 - d. Standby diesel generator and generator pad.
 - e. Electrical and control system.
 - f. Yard hydrant, piping and structures.
 - g. Electrical utility pole with transformer and service connection to Electrical Utility Company
 - h. Decommissioning and Demolition of existing Scott Creek Pump Station.
 - i. Traffic control during construction.
 - j. Jib Crane with Motorizee trolley hoist.
 - k. Concrete slab and equipment foundations
 - l. All associated miscellaneous work, including site grading, site restoration and cleanup.
4. Site improvements including fencing, site pad, driveway and lighting.
5. The Contractor shall furnish and install all labor, materials, equipment, and incidentals which are reasonable and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.
6. The Contractor shall perform the work complete, in place and ready for continuous service and shall include repairs, replacements and restoration required as a result of all damages that occurs a result of construction under this contract.
7. The contractor shall coordinate hatch selection and placement with pump manufacturer.

1.4 WORK COORDINATION

- A. The Contractor shall coordinate his/her work with all public and private utilities. The Contractor shall insure that all utilities in each street are field marked by the utility owner or designated agent prior to beginning any excavation in that street.

- B. The Contractor shall also coordinate his/her work with owners of private and public property where access is required for the performance of the work.

1.5 STATUS OF PERMITS AND EASEMENTS

- A. Permits for land disturbance and encroachment into public right-of-way expected to be obtained before the 60-day period expires after the bid opening. All required easements will be obtained by the owner.

1.6 MATERIALS

- A. Materials shall be as shown on the Drawings or provided within these specifications.

1.7 QUANTITIES

- A. The quantities shown on the Drawings and Bid Schedule are estimated based on the approximate linear feet of pipe to be installed. Portions of the project may require field design or modifications by the Engineer due to added scope or unforeseen field conditions or conflicts.
- B. RWR reserves the right to alter the quantities of work to be performed or extend or shorten the length of pipe to be furnished and installed at any time when, and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. No allowance will be made for any change in anticipated profits, nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

1.8 CONDITIONS OF THE SITE

- A. The Contractor shall make all necessary investigations to determine the site conditions in the project area and any unique features that may affect the prosecution of the work.
- B. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures.

**** END OF SECTION ****

SECTION 01055
CONSTRUCTION STAKING

1 GENERAL

1.1 SCOPE OF WORK

- A. Contractor's surveying and engineering responsibilities during the construction phase shall include the following:
1. Field surveying and engineering services required to supplement Contract Documents during construction of the Project. The Contractor shall employ qualified personnel acceptable to the Engineer to provide construction staking and shall furnish documentation confirming that staking is being performed to the lines and grades shown in the Contract Documents. Construction staking will include all the surveying work required to lay out the work and control the location, elevation, and position of the finished construction in accordance with the contract documents. Contractor's surveyor shall maintain a complete, accurate log of all control and survey work as it progresses, and shall periodically furnish copies of same to Engineer as the work progresses. Surveyor shall be registered in the State of Georgia.
 2. Civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.
 3. The contractor shall locate and protect control points prior to starting site work and preserve all permanent reference points during construction. Contractor's surveyor shall replace any control points that are lost or destroyed during construction.
 4. As-built plans for all construction shall be maintained by the Contractor and delivered to the Engineer at the completion of construction in a form that is acceptable to the Owner.
- B. Owner's responsibilities during the construction phase shall include the following:
1. The Owner will furnish Contract Documents including plan drawings with sufficient detail and geometric references to allow the Contractor to accurately construct the work.

** END OF SECTION **

SECTION 01060 CODES AND STANDARDS

1 GENERAL

1.1 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 adopted and published at the time of opening of Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices.
- B. The inclusion of an organization under one category does not preclude that organization's 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. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.2.

1.2 STANDARD ORGANIZATIONS

- A. Piping and Valves
 - 1. ACPA American Concrete Pipe Association
 - 2. ANSI American National Standards Institute
 - 3. ASME American Society of Mechanical Engineers
 - 4. AWWA American Water Works Association
- B. Materials
 - 1. AASHTO American Association of State Highway and Transportation Officials
 - 2. ANSI American National Standards Institute
 - 3. ASTM American Society for Testing and Materials
- C. Steel and Concrete
 - 1. ACI American Concrete Institute
 - 2. AISC American Institute of Steel Construction, Inc.
 - 3. AISI American Iron and Steel Institute
 - 4. CRSI Concrete Reinforcing Steel Institute
 - 5. NRMA National Ready-Mix Association
 - 6. PCA Portland Cement Association
 - 7. PCI Prestressed Concrete Institute
 - 8. SSPC Structural Steel Painting Council
- D. Welding
 - 1. AWS American Welding Society
 - 2. NACE National Association of Corrosion Engineers
- E. Government and Technical Organizations
 - 1. CFR Code of Federal Regulations
 - 2. CSI Construction Specifications Institute
 - 3. FS Federal Specifications

- 4. ISO International Organization for Standardization
- 5. OSHA Occupational Safety and Health Administration
- 6. SBC Standard Building Code

F. Roadways

- 1. DOT Department of Transportation
- 2. SSRBC Standard Specifications for Road and Bridge Construction,
Georgia Department of Transportation

1.3 DEFINITIONS

A. As Directed, as Required, Etc.

- 1. Wherever in the Contract Documents, or on the Drawings, the words "as directed," "as ordered," "as requested," "as required," "as permitted," or similar words are used, it shall be understood that the direction, order, request, requirement, or permission of the Engineer is intended. Similarly, the words "approved," "acceptable," "suitable," "satisfactory" and similar words shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

B. Provide

- 1. Wherever in the Contract documents the word "provide" is used, it shall mean to furnish (or supply) and install.

2 PRODUCTS (NOT USED)

3 EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01150

MEASUREMENT AND PAYMENT

1 GENERAL

1.1 SCOPE

- A. The Bid Proposal 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 Proposal.
- B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid Proposal, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid Proposal, 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 Proposal items. The Contractor shall prepare the Bid Proposal accordingly.
- C. Work includes furnishing all plant, labor, equipment, tools and materials, which are not furnished by the Owner, and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.2 PAYMENT

- A. Payment of lump sum items shall be based upon progress of the Work. Estimates of percent complete, as approved by the Engineer, shall be the basis by which payments will be authorized.
- B. Measurement of an item of work will be by the unit indicated in the Bid Proposal.
- C. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work.

1.3 PUMP STATION

- A. Pump station construction shall be paid for at the lump sum price in the bid proposal. Price shall include all work at the pump station site including but not limited to demolition, emolition of existing concrete structure at Honey Creek PS site, Jib Crane and motorized trolley hoist, clearing, grubbing and grading of the pump station site, excavation, blasting, rock excavation, dewatering, backfilling, crushed stone base, precast concrete wet well, flow meter and meter vault, surge relief vault and valve vault, guide rails and supports, pumps and controls, all electrical including motor control center, generator, generator and electrical concrete pads, all piping and pipe supports inside the wet well and valve vault and between them, aluminum access hatches, pressure gauges, aluminum ladders, vent pipe, coating of wet well, non-woven polypropylene fabric, pressure treated edge boards, crushed stone, driveway, RCP storm pipe, copper water line, freeze-proof yard hydrant, fencing, testing and start-up of the completed pump station. DIP force main section and all drain piping shall be included in this lump sum pay item. Rock excavation for the wet well and valve vault shall be included in this lump sum pay item. Silt fence, sewer manholes, gravity sewer pipe, HDPE force main and grassing at the pump station site shall not be included in the lump sum price and will be paid under the individual items listed in the bid proposal.

1.4 SANITARY SEWER PIPE

- A. All sewer lines will be measured horizontally from center to center of manholes and cut determined by the difference in elevation from the ground surface of the center line of the ditch to the invert grade of sewer.
- B. Payment will be made at the unit price bid per foot for each size, cut classification and type of pipe as included in the proposal and as shown on the plans and in the specifications.

- C. Unit price bid for sewer pipe shall include any and all clearing and grubbing of right-of-way required for the construction of sewer lines, excavation, dewatering, bedding, backfill, property restoration, testing of the completed pipeline and other work that is not designated as a bid item.

1.5 FORCE MAIN – STANDARD DEPTH

- A. Measurement of the force main and fittings with cover of 6 feet or less and standard cement lining shall be made horizontally along the main axis of the pipeline and no deduction will be made for footage occupied by valves and fittings. Payment will be made at the unit price bid per linear foot of each pipe size. The unit price shall include all materials, labor, equipment, clearing and grubbing, of easements required for construction, excavation (including rock excavation), dewatering, backfill, property restoration and incidentals necessary to install, test and complete the force main that are not covered under other pay items in accordance with the Contract Documents. Extra depth of installation and any special linings or coatings will be paid for in separate bid items.
- B. All pipe shall be installed with a 12-gauge solid copper wire for locating purposes. This item shall be paid under the force main pay item.

1.6 FORCE MAIN – EXTRA DEPTH

- A. Measurement for extra depth of installation will be paid for force main installed with more than 6 feet of cover, as shown on the Drawings. Payment will be made by linear foot. All materials, labor, equipment, clearing and grubbing, excavation, dewatering, backfill, property restoration, and testing shall be included in the unit price for Force Main – Standard Depth.

1.7 COMBINATION AIR AND VACUUM VALVE (CAV) ASSEMBLY

- A. Air and vacuum valves will be counted in place and paid for at the unit price bid for each type and size listed in the Bid Proposal. The unit price shall include all materials and labor for installing of the complete A & V Valve assembly including the manhole or vault and cover or hatch, isolation gate valve, check valve, outlet on the main (outlet saddle and tap), crushed stone, concrete and all necessary incidentals to complete the work as shown on the drawings.

1.8 STANDARD MANHOLE AND EXTRA DEPTH MANHOLE

- A. Manholes shall be counted in place and paid at the price per size bid. Bid price shall be full compensation for excavation, dewatering, crushed stone subgrade, precast manhole base and sections or risers, rubber boots, steps, ring and cover, and all incidentals needed to construct the manhole as shown on the drawings and as specified.
- B. Each manhole shall be measured from the invert of the lowest pipe at the center of the manhole to the top of the manhole ring. Standard manholes cover the range of depth from 0 to 6-feet. When the depth of a manhole is more than 6 feet, the difference between 6- feet and 12 feet shall be paid at the unit price bid per vertical foot for the Extra Depth Manhole (6' to 12' depth) item in the Bid Proposal and any additional depth shall be paid at the unit price bid per vertical foot for the Extra Depth Manhole (12' and higher depths) item in the Bid Proposal. As an example, for a manhole 15-feet deep, 6-feet are included in Standard Manhole, 6-feet would be included in Extra Depth Manhole (6' to 12' depth), and 3 feet would be included in Extra Depth Manhole (12' and higher depths). Crushed stone used for the base of each manhole shall be included in this item.

1.9 SERVICE WATER METER RELOCATION

- A. This Item will be measured as each unit of Water Meter Relocation complete in place as shown on the plans. provide all labor, tools and materials necessary for the relocation of the water meter as shown on the plans. Adjust, raise/lower extend and repair any associated pipes, fittings and other supplementary materials as needed for a successful relocation. The work performed and materials furnished shall be in accordance with this Item and measured as provided under "Measurement" will be

paid for at the unit price bid for "Service Water Meter Relocation". This price shall be full compensation for all labor, materials, excavation, including equipment and incidentals necessary to relocate the water meter as shown on the plans.

1.10 TRENCH ROCK EXCAVATION

- A. Trench rock excavation shall be paid for as an extra in addition to payment for pipe provided for elsewhere in these Specifications. Payment will be made for the measured quantity of rock excavated, with the conditions set forth in this section, at the set unit price included the Bid Proposal.
- B. The unit price for Rock Excavation shall include the cost of rock excavation, blasting, and all costs incidental thereto.
- C. Measurement of rock excavation volume for payment purposes shall be based on an assumed trench width of pipe diameter plus two feet for the area from the bottom of the trench up to 12" above the top of the pipe, and then widening out on each side of the trench at an angle of 1 foot in 5 feet (no extra volume will be figured for over-blasting). Depth of rock shall be measured from actual top of rock to a point 6 inches below the bottom of pipe. Length of rock shall be actual length measured along the centerline of pipe.
- D. The Engineer must be given reasonable notice to measure all rock.
- E. No allowance shall be made for excavating rock to extra widths for construction of manholes or other appurtenances, or for excavations made necessary by the physical limitations of the Contractor's equipment.

1.11 FLOWABLE FILL

- A. Payment will be made for each cubic yard of flowable fill placed or pumped. Flowable fill may be used to fill the annular space in the abandoned pipe, as described on the Drawings.

1.12 EROSION, SEDIMENTATION AND NPDES STORMWATER PERMIT COMPLIANCE

- A. This pay item shall include all work required to comply with the National Pollutant Discharge Elimination System (NPDES) General Permit to discharge Storm Water Associated with Infrastructure construction projects, which is not included in other pay items in the Bid Proposal. This item shall include submitting Notices of Intent and Termination to EPD and all sampling, testing, monitoring, reporting, recordkeeping, and certifications required by the Permit and the ESPCP prepared by the Engineer. It shall also include installation and maintenance of any Best Management Practices required, but not shown on plans and listed as a separate pay item in the Bid Proposal. Fees payable to EPD or the Owner for the NPDES permit will be reimbursed to the Contractor under the Allowance and shall not be included in this pay item.

1.13 MOBILIZATION

- A. The Bid Proposal includes a pre-set price for this item, which is intended to partially offset the Contractor's expense related to mobilizing personnel, equipment, facilities, construction trailers, and supplies to the jobsite, and the expense of administration, insurance and bonding throughout the project. Payment for this item will be phased over the life of the project as follows: 50% of the bid price of this item will be payable when in the opinion of the Engineer, the Contractor's mobilization is sufficient to pursue the Work to meet the Completion Date. 25% of the bid price will be made when the approval of all material submittals has been obtained. The final 25% for the bid price will be payable when As-Built drawings are submitted – this payment will be prorated to include partial submittals of As- Built drawings as the work progresses.

1.14 ALLOWANCE

- A. Payment will be made for allowance work in accordance with Section 01020 of these contract documents.

1.15 ADDITIONAL WORK

- A. Refer to General Conditions/Supplementary Conditions Articles 10 and 11.
- B. Additional work, when ordered by the Engineer, shall be measured and paid for in

accordance with the General Conditions/Supplementary Conditions, and implemented as described in the following paragraphs. Measurement of the quantities of additional work shall be made by the Engineer.

C. Unit Pricing

1. Should conditions arise that require execution of additional work that is not amenable to establishment of a lump sum price, the Contractor shall develop a proposed unit price for the additional work. The price shall be inclusive of all labor, equipment, tools and materials necessary to complete the additional work, in place. Development of an extended price will be established by estimating an overall amount of additional work to be delivered and be agreed upon by both Contractor and Engineer prior to initiation of the additional work. The aforementioned shall not relieve the Owner of its right to require the Contractor to provide additional work, nor shall it limit the number of times additional work can be ordered.
2. Payment will be made by extending the established unit price multiplied by the quantity provided. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the additional work, complete in place, in accordance with direction provided by the Engineer.

D. Lump Sum Pricing

1. Should any single occurrence of additional work be ordered by the Engineer, and the additional work can be clearly defined and quantified, the Contractor shall develop a proposed lump sum price for the additional work. The price shall be inclusive of all labor, equipment, tools and materials necessary to complete the additional work, in place. The aforementioned shall not relieve the Owner of its right to require the Contractor to provide additional work, nor shall it limit the number of times additional work can be ordered.
2. Payment for such additional work will be in accordance with the procedures defined in paragraph 1.2 A. of this section. Such price and payment shall constitute full compensation to the Contractor for furnishing all labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the additional work, complete in place, in accordance with direction provided by the Engineer.

E. Cost of the Work (Time and Materials) Pricing

1. Should any single occurrence of additional work be ordered by the Engineer, and the additional work cannot be defined and/or quantified, the Contractor shall prepare and submit a detailed list of rates for personnel, equipment, tools, materials, and the like, that would be involved with delivery of the additional work. The rates shall be unburdened. Overheads, taxes, insurance, profit, and the like, shall also be identified discretely and be applied appropriately to the respective rates and costs, as per Article 11.4 of the General Conditions. The aforementioned shall not relieve the Owner of its right to require the Contractor to provide additional work, nor shall it limit the number of times additional work can be ordered.
2. Payment for the additional work will be made by collecting all approved charges and providing full documentation with the respective application for payment. All additional work conducted under this format shall be documented and agreed to on a daily basis. All labor hours shall be recorded and agreed to, all operating equipment hours shall be recorded and agreed to, and all material invoices shall be collected and verified. Both Contractor and Engineer shall endorse all daily charges in writing, providing a copy of all charges to both Contractor and Engineer for record purposes. The Contractor shall be responsible for maintaining all original records and documents for payment purposes. Failure to document any charge may result in that charge being rejected for payment. Such price and payment shall constitute full compensation to the Contractor for furnishing all

plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the additional work, complete in place, in accordance with direction provided by the Engineer.

F. Markups (Fee)

1. Markups applied to additional work shall be as prescribed in Article 11.6 of the General Conditions.

2 PRODUCTS (NOT USED)

3 EXECUTION

3.1 APPLICATION FOR PAYMENT

- A. Refer to Article 30 of the General Conditions/Supplementary Conditions.

**** END OF SECTION ****

SECTION 01300

SUBMITTALS

1 GENERAL

1.1 DESCRIPTION

- A. The work under this Section includes submittals by CONTRACTOR of shop drawings, product data and samples required by the various sections of these Specifications to the ENGINEER.
- B. Definitions: Submittals are categorized as follows:
 - 1. Shop Drawings
 - a. Shop drawings shall include technical data, fabrication and erection/installation drawings, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.
 - b. Provide newly prepared information with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. Show dimensions and note, which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawing copies without appropriate final "Action" markings by the ENGINEER to be used in connection with the Work.
 - c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section or schedule shown on the Drawings.
 - 2. Product Data
 - a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.
 - b. Collect required data into one submittal for each unit of work or system and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

1.2 MANUFACTURER'S LITERATURE

- A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the ENGINEER's review.
- B. Submit the number of copies which are required to be returned plus four copies which will be retained by the ENGINEER.
- C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the ENGINEER.

1.3 COLORS

- A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the ENGINEER for review and selection.
- B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

1.4 GENERAL SUBMITTAL REQUIREMENTS

A. Scheduling

1. Where appropriate in various required administrative submittals (listings of products, manufacturers, supplier and subcontractors, and in job progress schedule), show principal work-related submittal requirements and time schedules for coordination and integration of submittal activity with related work in each instance.

B. Coordination of Submittal Times

1. Prepare and transmit each submittal to the Engineer sufficiently in advance of performing related work or other applicable activities, so the installation will not be delayed or improperly sequenced by processing times, including non-approval and re-submittal (if required). Coordinate with other submittals, testing, purchasing, delivery and similar sequenced activities. No extension of time will be authorized because of Contractor's failure to transmit submittals to the Engineer sufficiently in advance of the work.

C. Sequencing Requirements

1. As applicable in each instance, do not proceed with a unit of work until submittal procedures have been sequenced with related units of work, in a manner which will ensure that the action will not need to be later modified or rescinded by reason of a subsequent submittal which should have been processed earlier or concurrently for coordination.

D. Preparation of Submittals

1. Provide permanent marking on each submittal to identify project, date, Contractor, subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide a 3" x 5" space for the Engineer's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor's office will be returned "without action."

E. Transmittal Identification

1. Number transmittals in sequence for each Division of the Specifications. The number before the dash indicates the Section of the Specifications, and the number after the dash is the sequence number of the transmittal (15140-1 would be the first transmittal applicable to Section 15140 of the Specifications, 15140-2 would be the second transmittal for Section 15140, etc.)
2. Identify re-submittals with a letter of the alphabet following the original number, using "A" for the first re-submittal, "B" for the second re-submittal, etc. A re-submittal affecting transmittal 15140-1 would then be numbered 15140-1A. The number 15140-1 would then be entered in the space "Previous Transmittal Number," which is left blank except on re- submittals. Re-submittals shall include all previous submittal information. No partial submittals will be accepted.

1.5 ROUTING OF SUBMITTALS

A. Submittals and routine correspondence shall be routed as follows:

1. Supplier to Contractor (through representative if applicable) for preliminary check.
2. Contractor to Consulting Engineer for general review or comment.
3. Consulting Engineer to Contractor.
4. Contractor to Supplier.

1.6 ADDRESS FOR COMMUNICATIONS

- A. Rockdale Water
Resources Attn: Mr. David
Cervone, P.E. 1329
Portman Drive, Suite H
Conyers, GA 30012
(770) 278-7432

1.7 SUBMITTAL COPIES REQUIRED

A. Shop Drawings, Product Data, and Miscellaneous Submittals

1. All submittals marked "No Exception Noted" or "Furnish as Corrected" will be distributed as follows:
 - a. For Engineer 1 copy
 - b. For Contractor 2 copies
 - c. For Field Inspection Office 1 copy
 - d. For Owner 1 copy
 - e. Total 5 copies
2. To the above number may be added additional copies as required by the Contractor.
3. The Engineer will mark all copies of each shop drawing. One will be retained in the Engineer's office, one sent to the Field Inspection office, one will be retained for the Owner and the remaining copies sent to the Contractor for his records and distribution.
4. All submittals marked "Revise and Resubmit" or "Rejected" will be distributed as follows:
 - a. For Engineer 1 copy
 - b. For Contractor 2 copies
 - c. Total 3 copies

B. For non-approval items, such as parts lists and preliminary operation and maintenance manuals, 2 copies are required, unless specified otherwise:

1. For Engineer File 1 copy
2. For Contractor 1 copy
3. Total 2 copies

C. Samples

1. Submittal
 - a. At Contractor's option, provide preliminary submittal of a single set of samples for the Engineer's review and "action." Otherwise, initial submittal is final submittal unless returned with "action" which requires re-submittal. Submit two sets of samples in final submittal; one set will be returned.
2. Quality Control Set
 - a. Maintain returned final set of samples at project site, in suitable condition and available for quality control comparisons by Engineer and by others.

1.8 REVIEW OF SUBMITTALS

A. Review Time

1. Allow 15 working days from the date the submittal is received in the Engineer's office for the Engineer to review and respond to each submittal, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.

B. Engineer's Action

1. "No Exception Noted" - Indicates the drawings have been reviewed for conformance with the contract documents and no exceptions have been taken. Proceed with the work.
2. "Furnish as Corrected" - Indicates the drawings have been reviewed for conformance with the contract documents and work may proceed in accordance with all comments. Re- submittal will not be required.
3. "Revise and Resubmit" - Indicates the drawings have been reviewed for conformance with the contract documents, and work may not proceed. After items to which exceptions have been taken are corrected, Contractor shall again submit copies for review.
4. "Rejected" - Indicates the drawings have been reviewed for conformance with the contract documents and are too incomplete or in an unacceptable condition for review. A notation will be made on the shop drawings as to the exceptions taken. Drawings shall be revised and resubmitted for review before proceeding with the work.
5. "Submit Specific Item" - Indicates that one or more items in the submittal were missing or incomplete. Work may commence on any items to which no exceptions were taken; missing or incomplete items must be submitted as noted.

1.9 DAILY REPORTS

- A. The Contractor shall submit daily reports to the Engineer. Reports shall contain, but not be limited to, a list of all employees and subcontractors by trade that worked on the job that day, received equipment and materials, survey stake-out data, erosion control maintenance updates.

2 EXECUTION

2.1 CONTRACTOR'S COORDINATION OF SUBMITTALS

- A. Prior to submittal for the ENGINEER review, the CONTRACTOR shall use all means necessary to fully coordinate all material, including the following procedures:
 1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
 2. Coordinate as required with all trades and all public agencies involved.
 3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.
 4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.
- B. Each and every copy of the submittal data shall bear the CONTRACTOR's stamp showing that it has been so checked. Shop drawings submitted to the ENGINEER without the CONTRACTOR's stamp will be returned to the CONTRACTOR for conformance with this requirement.
- C. The OWNER may deduct from the Contract amount costs associated with having to review a particular shop drawing, product data, or sample more than two times in order to receive an acceptable disposition.
- D. Grouping of Submittals
 1. Unless otherwise specifically permitted by the ENGINEER, make all submittals in groups containing all associated items.
 2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the CONTRACTOR's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent

items, check them and then make one submittal to the ENGINEER along with CONTRACTOR's comments as to compliance, non-compliance or features requiring special attention.

E. Transmittal of Submittals

1. All submittals shall be submitted using a transmittal form similar to one furnished by the ENGINEER.

F. Shop Drawing Details

1. All details on shop drawings shall show clearly the relation of the various parts of the main members and lines of the structure. Where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for review.

G. Deviations

1. If a shop drawing shows any deviation(s) from the requirements of the Contract Documents, the CONTRACTOR shall make specific mention of the deviation(s) on the transmittal form and provide a written description of the deviation(s) on separate 8-1/2 X 11 paper attached to the transmittal form.

H. Maintenance and Lubrication Schedules

1. Submittals for equipment specified under Divisions 11, 13, 14, 15, and 16 shall include maintenance and lubrication schedules for each piece of equipment.
2. Schedule of Submittals: As detailed in the General Conditions. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

2.2 CONTRACTOR CERTIFICATION

- A. Each shop drawing, sample, and product data submitted by the CONTRACTOR shall have affixed to it the following certification statement:
- B. Certification Statement: By this submittal, I hereby represent that all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been determined and verified, and each item has been checked and coordinated with other applicable shop drawings and all Contract requirements. Further, these determination, verification, check, and coordination activities have been conducted by qualified personnel under my supervision.

2.3 TIMING OF SUBMITTALS

- A. Make all submittals in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary reviews, for possible revision and resubmittal, and for placing orders and securing delivery.
- B. In scheduling, allow 10 working days for the ENGINEER's review following the receipt of the submittal.
 1. Acceptable submittals will be marked "No Exceptions Taken". Three copies will be retained by the ENGINEER for ENGINEER's and the OWNER's use and the remaining copies will be returned to the CONTRACTOR.
 2. Submittals requiring minor corrections before the product is acceptable will be marked "Make Corrections Noted". The CONTRACTOR may order, fabricate, ship, and install the items included in the submittals, provided the indicated corrections are made. Resubmission is not required on a "Make Corrections Noted" submittal disposition.
 3. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure must be repeated.
 4. The "Rejected" notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the CONTRACTOR shall repeat the initial review procedure utilizing acceptable products.
 5. Only three copies of items marked "Amend and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by the ENGINEER and the other two

copies will be returned to the CONTRACTOR for resubmittal.

- C. No work or products shall be installed without a drawing or submittal bearing either the "No Exceptions Taken" or "Make Corrections Noted" notation. The CONTRACTOR shall maintain at the job site a complete set of shop drawings bearing the ENGINEER's stamp. Fabrication performed, materials purchased or on-site construction accomplished which does not conform with a properly and completely processed submittal shall be remedied by the CONTRACTOR with no liability to the OWNER. The OWNER will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity. Project work, materials, fabrication, and installation shall conform with properly and completely processed shop drawings, applicable samples, and/or product data.
- D. Substitutions: In the event the CONTRACTOR obtains the ENGINEER's approval for the use of products other than those which are listed first in the Contract Documents, the CONTRACTOR shall, at the CONTRACTOR's own expense and using methods approved by the ENGINEER, make any changes to structures and piping that may be necessary to accommodate these products.
- E. Use of the "No Exceptions Taken" or "Make Corrections Noted" notation on shop drawings or other submittals is general and shall not relieve the CONTRACTOR of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The ENGINEER's review is intended only to review conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The CONTRACTOR is responsible for dimensions to be confirmed and correlated at the job site. The CONTRACTOR is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

**** END OF SECTION ****

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1 GENERAL

1.1 SCOPE

- A. Temporary facilities required for this work include, but are not necessarily limited to:
1. Temporary utilities required by CONTRACTOR such as water, telephone, and electricity.
 2. Sanitary facilities.
 3. Temporary enclosures and construction facilities.

1.2 GENERAL

- A. Sanitary facilities and potable water shall be made available by the CONTRACTOR on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.
- B. Maintenance: Use all means to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the OWNER.
- C. Removal: Remove all such temporary facilities and controls as appropriate relative to the progress of the Work, and as the requirements of the Contract provide.

1.3 TEMPORARY UTILITIES

A. General

1. Provide and pay all costs for electricity and sanitary utilities required for the performance of the Work.
2. If water service is available to the site at the time of construction, OWNER will provide tap and meter at the curb and CONTRACTOR will provide service line and pay for water at standard local rates.

1.4 CONTRACTOR'S USE OF PREMISES

- A. Lands furnished by OWNER upon which CONTRACTOR and their respective Subcontractors shall perform the Work are as shown in the Contract Drawings.
1. CONTRACTOR shall coordinate use of premises with the OWNER. The CONTRACTOR shall be responsible for all site activities conducted under the terms of this contract and/or under their purview.

1.5 PERMITS

- A. Permits, Licenses, or Approvals: The CONTRACTOR will be responsible for acquiring any permits that are required for this project/purchase. OWNER will waive fees on all permits issued by OWNER.
- B. The OWNER will obtain permits required from agencies of the State of Georgia and the United States of America.

1.6 PROTECTION OF WORK AND PROPERTY

- A. Comply with applicable Federal, State, and Local health, safety and environmental laws pertinent to this Work, or referenced by the Contract provisions, while on OWNER's property.
- B. During the performance of the Work, CONTRACTOR is responsible for adapting his means, methods, techniques, sequences and procedures of construction to allow effective and timely prosecution of the Work. In order to accomplish this, it may be necessary for the CONTRACTOR to plan, design, and provide various temporary services, utilities, temporary piping and heating, access, and similar items which will be included within the Contract Price.

1.7 VEHICULAR TRAFFIC

- A. CONTRACTOR's vehicular traffic must comply with OWNER's requirements. CONTRACTOR will coordinate vehicular traffic in a manner that will maximize overall access to the site and avoid interference with other CONTRACTORS working at the site.

1.8 PROJECT SIGN

- A. Should the CONTRACTOR desire to post their business name for delivery purposes, the CONTRACTOR may place an appropriately sized sign near project access points.

2 EXECUTION

2.1 RESPONSIBILITIES

- A. CONTRACTOR shall provide temporary facilities and controls as specified throughout this Section for use by CONTRACTOR's personnel at the site, or sites of the Work, until the project is complete.
- B. CONTRACTOR is solely responsible for temporary facilities and controls removal and restoration of the affected area when the temporary facilities and controls are no longer needed or required by virtue of the Work being complete.
- C. CONTRACTOR shall include in his Bid the costs associated with the temporary facilities and controls that are to be provided.

2.2 STORAGE YARDS AND BUILDINGS

- A. Temporary Storage Yards: CONTRACTOR may construct temporary storage yards for staging and storage of its own products, equipment, and materials. Location is subject to ENGINEER's approval.
- B. Temporary Storage Trailers: Trailers may be utilized for temporary storage. Location is subject to ENGINEER's approval.

2.3 SITE ACCESS

- A. General access to the site will be from Honey Creek Road, Parr Road, Stanton Road, Goode Road, Ralph Road, GA. Hwy 212, Hull Road, Oglesby Bridge Rd, Crowell Road and Troupe Smith Road.

2.4 SITE SECURITY

- A. The CONTRACTOR shall be responsible for security of their temporary facilities, equipment, tools, vehicles, materials, work-in-place, and any other property located on site for the duration of this Contract.
- B. The CONTRACTOR shall remove all temporary facilities, equipment, tools, vehicles, materials, and any other property remaining upon completion of the Work, and no later than close-out of the Contract.
- C. Coordination: Coordinate traffic routing with that of others working in the same or adjacent areas.

2.5 CLEANING DURING CONSTRUCTION

- A. The site shall be maintained in a neat, clean, and orderly manner to allow and ensure ready access, safe working and observation conditions, and a workmanlike appearance. Debris, waste materials, refuse, and rubbish shall be collected and properly disposed of daily.

**** END OF SECTION ****

SECTION TRAFFIC REGULATION**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.

SECTION 01570-TRAFFIC REGULATION**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.

SECTION 01570-TRAFFIC REGULATION

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 01610
TRANSPORTATION AND HANDLING

1 GENERAL

1.1 DESCRIPTION

- A. The CONTRACTOR shall provide transportation of all materials and products furnished under these Contract Documents to the Work site. In addition, the CONTRACTOR shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the CONTRACTOR for the satisfactory prosecution and completion of the Work.
- B. Any and all materials and products, including spare parts, damaged during transportation or handling shall be repaired or replaced by the CONTRACTOR at no additional cost to the OWNER prior to being incorporated into the Work.

1.2 TRANSPORTATION

- A. The scheduling of equipment deliveries to the job site is the responsibility of the CONTRACTOR. Mechanical equipment and related electrical components shall not be delivered before satisfactory storage is available.
- B. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.
- C. All materials shall be suitably boxed, crated or otherwise protected during transportation.
- D. Inspect and inventory items upon delivery to the site.

1.3 HANDLING

- A. All materials and products, including spare parts, shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.
- B. Lifting and handling instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on materials shall be used in handling the equipment. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.
- C. Under no circumstances shall products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, be thrown or rolled off of trucks onto the ground.
- D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

** END OF SECTION **

SECTION 01620
STORAGE AND PROTECTION

1 GENERAL

1.1 SCOPE

- A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials to properly store and protect all materials, products, and the like, including spare parts, for the proper and complete performance of the Work.

1.2 STORAGE AND PROTECTION

A. Storage

1. Maintain ample way for foot traffic at all times.
2. All property damaged as a result of storing of material shall be properly replaced at no additional cost to the OWNER.
3. Packaged materials shall be delivered in original unopened containers and stored until ready for use.
4. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.
5. Store products, including spare parts, in accordance with manufacturer's instructions. Products must be specifically prepared and certified for long-term outdoor storage by the manufacturer.

- B. Protection: Use all means to protect the materials and products, including spare parts, of every section before, during and after installation and to protect the installed work and materials of all other trades.

- C. Replacements: In the event of damage, immediately make all repairs and replacements at no additional cost to the OWNER.

- D. Products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports.

- E. Building products and materials such as cement and grout shall be stored indoors in a dry location. Building products such as rough lumber and plywood may be stored outdoors under a properly secured waterproof covering. Reinforcing steel, anchor bolts, concrete inserts, wire ties, wall ties, sleeves, and the like, shall be stored off the ground (e.g., on pallets) in a prepared area.

** END OF SECTION **

SECTION 01625
GENERAL EQUIPMENT AND REQUIREMENTS

1 GENERAL

1.1 DESCRIPTION

- A. These General Equipment Requirements apply, in general, to all equipment and piping. They supplement the detailed equipment Specifications, but in case of conflict, the detailed equipment Specifications shall govern.

1.2 UNIT RESPONSIBILITY

- A. A single manufacturer shall assume unit responsibility for all items so specified in each technical section. Unit responsibility shall require that all items be products of, or guaranteed by, the manufacturer. The manufacturer shall be responsible for all coordination between components and provide all submittals, installation and start-up assistance and certifications on the equipment as a unit.

1.3 INSTALLATION

- A. All equipment and materials shall be installed by skilled mechanics, in accordance with the approved shop drawings and the printed instructions of the manufacturer and as indicated and specified. Installation shall include furnishing any required lubricant and oil and grease in accordance with manufacturer's recommendations.

1.4 ADAPTATION AND LOCATION OF EQUIPMENT

- A. When proposing equipment which requires an arrangement differing from that indicated on the drawings or specified, the CONTRACTOR must prepare and submit for review detailed structural, mechanical, and electrical drawings and equipment lists, utilities consumption schedule and operating instructions, showing necessary changes and embodying special features of the equipment he proposes to furnish. No responsibility for alteration of a planned structure to accommodate other types of equipment will be assumed by the OWNER. Equipment which requires alteration of a structure or structures will be considered only if the CONTRACTOR assumes all responsibility for making and coordinating all necessary alterations. Any and all such alterations shall be made at no additional cost to the OWNER.

1.5 PATENT ROYALTIES

- A. All royalties and fees for patents covering materials, articles, apparatus, devices, or equipment shall be included in the Bid by the CONTRACTOR.

1.6 WORKMANSHIP AND MATERIALS

- A. All equipment shall be designed, fabricated and assembled in accordance with the most modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall be new and shall not have been in service at any time prior to delivery, except as required by tests.
- B. Materials shall be suitable for service conditions. Iron castings shall be close grained, gray iron free from blowholes, flaws or excessive shrinkage and shall conform to ASTM A 48, Class 30 minimum. Plugging of defective castings shall not be permitted. Castings shall be annealed to remove internal stresses prior to machining and shall have the mark number and heat number cast on them.
- C. Except where otherwise specified, structural and miscellaneous fabricated steel used in items of equipment shall conform to the Standards of the American Institute of Steel Construction. All structural members shall be considered as subject to shock or vibratory loads.
- D. All replaceable or expendable elements such as filters, screens, drive belts, fuses, lamps, etc., shall be easily accessible and replaceable without need of dismantling equipment or

pipng. All such items shall be of a standard type that is readily available from multiple suppliers.

- E. Threaded openings for drains or vents in pump volutes, compressor or fan scrolls, air receivers, and heat exchangers which are plugged during normal operation shall be provided with stainless steel plugs.

1.7 LUBRICATION AND LUBRICATION FITTINGS

- A. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during start-up or shutdown and shall not waste lubricants.
- B. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity by the CONTRACTOR to fill all lubricant reservoirs and to replace all lubricants consumed during testing, start-up and initial operation, plus sufficient quantities of lubricants to lubricate all equipment for one year of normal service.
- C. Where special run-in oil or storage lubricants are used, they shall be flushed out and replaced with the required service lubricant by the Manufacturer's Technical Representative.
- D. Tag each piece of equipment with a cloth tag showing proper type lubricant, period between lubrications, date of lubrication and worker's initials. Have space for 10 lubrication notations.
- E. Fittings shall be of the bull-neck, check type for use with a portable high-pressure grease gun.
- F. Except for rotating shaft couplings, all lubrication fittings shall be brought to the outside of all equipment so that they are readily accessible from the outside without the necessity of removing covers, plates, housings or guards. Fittings shall be accessible from safe, permanent platforms or walk areas. Extension fittings and tubing shall be provided on all grease fittings that are installed in an inaccessible location. The extension is to be located so that equipment can be lubricated from the operating level without the use of ladders, staging or shutting down the equipment. Connection from a remote fitting to the point of use shall be with minimum 3/16-inch Type 316 stainless steel tubing, securely mounted parallel to equipment lines and protected where exposed to damage.

1.8 SAFETY GUARDS

- A. All belt or chain drives, fan blades, couplings and other moving or rotating parts shall be covered on all sides by an OSHA-approved all-metal safety guard. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or 1/2- inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal. All supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water. All safety guards shall comply with OSHA general industry standards, Part 1910, Subpart O, Machinery and Machine Guarding. Provide tachometer access on shaft ends.

1.9 EQUIPMENT FOUNDATIONS AND GROUTING

- A. The CONTRACTOR shall furnish all materials and construct suitable raised, reinforced concrete foundations for all equipment in accordance with approved shop drawings and manufacturer installation instructions, even though such foundations may not be indicated on the Drawings.

1.10 ALIGNMENT OF MOTORS AND EQUIPMENT

- A. In every case where a drive motor is connected to a driven piece of equipment by a flexible coupling, the coupling halves shall be disconnected and the alignment between the motor and the equipment checked and corrected. Machinery shall first be properly aligned and leveled by means of steel wedges and shims or jacking screws near anchor bolts. Anchor bolts shall be tightened against the shims on wedges or jacking screws and the equipment

shall again be checked for level and alignment before placing grout. Wedges shall not be placed between machined surfaces.

- B. In general, checking and correcting the alignment shall follow the procedures set up in the Standards of the Hydraulic Institute, Instructions for Installation, Operation, and Maintenance of Centrifugal Pumps. Equipment shall be properly leveled and brought into angular and parallel alignment.
- C. Equipment shall be installed in such a way that no strain is transmitted to the equipment by piping systems or adjacent equipment.

**** END OF SECTION ****

SECTION 16231-1
GENERATOR AND ATS

SECTION 16231
GENERATOR AND ATS

PART 1 - GENERAL

1.01 REFERENCES

- A. The equipment covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards of ANSI, NEC, ISO, U.L., IEEE and NEMA.

1.02 WORK INCLUDED

- A. The work includes supplying a complete integrated emergency generator system. The system consists of a diesel generator set with related component accessories and Automatic Transfer Switch as specified herein.
- B. The Contractor shall provide a full tank of diesel fuel for the completion of all testing.
- C. A complete system load test shall be performed after all equipment is installed.
- D. The equipment supplied and installed shall meet the requirements of the NEC and all applicable local codes and regulations. All equipment shall be of new and current production by a Manufacturer who has 25 years of experience building this type of equipment. Manufacturer shall be ISO9001 certified.

1.03 MANUFACTURERS

- A. There shall be one source responsibility for warranty, parts and service through a local representative with factory trained service personnel.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Generator Set
 - a. Cummins-Onan
 - b. Caterpillar
 - c. Kohler
 - d. John Deere
 - 2. Automatic Transfer Switch
 - a. Cummins-Onan
 - b. ASCO

SECTION 16231-2
GENERATOR AND ATS

1.04 SUBMITTALS

- A. Engine-generator submittals shall include the following information
1. Factory published specification sheet indicating standard and optional accessories, ratings, etc.
 2. Manufacturer's catalog cut sheets of all auxiliary components such as Automatic Transfer Switches, battery charger, control panel, enclosure, main circuit breaker, etc.
 3. Dimensional elevation and layout drawings of the generator set, enclosure and transfer switchgear and related accessories.
 4. Weights of all equipment.
 5. Concrete pad recommendation, layout and stub-up locations of electrical and fuel systems.
 6. Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, jacket water heater, remote alarm indications.
 7. Engine mechanical data including heat rejection, exhaust gas flows, combustion air and ventilation air flows, noise data, fuel consumption, etc.
 8. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.
 9. Generator resistances, reactances, and time constants.
 10. Generator motor starting capability.
 11. Control panel schematics.
 12. Oil sampling analysis, laboratory location, and information.
 13. Manufacturer's and dealer's written warranty.
 14. Letter of guarantee that the proposed generator will be capable of starting and running the loads specified on the drawings.

SECTION 16231-3 GENERATOR AND ATS

1.05 WARRANTY

- A. The manufacturer's standard warranty shall in no event be for a period of less than two (2) years from date of substantial completion and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Submittals received without written warranties as specified will be rejected in their entirety.

1.06 PARTS AND SERVICE QUALIFICATIONS

- A. The engine-generator supplier shall have service facilities within 75 miles of the project site and maintain 24-hour parts and service capability. The distributor shall stock parts as needed to support the generator set package for this specific project.
- B. The dealer shall maintain qualified, factory-trained service personnel that can respond to an emergency call within 4 hours of notification, 24 hours per day.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The generator set shall be Standby and have a kW rating as shown on the One Line diagram. The additional ratings shall be 1800 RPM, 0.8 power factor, 480/277 VAC, 3 phase, 4 wire, 60 hertz, including radiator fan and all parasitic loads. See Electrical Drawings for additional Generator and ATS requirements.
- B. All materials and parts comprising the unit shall be new and unused.
- C. The selected generator shall have a voltage dip not exceeding 25% and frequency dip not exceeding 10%.

2.02 DIESEL ENGINE

- A. The engine shall be water-cooled inline or vee-type, four cycle compression ignition diesel. It shall meet specifications when operating on number 2 domestic burner oil. Two cycle engines will not be considered. The engine shall be equipped with fuel, lube oil, and intake air filters, lube oil cooler, fuel transfer pump, fuel priming pump, service meter, gear-driven water pump.
- B. The complete engine block shall be machined from one casting. Designs incorporating multiple blocks bolted together are not acceptable.
- C. The engine shall utilize a gear-type, positive displacement, full pressure lubricating oil pump and water-cooled lube oil cooler. Pistons shall be spray-cooled. Provide oil filters, oil pressure gauge, dipstick and oil drain.
- D. Fuel filter and serviceable fuel system components shall be located to prevent fuel from spilling onto generator set batteries.

SECTION 16231-4
GENERATOR AND ATS

- E. The engine shall be equipped with an isochronous electronic governor to maintain 0% drop from no load to full load and +/- 0.25% steady state frequency variation. The governor shall be equipped with speed adjustment.

2.03 GENERATOR

- A. The synchronous generator shall be a single bearing, self-ventilated, drip-proof design in accordance with NEMA MG 1 and directly connected to the engine flywheel housing with a flex coupling.
- B. The insulation material shall meet NEMA standards for Class H insulation and be vacuum impregnated with epoxy varnish to be fungus resistant. Temperature rise of the rotor and stator shall not exceed NEMA class F (130° C rise by resistance over 40° C ambient). The excitation system shall be of brushless construction.
- C. The brushless exciter shall be independent of main stator windings (either permanent magnet or auxiliary windings) and shall consist of a three-phase armature and a three-phase full wave bridge rectifier mounted on the rotor shaft. Surge suppressors shall be included to protect the diodes from voltage spikes. Generator shall have the ability to sustain short circuit current of 300% of rated current to allow protective devices to operate.
- D. The automatic voltage regulator (AVR) shall maintain generator output voltage within +/- 0.5% for any constant load between no load and full load. The regulator shall be a totally solid-state design which includes electronic voltage buildup, volts per Hertz regulation, three phase sensing, over-excitation protection, loss of sensing protection, temperature compensation, shall limit voltage overshoot on startup, and shall be environmentally sealed.

2.04 CIRCUIT BREAKER

- A. Provide a generator mounted circuit breaker, molded case or insulated case construction. Breaker shall be sized as shown on the drawings. Breaker shall be thermal magnetic trip unit. The breaker shall be UL listed with shunt trip device connected to engine/generator safety shutdowns. Breaker shall be housed in an extension terminal box mounted on the side of the generator. Mechanical type lugs, sized for the circuit breaker feeders shown on drawing, shall be supplied on the load side of breaker. Breaker shall include long term, short term instantaneous, and ground fault protection.

2.05 CONTROLS

- A. Generator Mounted Control Panel:
 - 1. Provide a generator mounted control panel for complete control and monitoring of the engine and generator set functions. Panel shall include automatic start/stop operation, adjustable cycle cranking, digital LCD AC metering (0.5% true rms accuracy) with phase selector switch, digital engine

SECTION 16231-5
GENERATOR AND ATS

monitoring, shutdown sensors and alarms with horn and reset, adjustable cooldown timer and emergency stop push-button. Panel shall incorporate self-diagnostics capabilities and fault logging. Critical components shall be environmentally sealed to protect against failure from moisture and dirt. Components shall be housed in a NEMA 1/IP22 enclosure with hinged lid.

2. Provide the following digital readouts on the Generator Mounted Control Panel:
 - a. Engine oil pressure
 - b. Coolant temperature
 - c. Engine RPM
 - d. System DC Volts
 - e. Engine running hours
 - f. Generator AC volts
 - g. Generator AC amps
 - h. Generator frequency
3. Control Panel Annunciation - Provide the following indications for protection and diagnostics according to NFPA 110 level 1:
 - a. Low oil pressure
 - b. High water temperature
 - c. Low coolant level
 - d. Overspeed
 - e. Overcrank
 - f. Emergency stop depressed
 - g. Approaching high coolant temperature
 - h. Approaching low oil pressure
 - i. Low coolant temperature
 - j. Low voltage in battery
 - k. Control switch not in auto. position
 - l. Low fuel main tank

SECTION 16231-6
GENERATOR AND ATS

- m. Battery charger ac failure
 - n. High battery voltage
 - o. Generator supplying load
 - p. Spare.
4. Generator “Running”, “Low Fuel Level” and Generator “Common Fault” relays with dry, 120VAC, 5 Amp rated contacts.

B. COOLING SYSTEM

1. The generator set shall be equipped with a rail-mounted, engine-driven radiator with blower fan and all accessories. The cooling system shall be sized to operate at full load conditions and 110° F ambient air entering the room or enclosure (If an enclosure is specified) without derating the unit and 50/50 anti-freeze mixture. The generator set supplier is responsible for providing a properly sized cooling system based on the enclosure static pressure restriction.

C. FUEL SYSTEM

- 1. Filter/Separator - In addition to the standard fuel filters provided by the engine manufacturer, there shall also be installed a primary fuel filter/water separator in the fuel inlet line to the engine.
- 2. All fuel piping shall be black iron or flexible fuel hose rated for this service. No galvanized piping will be permitted.
- 3. Flexible fuel lines shall be rated for 300 degrees F and 100 PSI.
- 4. Fuel Tank shall be double wall with Leak Detection.

D. EXHAUST SYSTEM

- 1. A critical type silencer, companion flanges, and flexible stainless steel exhaust fitting properly sized shall be furnished and installed according to the manufacturer’s recommendation.
- 2. Mounting shall be provided by the contractor as shown on the drawings. The silencer shall be mounted so that its weight is not supported by the engine.
- 3. Exhaust pipe size shall be sufficient to ensure that exhaust back pressure does not exceed the maximum limitations specified by the engine manufacturer.

E. STARTING SYSTEM

- 1. A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be as recommended by the engine manufacturer.

SECTION 16231-7 GENERATOR AND ATS

2. Jacket Water Heater: A unit mounted thermal circulation type water heater. The heater watt rating shall be sized by the manufacturer to maintain jacket water temperature at 90 degrees F, and shall be a 120 volt, single phase, 60 hertz.
3. Batteries: A lead-acid storage battery set of the heavy duty diesel starting type shall be provided. Battery voltage shall be compatible with the starting system. The battery set shall be rated no less than 140 ampere hours and 1000 CCA. Necessary cables and clamps shall be provided.
4. A battery tray shall be provided for the batteries and shall conform to NEC 480-7(b). It shall be treated to be resistant to deterioration by battery electrolyte. Further, construction shall be such that any spillage or boil-over battery electrolyte shall be contained within the tray to prevent a direct path to ground.
5. Battery Charger: A current limiting battery charger shall be furnished to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, and fused AC input. AC input voltage shall be 120 volts, single phase. Charger shall have LED annunciation for low DC volts, rectifier failure, loss of AC power, high DC volts. Amperage output shall be as required. Charger shall be wall mounting type in NEMA 1 enclosure, installed in the generator set enclosure.

F. GENERATOR SET ENCLOSURE – SOUND ATTENUATED AND WEATHER PROTECTIVE

1. The complete diesel engine generator set, including generator control panel, engine starting batteries and fuel oil tank, shall be enclosed in a factory assembled, weather protective, level II enclosure mounted on the fuel tank base.
2. The enclosure shall be constructed of corrosion resistant steel with electrostatically applied powder coated baked polyester paint. It shall consist of a roof, side walls, and end walls. Fasteners shall be either zinc plated or stainless steel.
3. A dual wall fuel tank base of 24 hour capacity at 100% load shall be provided as an integral part of the enclosure. It shall be contained in a rupture basin with 110% capacity. The tank shall be pressure tested for leaks prior to shipment and have all necessary venting per UL142 standards. A locking fill cap, a mechanical reading fuel level gauge, low fuel level alarm contact, and fuel tank rupture alarm contact shall be provided.
4. The enclosure shall reduce the ambient noise level at full load to a maximum of 70 dB at 23 feet.
5. Number of doors on enclosure shall be as required so that all normal maintenance operations, such as lube oil change, filter change, belt adjustment and replacements, hose replacements, access to the control

SECTION 16231-8
GENERATOR AND ATS

panels, etc., may be accomplished without disassembly of any enclosure components. Access doors shall be fabricated of the same material as the enclosure walls and shall be reinforced for rigidity.

6. Handles shall be key lockable, all doors keyed alike, and hinges shall be zinc die cast or stainless steel. Fasteners shall be zinc plated or stainless steel. Doors shall be of a lift off design allowing one person to remove door if necessary.
7. Air handling will be sized and designed by the manufacturer for 0.5" static pressure drop through enclosure. Intake openings shall be screened to prevent the entrance of rodents.
8. Lube oil and coolant drains shall be extended to the exterior of the enclosure and terminated with drain valves. Radiator access shall be through a hinged, lockable cover on enclosure. Cooling fan and charging alternator shall be fully guarded to prevent injury.
9. Lifting points shall be provided on base frame suitable for lifting combined weight of base tank, generator set and enclosure.

G. AUTOMATIC TRANSFER SWITCH

1. GENERAL

- a. The transfer switch shall have an enclosure type, voltage and ampacity rating as shown on the Drawings and shall have 600 volt insulation on all parts in accordance with NEMA standards.
- b. The current rating shall be a continuous rating when the switch is installed in an unventilated enclosure, and shall conform to NEMA temperature rise standards. Designs which require cabinet ventilation are unacceptable and do not meet this specification.
- c. The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast and inductive loads. Switches rated 400 amperes or less shall be UL listed for 100% tungsten lamp load.
- d. As a precondition for approval, all transfer switches complete with accessories shall be listed by Underwriters Laboratories, under Standard UL 1008 (automatic transfer switches) and approved for use on emergency systems.
- e. The withstand current capacity of the main contacts shall not be less than 20 times the continuous duty rating when coordinated with any molded case circuit breaker established by certified test data.
- f. Temperature rise tests in accordance with UL 1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.

SECTION 16231-9
GENERATOR AND ATS

- g. Transfer switches shall comply with the applicable standards of UL, CSA, ANSI, NFPA, IEEE, NEMA and IEC.
- h. The transfer switches shall be supplied with a solid state control panel as detailed further in these specifications.

2. SEQUENCE OF OPERATION

- a. The ATS shall incorporate adjustable three phase under-voltage sensing of the normal source.
- b. When the voltage of any phase of the normal source is reduced to 80% of nominal voltage, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine generator.
- c. The ATS shall incorporate adjustable single phase under-voltage sensing of the emergency source.
- d. When the emergency source has reached a voltage value within 10% of nominal voltage and achieved frequency within 5% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.
- e. When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be re-transferred to the normal source after a time delay of 0 to 30 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.
- f. If the engine generator should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of proper voltage (90%) on the normal source.
- g. The transfer switch shall be equipped with a solid state control panel. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position and source availability.
- h. The control panel shall include indicators for timing functions, and ATS test switch.
- i. The control panel shall be provided with calibrated pots (accessible only by first opening the lockable cabinet door) to set time delays, voltage and frequency sensors. The ATS shall be capable of being adjusted while the controls are energized and the unit in automatic mode. Designs which force a "programming mode" or require the controls be de-energized during adjustment are unacceptable.

SECTION 16231-10
GENERATOR AND ATS

- j. The control panel shall be opto-isolated from its inputs to reduce susceptibility to electrical noise and provided with the following inherent control functions and capabilities:
 - i. An LED display for continuous monitoring of the ATS functions.
 - ii. Test switch to simulate a normal source failure.
 - iii. Time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds (continuously adjustable via a calibrated potentiometer factory set at 3 seconds.
 - iv. Time delay on retransfer to normal source, continuously adjustable 0- 30 minutes, factory set at 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
 - v. Time delay on transfer to emergency, continuously adjustable 0-15 seconds, factory set at 1 second.
 - vi. An in-phase monitor or time delayed neutral shall be provided to prevent excessive transient currents from switching motor loads.
 - vii. An interval-type automatic clock exerciser with load/no load selectability shall be incorporated in the ATS.

3. CONSTRUCTION AND PERFORMANCE

- a. The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.
- b. The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.
- c. For switches installed in systems having ground fault protective devices, and/or wired so as to be designated a separately derived system by the NEC, a 4th pole shall be provided. This additional pole shall isolate the normal and emergency neutrals. The neutral pole shall have the same withstand and operational ratings as the other poles and shall be arranged to break last and make first to minimize neutral switching transients. Add-on or accessory poles that are not of identical construction and withstand capability are not acceptable.

SECTION 16231-11 GENERATOR AND ATS

- d. The contact structure shall consist of a main current carrying contact, which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes above 400 Amps.
- e. The transfer switch manufacturer shall submit test data for each size switch required for this project, showing that it can withstand fault currents of the magnitude and the duration necessary to maintain the system integrity. Minimum UL listed withstand and close into fault ratings shall be as follows:

Any Molded Case Breaker*:

Size (Amps)	(RMS Symmetrical)
Up to 200	10,000
201 - 260	35,000
261 - 400	35,000
401 - 1200	50,000
1201 - 4000	100,000

i. Specific Coordinated Breaker*:

Size (Amps)	(RMS Symmetrical)
Up to 150	30,000
151 - 260	42,000
261 - 400	50,000
401 - 800	65,000
801 - 1200	85,000
1201 - 4000	100,000

ii. Current Limiting Fuse*:

Size (Amps)	(RMS Symmetrical)
Up to 4000	200,000

*All values 480 volt, RMS symmetrical, less than 20% power factor.

Note: Actual necessary current withstand ratings for this project may be higher than the minimums listed above. Refer to electrical plans for exact requirements.

- f. The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at .50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.
- g. All relays shall be continuous duty industrial type with wiping contacts. Customer interface contacts shall be rated 10 amperes minimum. Coils,

SECTION 16231-12 GENERATOR AND ATS

relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.

- h. Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.
- i. A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.
- j. The switch shall be mounted in a NEMA 4X stainless steel enclosure unless otherwise indicated on the plans.
- k. Switches composed of molded case breakers, contactors or components thereof not specifically designed as an automatic transfer switch will not be acceptable.
- l. To afford the advantage of a single source of supply to the owner, the automatic transfer switch shall be supplied by the manufacturer of the engine generator set and covered under the same warranty program.

2.06 INSTALLATION

- A. Install equipment in accordance with manufacturer's recommendations, the project drawings and specifications, and all applicable codes. Installation of the system includes but is not limited to pouring a concrete pad for the generator set and automatic transfer switch, receiving and offloading the equipment, providing all labor, permits and material to install the total system.
- B. Start-Up and Testing
 - 1. Coordinate all start-up and testing activities with the Engineer and Owner.
 - 2. After installation is complete and normal power is available, the manufacturer's local dealer shall perform the following:
 - 3. Verify that the equipment is installed properly.
 - 4. Check all auxiliary devices for proper operation, including battery charger, jacket water heater(s), generator space heater, remote annunciator, etc.
 - 5. Test all alarms and safety shutdown devices for proper operation and annunciation.
 - 6. Check all fluid levels.
 - 7. Start engine and check for exhaust, oil, fuel leaks, vibrations, etc.

SECTION 16231-13 GENERATOR AND ATS

8. Verify proper voltage and phase rotation at the transfer switch before connecting to the load.
9. Connect the generator to building load and verify that the generator will start and run all designated loads in the plant.
10. Perform a 4 hour load bank test at full nameplate load using a load bank and cables supplied by the local generator dealer. Observe and record the following data at 15 minute intervals:
 - a. Service meter hours
 - b. Volts AC - All phases
 - c. Amps AC - All phases
 - d. Frequency
 - e. Power factor or Vars
 - f. Jacket water temperature
 - g. Oil Pressure
 - h. Fuel pressure
 - i. Ambient temperature
11. Operation and Maintenance Manuals
 - a. Provide three (3) sets of operation and maintenance manuals covering the generator, switchgear, and auxiliary components. Include parts manuals, final as-built wiring interconnect diagrams and recommended preventative maintenance schedules.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Division 1 Section "Demonstration and Training."
 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
 2. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".
 3. Schedule training with Owner, with at least seven days' advance notice.
 4. Minimum Instruction Period: Four hours.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

1 GENERAL

1.1 DESCRIPTION

- A. Contract closeout is the process that recognizes Substantial Completion, the transition of operations to the OWNER, and Final Completion. As the Work nears Substantial Completion, sequences of activities and their responsibilities need to be identified, planned, scheduled, and effectively implemented to facilitate a smooth completion of the overall project.
- B. This section defines the process by which the transition from construction to plant operations will be affected. Terms, roles, responsibilities, and actions will be identified herein.

1.2 RELEASES FROM AGREEMENTS

- A. Furnish OWNER written releases from any and all subcontractors or suppliers, or the like, who performed Work or supplied labor, materials, and/or services pursuant.
- B. In the event CONTRACTOR is unable to secure written releases, inform the OWNER of the reasons.

1.3 FINAL INSPECTION

- A. OWNER or its representatives will examine the site and/or Work, and OWNER will direct CONTRACTOR to complete Work that may be necessary to satisfy terms of the agreement.

2 PRODUCTS (NOT USED)

3 EXECUTION

3.1 SUBSTANTIAL COMPLETION

- A. Substantial Completion is defined in the General Conditions.
- B. The intended use for the project is to have the pump station complete and in service pumping wastewater in accordance with contract requirements. The pump station is to be fully functional in the designed control mode and properly operating for a period of not less than twenty-four hours before the Work will be eligible for declaration as substantially complete. Additionally, any and all site grading, site lighting, and all roads and pavements are to be complete.
- C. All required certificates of proper installation shall be properly completed and submitted to the ENGINEER prior to the Work being eligible for declaration as substantially complete.
- D. The balance of Work remaining and all unsatisfactory work items shall be identified, compiled, and submitted to the ENGINEER, along with a schedule of completion for all listed activities prior to the Work being eligible for declaration as substantially complete. The ENGINEER shall be afforded 5 working days to review the index and schedule and preparation of the punch list. Upon development of the punch list, the Work may be declared substantially complete.
- E. The CONTRACTOR shall perform all punch list tasks in a manner which will not disrupt operations of the pump station.

3.2 PUNCHLIST

- A. Development of the punch list is the result of a survey of the CONTRACTOR's work by the ENGINEER and the OWNER performed prior to Substantial Completion. The objective of the survey is to identify the activities which are incomplete or work products that are

unacceptable/unsatisfactory. The survey itself will corroborate the index of activities submitted by the CONTRACTOR.

3.3 FINAL ACCEPTANCE

- A. Final Acceptance is as addressed in the General Conditions.
- B. Completion of all punch list tasks/requirements is required prior to the Work being eligible for declaration as finally accepted.
- C. All record documents must be submitted to and accepted by the ENGINEER prior to the Work being eligible for declaration as finally accepted.
- D. All releases must be submitted to and accepted by the ENGINEER prior to the Work being eligible for declaration as finally accepted.

**** END OF SECTION ****

SECTION 01710

CLEANING

1 GENERAL

1.1 SCOPE

- A. 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.

1.2 QUALITY ASSURANCE

- A. Daily, and more often if necessary, 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.

1.3 HAZARDOUS MATERIAL AND WASTE

- A. The CONTRACTOR shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall 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.

1.4 DISPOSAL OF SURPLUS MATERIALS

- A. 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.

2 PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Use only 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 ENGINEER.

3 EXECUTION

3.1 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. At least each week, and more often if necessary, 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.
 - 4. At all times maintain the site in a neat and orderly condition which meets the approval of the ENGINEER.

3.2 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. 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. Unless otherwise specifically directed by the ENGINEER, 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. 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.
- E. Timing: Schedule final cleaning as approved by the ENGINEER to enable the OWNER to accept the Project.

**** END OF SECTION ****

SECTION 01720
RECORD DOCUMENTS

1 GENERAL

1.1 SCOPE

- A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording and submitting of project record documents as herein specified.
- B. Record documents to be prepared and submitted by the CONTRACTOR include, but are not limited to:
 - 1. Record Drawings
 - 2. Change orders and other modifications to the Contract
 - 3. ENGINEER field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums
 - 4. Reviewed shop drawings, product data and samples
 - 5. Test Records
 - 6. Original copies of all Warranties
 - 7. Final Operation and Maintenance Manuals
- C. The CONTRACTOR shall maintain on the Project site throughout the Contract Time an up- to-date set of Record Drawings.

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Storage
 - 1. Store documents and samples in the CONTRACTOR's field office, 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.
 - 3. Maintain at the site for the Local Governing Authority one copy of all record documents.
- D. Make documents and samples available at all times for inspection by ENGINEER.
- E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.3 QUALITY ASSURANCE

- A. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide dimensions, distances, and coordinates to the nearest 0.1 foot in North American Datum of 1983 (1986 adjustment) Georgia State Plane West 1002 System format in accordance with Rockdale County Water & Wastewater standards and specifications.
- B. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide elevations to the nearest 0.01 foot referenced to the North American Vertical Datum of 1988 (NAVD88) format. All coordinate values shall be provided as grid coordinates in US Survey Feet.
- C. Any transformation or adjustment necessary to project surveyed coordinates to the Reference Coordinate System will be the responsibility of the Contractor.

- D. The Contractor shall employ a Professional Land Surveyor (PLS) licensed in the State of Georgia to certify the Record Drawings from the collected GIS data or a post-construction, field survey of sewer line and appurtenances newly constructed, replaced or otherwise adjusted in position or elevation. Additionally, the Contractor shall submit the corresponding GIS data to indicate the as-built condition and GIS data attributes of these structures and pipelines.

1.4 SPECIFICATIONS

- A. Legibly mark each section to record changes made by Requests for information (RFI), field order, clarification memoranda, or by change order.

1.5 SUBMITTAL

- A. At contract closeout, deliver Record Documents to the ENGINEER.
- 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

1.6 RECORD DRAWINGS

- A. The CONTRACTOR must maintain an up-to-date field record set of Record Drawings by marking changes and other information directly on a set of contract drawings. The Contractor shall submit up-to-date Record Drawings with monthly pay applications and have them available for review at monthly progress meetings. Approval of monthly pay applications will not occur until the updated Record Drawings are approved. The ENGINEER will review the working drawings to confirm that the recorded information is current.
- B. Record Drawings are a final deliverable and 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 shall provide Record Drawings in both PDF form as well as the native format (for platcard and GIS update).
- C. Legibly mark Record Drawings to record actual construction, including:
 1. All Construction:
 - a. Changes of dimension, diameter, or material and detail.
 - b. Location (address, intersections, other) and type of work performed on each manhole or sewer line.
 - c. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order.
 - d. Details not on original Drawings
 - e. The distance (length) between valves on pipe segments where work was performed.
 2. Structures:

Position coordinates, as well as elevations of all sewer line appurtenances where they have been newly constructed, replaced or adjusted.
 3. Valves:

Date of installation, type, GPS coordinates, manufacturer, pressure rating.
 4. Legibly mark to record actual changes made during construction, including, but not limited to:

- a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new underground facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and ENGINEER's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on Record Drawing, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
- a. Clearly identify the item by accurate note such as "cast iron drain, "galv. water," and the like.
 - b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
 - c. Make identification so descriptive that it may be related reliably to the Technical Specifications.
6. Technical Specifications: Legibly mark to record and reference actual changes made during construction, including, but not limited to:
- a. Approved changes to material, equipment or construction procedures referencing the document (RFI, CO, Addendum, Shop Drawing Submittal, etc.) that authorized the change.
 - b. Note all changes to material and equipment design, performance and maintenance criteria.

2 PRODUCTS (NOT USED)

3 EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01740
WARRANTIES AND BONDS

1 GENERAL

1.1 PROJECT MAINTENANCE AND WARRANTY

- A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the OWNER.
- B. The CONTRACTOR shall warrant for a period of one year, or for the period as specified in the technical specifications of these Contract Documents, from the date of OWNER's written acceptance of the Work, or portions of the Work, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.
- C. The CONTRACTOR shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another CONTRACTOR or the OWNER, or to perform any work which is normally performed by a maintenance crew during operation.
- D. The CONTRACTOR shall, at CONTRACTOR's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the CONTRACTOR. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

** END OF SECTION **

SECTION 02000
GENERAL CONSTRUCTION REQUIREMENTS

1 GENERAL

1.1 WORK INCLUDED

- A. The work described in this section applies to the Project in general. The Contractor shall comply with these requirements in performing all construction activities under the Contract. Provide labor, material, tools and equipment to perform site preparation work as indicated and specified.

1.2 CLEARING AND GRUBBING

- A. Where necessary, the Contractor shall clear and grub a sufficient width along the pipeline to permit installation of the work. The minimum width of the cleared and grubbed area shall be the width of the permanent easement and the maximum shall be the width of the construction easement. Disposal of all trees, shrubs and debris shall be the responsibility of the Contractor who shall comply with all state and local laws and regulations including any burning bans in effect at the time of construction. The Contractor shall clear only that area of the construction site that has adequate erosion and sedimentation control in place.
- B. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the project, shoved onto abutting private properties or buried on the project. Trees, stumps, brush or other clearing debris may be used within the construction easement only if ground into wood chips and used as mulch for erosion and sedimentation control.

1.3 BARRICADES AND WARNING SIGNS

- A. The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient lighting, danger signals and signs, provide sufficient number of watchmen and take all necessary precautions for the protection of the work and the safety of the public. Streets closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. All barricades and obstructions shall be illuminated at night, and all lights for this purpose shall be kept burning from sunset to sunrise.

1.4 VEHICULAR TRAFFIC CONTROL

- A. All work shall be planned and prosecuted by the Contractor to minimize interference with vehicular and pedestrian traffic. Whenever the work under this contract causes disruption to the normal flow of traffic or poses a potential hazard, the Contractor shall be responsible for implementing safety measures and traffic control procedures as outlined in the "Manual on Uniform Traffic Control Devices", latest edition, published by the U.S. Department of Transportation, Federal Highway Administration.
- B. At the beginning of the Project, Contractor shall contact the Owner and local authorities having jurisdiction over public roads to confirm procedures for road closures and shall comply with State and Local Laws and Regulations regarding closing or restricting the use of public streets or highways. No public or private road shall be closed or restricted except with permission of the proper authority. No resident or business shall be denied vehicular access to his property for any length of time except as necessary as determined by the Engineer.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and/or walks, whether public or private, Contractor shall provide suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.

- D. No loading or unloading of equipment or materials shall be allowed on the pavement of local public streets unless authorized by the Owner. During loading or unloading operations, flagmen and temporary signs shall be provided to regulate traffic. Mats shall be utilized beneath tracked equipment to prevent pavement damage. Pavement, curbing, sidewalks, or any other street component damaged by the Contractor shall be replaced by the Contractor at the Contractor's expense.
- E. On any utility crew working in the vicinity of public roads, Contractor shall employ workers that are trained and competent in traffic control and safety procedures.

1.5 PROTECTION OF PROPERTY

- A. Unless otherwise noted, the Contractor is responsible for removal of trees within the construction easement as necessary for safe performance of the work, but only such trees as necessary shall be removed. Trees which are damaged or later die as a result of the work shall be removed. Protect from damage and preserve trees, shrubs, and other plants outside the limits of the Work.
 - 1. Do not stockpile materials or permit traffic within drip lines of trees.
 - 2. Maintain temporary barricades around trees.
 - 3. No trees outside the construction easement shall be removed without written approval of the property owner and the Engineer.
 - 4. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
- B. In the case of shrubs and ornamental trees smaller than 3 inches diameter, the Contractor is responsible for either: (a) protecting these from damage, or (b) temporarily removing and then re-setting them without damage, or (c) replacing them with new stock of equal quality.
- C. In general, grass will be seeded over all areas as specified elsewhere herein and all areas will be left in a neat condition, free of debris.
- D. All property such as mailboxes, fences, signs, curb, paving, drain pipes, etc. shall be restored to original condition. Payment will be made only for those items that are listed in the bid proposal.
- E. No property beyond the construction easement is to be altered, but if this does occur the Contractor will promptly remedy same at no cost to the Owner.
- F. Contractor is responsible for maintaining all existing property corner markers. Markers in the way of construction shall be referenced prior to construction to facilitate replacement. Any lost or damaged property markers and pins shall be replaced and the contractors expense.

1.6 PROTECTION OF PAVEMENT

- A. When working along paved streets or roads, the Contractor shall use rubber-tired or other equipment which will not damage the paving and when pavement is damaged through negligence or carelessness on the part of the Contractor during construction, it shall be replaced at no expense to the City, County, or State, as the case may be. Mats shall be used to support tracked equipment while in use or while sitting on pavement. In no case shall a tracked vehicle be "walked" along a paved road or street from one section of work to another.

1.7 EXISTING UTILITIES AND STRUCTURES

- A. Information regarding underground utilities on the drawings is not guaranteed as to accuracy or completeness. Prior to beginning work the Contractor shall request a field location through the Utilities Protection Center (811 or 1-800-282-7411) and any utility owners thought to have facilities in the area. The Contractor shall promptly compare these field-marked locations with the project plans and then notify the engineer of any anticipated problems or need for contract changes. It is the Contractor's responsibility to excavate for

the purpose of determining exact elevations or locations at utility crossings and other critical locations well in advance of the work under this contract.

- B. All existing pipes, drains, or other structures on, above, or below ground shall be carefully supported and protected from injury and if injured, they shall be restored in a satisfactory manner by and at the expense of the Contractor.

1.8 HIGHWAY AND RAILROAD CROSSINGS

- A. Where lines cross railroads and/or highways under the jurisdiction of the State highway department, the Owner will secure written permission from the controlling authority before any work can be done within the right-of-way. After the Owner notifies the Contractor that the permit or permits have been obtained, the Contractor shall coordinate his activities and construction procedure with the proper authority of the Railroad or Highway Department and shall conform with the requirements thereof. The Contractor will be required to furnish a release from the said controlling authority before final acceptance of the work. The Contractor will be responsible for all damage and injuries to persons and property inflicted or caused by said work.

1.9 FENCE REMOVED AND REPLACED (ALL TYPES AND SIZES)

- A. The Contractor shall take down fences on or crossing right-of-way for such periods of time only as are necessary to prosecute the work of clearing, grubbing, trenching, pipe laying and backfilling. Gaps made in fences shall be closed in a substantial manner at night and during any suspension of work, and upon completion of the pipe line, fences shall be restored to as good condition as before disturbed. No charges shall be made by the Contractor for any expense incurred in taking down or restoring fences, except where listed in the bid proposal.

1.10 REMOVING AND REPLACING PAVEMENT

- A. All pavement cuts on City or County roads shall be made by sawing prior to excavation to eliminate uneven and ragged edges. Removing and replacing pavement shall consist of removing the type of pavement and base encountered and replacing same to its original shape, appearance and riding quality, in accordance with the drawings.
- B. The trench shall be backfilled in layers not more than 6" thick and shall be thoroughly compacted with mechanical tamps. No base course shall be placed on loose earth or dusty material.
- C. Paving material and thickness shall be as shown on the drawings.

1.11 BACKFILL MATERIAL - GENERAL

- A. Backfill material shall consist of soil or soil-rock mixture, which is free from topsoil, organic matter, and other deleterious substances. Large boulders, thick rock or quartz layers, which are not broken down by compaction equipment, will not be suitable for use in the fill.
- B. Backfill material shall be subject to the approval of the Engineer.

1.12 SIDEWALK REPLACEMENT

- A. Sidewalk removed shall be replaced with sidewalks of the same width, similar finish and a minimum of 4" thickness. The Contractor shall remove only those sections of sidewalk that need to be removed to carry out the work. Adjoining sections of sidewalk shall be protected from damage during construction. Sidewalks to be removed shall be removed to the nearest expansion joint or sawed at the nearest control joint.

1.13 CURB AND GUTTER REMOVAL AND REPLACEMENT

- A. Curb and Gutter shall be removed only to the extent necessary to complete the work under this Project. Any curb and gutter that is removed shall be replaced. The replaced section shall match adjacent curb and gutter with respect to materials, finish, shape, slope and alignment.
- B. Before removal of any section, it shall first be cut to avoid damage to adjacent, remaining curb and gutter.

- C. After the concrete has set sufficiently, the space behind the curb shall be refilled to the required elevation with material which shall be compacted by tamping until firm and solid.

1.14 REPLACING GRAVEL DRIVEWAYS

- A. Gravel driveway stone shall be removed and replaced where required. Replacement materials shall resemble the original stone as close as practical. Gravel shall be placed 4" deep.

1.15 DUST CONTROL

- A. Contractor shall use all means necessary to control dust on and near the work and all off- site areas. As a minimum, Contractor shall moisten all surfaces as required to prevent excessive dust from escaping the work site and all off-site areas.

1.16 CLEAN-UP AND MAINTENANCE

- A. All surplus materials, tools, temporary structures, excess dirt, rubbish and debris shall be removed by the Contractor and the site of construction shall be left in a clean and neat condition, satisfactory to the Engineer.
- B. After the work is accepted as a whole, the Contractor shall maintain the surface of the unpaved streets, adjacent curbs, sidewalks, gutters, street paving, shrubbery, fences, sod, grass and other disturbed surfaces for a period of one hundred twenty days thereafter.
- C. All labor and material required for such maintenance and/or repairs shall be furnished at no cost to the Owner, and the work shall be done in a manner satisfactory to the Engineer.

** END OF SECTION **

SECTION 02125

EROSION AND SEDIMENTATION CONTROL FOR INFRASTRUCTURE PROJECTS

PART 1 – GENERAL

1.01 SCOPE

- A. The work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings and as needed to comply with the Georgia Erosion and Sedimentation Control Act of 1975. It also includes performing all work required for compliance with the National Pollutant Discharge Elimination System (NPDES) General Permit (No. GAR100002, Storm Water Discharges Associated With Construction Activity For Infrastructure Construction Projects), and with all other applicable regulations. Contractor's obligations under NPDES permitting shall include:
1. Contractor shall prepare a Notice of Intent (NOI), showing the Contractor as "Operator" and Primary Permittee. Contractor shall sign certifications required in section V of the NOI.
 2. Contractor shall install and maintain Best Management Practices (BMPs) necessary for compliance with regulations.
 3. Contractor shall conduct, utilizing qualified personnel as defined by the Permit, all inspections, monitoring, recording and reporting required by the Permit.
 4. Contractor shall prepare a Notice of Termination (NOT) to EPD as required by the Permit.
 5. Contractor shall be liable for any violations or enforcement actions by regulatory authorities in connection with the NPDES Permit for Stormwater Discharge.
- B. The erosion control measures shown on the contract drawings constitute only a conceptual plan with minimum requirements. Additional Best Management Practices (BMPs), coordinated with the Contractor's specific construction operations and scheduling for this project, may be needed to meet the requirements of the NPDES Permit. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers for control of erosion and sedimentation within acceptable limits as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, the Federal Clean Water Act, as amended, the Georgia Water Quality Control Act, as amended, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.
1. "Minimum BMP Requirements" for this project include:
 - a. Installation of Type B silt fence at those locations where runoff leaves the construction zone; that is, the downhill edge of construction limits. Note that in general the construction drawings do not show the specific locations for Type B fence since this a universal requirement for the project.
 - b. Installation of Type C silt fence at those locations such as ditch crossings, around drainage inlets and other areas where runoff flow and sediment storage requirements are expected to exceed the capacity of Type B silt fence. Note that in general these minimum locations for Type C silt fence are shown on the

contract.

- c. Installation of Construction Exits at locations where construction equipment is expected to exit from the construction zone. Note that in general these minimum locations are shown on the contract.
 - d. Installation of other BMPs that are shown on the contract drawings or listed herein under "Minimum BMP Requirements" for this project.
2. "Additional BMP Requirements" for this project include all other work, beyond the "Minimum BMP Requirements" listed above, that is required to comply with this section of the contract documents.
- C. Land disturbance permit shall be obtained by the Owner. Land disturbance activity shall not commence until the Land Disturbance Activity Permit has been issued.
 - D. This work also includes the subsequent removal of temporary erosion and sedimentation controls.

1.02 SUBMITTALS

- A. Submit product data in accordance with the requirements of Section 01340 of these Specifications.
- B. Submit three copies of the Erosion, Sedimentation and Pollution Control Plan (ESPCP) and Notice of Intent (NOI) to the Engineer for the project records.
- C. Submit the Erosion, Sedimentation and Pollution Control Plan (ESPCP) and fully executed Notice of Intent (NOI) to the Georgia Environmental Protection Division (EPD) at least fourteen (14) prior to starting work at the project site.

1.03 QUALITY ASSURANCE

- A. Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications. Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.
- B. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Control Act of 1975, as amended (OCGA §12-7-1, et. seq.), the NPDES General Permit, local ordinances, other permits, local enforcing agency guidelines and these Specifications.
- C. Basic Principles
 - 1. Coordinate the land disturbance activities to fit the topography, soil types and construction operations.
 - 2. Minimize the disturbed area and the duration of exposure to erosive elements.
 - 3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
 - 4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.

5. Retain sediment on-site that was generated on-site.
6. Minimize encroachment upon watercourses.

D. Implementation

1. The Contractor is solely responsible for the control of erosion within the Project site and the prevention of sedimentation from leaving the Project site or entering waterways.
2. The Contractor shall install temporary and permanent erosion and sedimentation controls which will ensure that runoff from the disturbed area of the Project site shall pass through a filter system before exiting the Project site.
3. The Contractor shall provide temporary and permanent erosion and sedimentation control measures to prevent silt and sediment from entering the waterways.
4. The Contractor shall limit land disturbance activity to the minimum required to perform the work required by the project.
5. The Contractor shall maintain erosion and sedimentation control measures within disturbed areas on the entire site until final stabilization has been achieved on areas disturbed by construction. Maintenance shall include mulching, re-seeding, clean-out of sediment barriers and sediment ponds, replacement of washed-out or undermined rip rap and adding of erosion control material as necessary.
6. All erosion and sediment control measures shall be installed prior to initiation of construction activities or immediately after if location of control measures interferes with construction.
7. The Contractor shall designate one individual to be responsible for implementation and maintenance of erosion and sediment controls on a 24-hour, everyday basis and shall furnish the individual's name, address, and 24-hour telephone number to the Owner. This information shall be updated as necessary.

PART 2 – PRODUCTS

2.01 GENERAL

Standard vegetative and structural BMP measures shall comply with the Manual for Erosion and Sediment Control in Georgia. Products not listed that manual may be utilized on the project upon approval by the person who prepared the Erosion, Sedimentation and Pollution Control Plan (ESPCP) for the project.

2.02 SEDIMENT BARRIERS

A. STAKED HAYBALES - Sd1

1. Hay bale barriers are placed in a single row on natural ground where the most likely erodible areas are located to restrain sediment particles carried by sheet flow.

B. SILT FENCE - Sd1

1. Silt fences are temporary measures to retain suspended silt particles carried by sheet flow.

2. Silt fence consists of silt fabric, as specified in the Georgia Department of Transportation list #36, wood or steel posts, and wire or nail fasteners.
3. Type Sd-S silt fence is a woven 36-inch wide filter fabric with wire reinforcement. Sediment barriers being used as Type S for sensitive areas shall have a support spacing of no greater than 4 feet on center, with each driven into the ground 18 inches.

- C. Stone Check Dams: Stone shall conform to the requirements of Section 805.01 of the Georgia Department of Transportation Standard Specification, latest edition, for Stone Dumped Rip Rap except the stone shall be graded stone ranging from 2 to 10-inches in size.

2.03 CONSTRUCTION EXIT STONE

Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone).

2.04 CONCRETE

Concrete shall have a compressive strength of not less than 3,000 psi and shall conform to the requirements for Class "B" concrete.

2.05 RIPRAP

Stone Rip Rap: Unless shown or specified otherwise, stone rip rap shall be Georgia DOT, Type 3.

2.06 FILTER FABRIC

- A. Filter fabric used for sediment control purposes shall be the non-woven type and shall conform to the Georgia Department of Transportation Standard Specifications, Section 881.06 for non- woven fabrics.
- B. Filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No. 28, latest edition.

2.07 VEGETATIVE PRACTICES

A. GENERAL

1. Disturbed areas shall be stabilized as construction progresses. For water mains installed within easements, the construction corridor shall not exceed 1,000 linear feet without stabilization. All other projects shall not exceed 300 linear feet without stabilization

B. DISTURBED AREA STABILIZATION (WITH MULCHING ONLY) - Ds1

1. This practice is applicable where disturbed areas, temporarily idle, have not been established to final grade and/or where permanent vegetative cover is delayed for a period not to exceed 6 months.
2. Mulch materials shall consist of dry straw or hay, wood chips, erosion control matting or netting, or polyethylene film. The mulch should be uniform, spread over the designated area from 2 to 4 inches thick.

3. Any and all disturbed areas that have not yet reached final grade shall be stabilized with mulch or temporary grassing within fourteen (14) calendar days of disturbance.

C. DISTURBED AREA STABILIZATION (WITH TEMPORARY SEEDING) - Ds2

1. Temporary seeding is a measure consisting of seeding and mulching to reduce erosion. All disturbed areas shall be seeded when and where necessary to reduce erosion.
2. This practice is applicable where disturbed areas, temporarily idle, have not been established to final grade and/or where permanent vegetative cover is delayed for up to 6 months.
3. Temporary seeding consists of a grass or grass-legume mixture suitable to the area and season of the year.

D. DISTURBED AREA STABILIZATION (WITH PERMANENT VEGETATION) - Ds3

1. See Section 02936 – Grassing

E. DISTURBED AREA STABILIZATION (WITH SODDING) - Ds4

1. See Section 02936 – Grassing

F. EROSION CONTROL MATTING AND BLANKETS - Mb

1. This practice is a protective covering (blanket) or soil stabilization mat used to stabilize disturbed areas until permanent vegetation on steep slopes, channels, or shorelines can be established.
2. Concentrated flow areas, all slopes steeper than 2.5:1 and with a height of ten feet or greater, and cuts and fills within stream buffers, shall be stabilized with the appropriate erosion control matting or blankets.
3. All blanket and matting materials shall be on the Georgia Department of Transportation Qualified Products List (QPL #62 for Blankets, QPL #49 for Matting).

PART 3 – EXECUTION

3.01 GENERAL

- A. All erosion and sediment control devices and structures shall be inspected by the Contractor after each rainfall event and maintained, repaired or supplemented as necessary to satisfy the contract requirements. Sediment ponds and barriers shall be cleaned out after buildup of sediment on a schedule that will prevent overflow of silt over the top of the barrier.
- B. After adequate permanent stabilization has been provided and accepted by the Engineer, all temporary erosion and sediment control structures and devices shall be removed.
- C. Basic Guidelines for Best Management Practices:
 1. Coordinate the land disturbance activities to fit the topography, soil types and site conditions.

2. Minimize the size of disturbed areas and the duration of exposure of non-vegetated areas. Refer to Section 02612, 3.02, for trench excavation.
3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
5. Retain sediment on-site as near as possible to the location where sediment originated.
6. Minimize encroachment upon watercourses and stream buffers.

3.02 SEDIMENT CONTROL

A. Construction Exit

1. Construction exit(s) shall be placed as shown on the Drawings, on the ESPCP, and as directed by the Engineer. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.
2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction, and shall be GA DOT Standard Specification 800, Designation #57.
3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Engineer.
4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public rights-of-way or paved surfaces has ceased and as directed by the Engineer.

B. Sediment Barriers

1. Sediment barriers shall include, but are not necessarily limited to, any device that prevents sediment from leaving the disturbed area and shall be installed as shown on the Drawings and as directed by the Engineer.
2. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Engineer. Torn, damaged, destroyed or washed-out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.
3. Silt fences, hay bales and rock check dams shall not be used in any flowing stream, creek or river.

4. Rip rap shall be placed as shown on the Drawings and as directed by the Engineer. Filter fabric shall be placed under all rip rap unless shown or specified otherwise; except that, filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.

C. Temporary Grassing

1. Temporary grassing shall be used on any area within the construction limits that is not scheduled for a permanent stand of grass or mulch cover.
2. In those locations where Temporary Grassing is utilized, the grassing operation shall follow promptly behind the clearing operation as soon as the work allows.

D. Mulch Stabilization

1. Straw mulch stabilization or wood chips shall be used on any area within the construction limits that is not scheduled for a permanent or temporary stand of grass. Straw mulch shall be applied uniformly by hand or mechanical means to a depth of 6" (approximately 2 1/2 tons of dry straw per acre). To prevent displacement by wind and water after application, the straw mulch shall be pressed into the soil with a tracked vehicle or disk harrow.
2. Wood chip mulch stabilization may be used in any area when directed by the Engineer except any area where a permanent stand of grass is to be installed. Wood chips shall be spread uniformly to a depth of at least 3 inches.

E. Erosion Control Blankets

1. Erosion control blankets of an approved type shall be placed on slopes steeper than 3 horizontal to 1 vertical, on the bottom of ditches and others areas where necessary to limit erosion and facilitate the establishment of grass.

END OF SECTION

SECTION 02227-ROCK REMOVAL-BLASTING

**SECTION 02227
ROCK REMOVAL-BLASTING****PART 1 GENERAL****1.1 DESCRIPTION**

1. Work included: Remove all rock encountered while excavating for structures, utility trenches as required by the Contract Documents.

1.2 RELATED WORK

1. Documents affecting the work of this Section include, but are not necessarily General Conditions, Supplementary Conditions and Sections in Division 1 specifications.

1.3 DEFINITIONS

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 hammer removal.

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 hammer removal.

1.4 STANDARDS

1. 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.

1. 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.

SECTION 02227-ROCK REMOVAL-BLASTING

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

1.6 SUBMITTALS

1. Submit plans for proposed pre-blast survey (Record purposes only).
2. Submit Copy of Blasting Licenses and Permits
3. 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

3.5 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.

3.6 LIMITS OF EXCAVATION IN ROCK

SECTION 02227-ROCK REMOVAL-BLASTING

- 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 Rockdale County Specifications.

3.7 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. 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.
- C. 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.
 - i. The Engineer shall be notified in writing that such permit has been obtained.

SECTION 02227-ROCK REMOVAL-BLASTING

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

SECTION 02227-ROCK REMOVAL-BLASTING

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.

3.8 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 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 02440
CHAIN LINK FENCE AND GATES

1 GENERAL

1.1 The scope of work includes:

Furnishing and installing new eight-foot high, vinyl-coated, chain link fence, with three strands of barbed wire, and 12-foot wide, double-leaf swing gate (6-feet each), complete with all accessories, at locations shown on the drawings.

1.2 Submittals. Within 30 calendar days after award of the contract, submit complete literature of all materials proposed to be furnished and installed under this section; submit certification from the manufacturer of the product that the products meet all applicable Standards.

2 PRODUCTS

2.1 All components and accessories of the fence shall be black in color. Chain link fabric, barbed wire and tension wire shall have a black PVC coating conforming to ASTM F 668 with a Class 2a coating of extruded and adhered PVC coating of 0.015 to 0.025 inches thickness. Posts and framework items shall be galvanized steel with an exterior zinc chromate conversion coating and a finish coating of fusion bonded polyester powder having a dry film thickness of 3 mils. Accessories shall be color coated to match fabric.

2.2 Chain Link Fabric: Shall conform to FS RR-F-00191/1 Type A, Class I, two-inch mesh, galvanized steel, one-piece fabric, six feet wide. Wire diameter shall be 9 gauge.

2.3 Chain Link Gates: Fabricate sliding cantilever gate frames of 1 5/8-inch schedule 40 steel pipe. All frame and support connections shall be welded to form a single, rigid unit with vertical and diagonal members spaced as needed for the size and height of the gate. Gate fabric shall be the same type as used in the fence construction. The fabric shall be attached securely to the gate frame at intervals not exceeding 15 inches. Stretcher bars shall be used on all four sides of cantilever gate fabric within the frame.

Provide one-piece enclosed track-frame member assembly containing two swivel type die cast trucks for each gate. Also provide all brackets, guide wheel and alignment mechanisms, stays, bracing, supports, and accessories. Track and truck assembly shall be designed to withstand a reaction load of 2,000 pounds. All sliding gates shall be cantilever slide. Cantilever gate trucks shall have factory lubricated and sealed roller bearing wheels with additional side rolling wheels to ensure alignment.
Maximum spacing of support posts is 10 feet.

2.4 Posts: Shall conform to FS RR-F-00191/3, Type 1, Class 1, diameters as

follows: Line posts 2 1/2 inches diameter (3.65 lb/lf)

Corner posts 3 inches diameter (5.79 lb./lf)

Gate posts 4 inches diameter (9.11 lb/lf).

2.5 Top Rails and Braces: Shall conform to FS RR-F-00191/3 Type II Class 1, with top rail and braces 1-5/8 inches in diameter. (2.27lb/lf)

2.6 Barbed Wire Support Arms: Shall conform to FS RR-F-00191/4 Type X.

2.7 Barbed Wire: Shall be four-point pattern, three strand No. 12-1/2 gauge aluminized steel after weaving with large barbs placed 3 inches apart. When vinyl coating is specified for fence fabric, barbed wire shall also be vinyl coated with the exception of the barbs.

- 2.8 Concrete: Shall be 3,000 psi compressive strength as described in Section 03000. Concrete shall be vibrated or rodded around the post in layers to ensure full coverage and consolidation.
- 2.9 Bottom Tension Wire: Shall be not less than no. 7 gage wire. Tie or clips shall be provided for attaching the wire to the fabric at intervals not exceeding 2 feet.

3 EXECUTION – NEW FENCE AND GATE

3.1 Inspection:

- A. Stake out location of fence and gate prior to installation. Obtain approval of fencing and gate location from Engineer prior to any installation.
- B. Verify that final grading in fence location is completed without irregularities, which would interfere with fence installation. Assure that maximum gap between fence fabric and ground will be no greater than 3 inches.

3.2 Preparation

- A. Measure and lay out complete fence line.
- B. Measure parallel to surface of ground.
- C. Locate and Mark position of posts.
- D. Locate line posts at equal distance spacing, not exceeding 10-foot centers.
- E. Locate corner posts at positions where fence changes direction more than 10 degrees.

3.3 Installation

A. Posts

- 1. Minimum posthole (concrete) diameter shall be three times the outside diameter of the post.
- 2. Minimum posthole (concrete) depth shall be 3 times the hole diameter.
- 3. Concrete shall extend 3 inches below the bottom of the post.
- 4. Set post plumb to 1/4 in. in 10 ft.
- 5. Fill hole with concrete to slightly above grade.
- 6. Crown surface of concrete to slope 1 or 2 inches away from post.

B. Fence Fabrics

- 1. Stretch fabric tight between terminal post.
- 2. Position bottom of fabric approximately 1 in. to 2 in. above ground level at each post.
- 3. Join ends of fabric by weaving with single strand of fabric wire to form continuous mesh pattern with selvage twisted to match balance of fabric.
- 4. Attach fabric to line posts using wire ties or clips, spacing not to exceed 15 in. o.c.
- 5. Attach top edge of fabric to top rail using wire ties or clips, spacing not to exceed 24 in. o.c.

6. Attach bottom edge of fabric to bottom tension wire using wire ties or clips spaces at 24 inches apart.

C. Gates

1. Install gates plumb and level with a clearance of 3 to 4 inches above ground.
2. Install ground-set items in concrete.
3. Adjust hardware to provide smooth operation.

3.4 Adjust and Clean

- A. Adjust brace rails and tension rods for rigid installation.
- B. Tighten hardware, fasteners, and accessories.
- C. Remove excess and waste materials from project site.

END OF SECTION

SECTION 02575
REMOVING AND REPLACING PAVEMENT

PART 1 GENERAL

1.01 SCOPE

The work to be performed under this Section shall consist of removing and replacing existing pavement, sidewalks and curbs in paved areas where such have been removed for construction of sewers, manholes and all other sewer appurtenances and structures.

1.02 SUBMITTALS

- A. Provide certificates stating that materials supplied comply with Specifications. The asphalt producer and the Contractor shall sign certificates.
- B. Traffic paint manufacturer's application instructions and a description and other data relative to the Contractor's application equipment and methods shall be submitted to the Engineer for approval.

1.03 CONDITIONS

- A. Weather Limitations
 - 1. Apply bituminous prime and tack coats only when the ambient temperature in the shade has been at least 50 degrees F for 12 hours immediately prior to application.
 - 2. Do not conduct paving operations when surface is wet or contains excess of moisture, which would prevent uniform distribution and required penetration.
 - 3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
 - 4. Place base course when air temperature is above 35 degrees F and rising.
- B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

SECTION 02575-REMOVING AND REPLACING PAVEMENT

PART 2 PRODUCTS**2.01 MATERIALS AND CONSTRUCTION**

- A. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications.
- B. Black Base: Black base course shall be of uniform quality throughout and shall conform to the requirements of Section 828 of the Georgia Department of Transportation Standard Specifications.
- C. Binder Course: The binder course of all paved roadways shall conform to the requirements of Section 400, Type "B" of the Georgia Department of Transportation Standard Specifications.
- D. Surface Course: The surface course for all pavements, including prime or tack coat when required by the Engineer, shall conform to the requirements of Section 400, Type "F" of the Georgia Department of Transportation Standard Specifications.
- E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Georgia Department of Transportation Standard Specifications, Section 430. Concrete shall be of the strength classifications shown in Section 02730 of these Specifications.
- F. Special Surfaces: Where driveways or roadways are disturbed or damaged which are constructed of specialty type surfaces, e.g., brick, stone or decorative sidewalks, these driveways and sidewalks shall be restored utilizing similar, if not original, materials. A specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 TYPES OF PAVEMENTS

- A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existing prior to construction, unless otherwise directed by the Engineer. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair or new pavements.
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

- B. Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of Section 310 of the Georgia Department of Transportation Standard Specifications. The maximum thickness to be laid in a single course shall be 6-inches compacted. If the design thickness of the base is more than 6-inches, it shall be constructed in two or more courses of approximate equal thickness. After the material placed has been shaped to line, grade and cross-section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.
- C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish of the replaced concrete pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced.
- D. Asphaltic Concrete Base, Binder and Surface Course: Asphaltic concrete base, binder and surface course construction shall conform to Georgia Department of Transportation Standard Specifications, Section 400. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, and dry and the tack coat has been applied. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Engineer. After compaction, the black base shall be smooth and true to established profiles and sections. Apply and compact binder and the surface course in a manner approved by the Engineer. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.
- E. Surface Treatment Pavement: Bituminous penetration surface treatment pavement shall be replaced with a minimum thickness of 1-inch conforming to Section 424, Georgia Department of Transportation Standard Specifications.
- F. Temporary Measures: During the time period between pavement removal and complete replacement of permanent pavement, maintain highways, streets and roadways by the use of steel running plates anchored to prevent movement. The backfill above the pipe shall be compacted, up to the existing pavement surface to
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

provide support for the steel running plates. All pavement shall be replaced within seven calendar days of its removal.

PART 3 EXECUTION**3.01 REMOVING PAVEMENT**

- A. General: Remove existing pavement as necessary for installing the pipeline and appurtenances.
- B. Marking: Before removing any pavement, mark the pavement neatly paralleling pipelines and existing street lines. Space the marks the width of the trench.
- C. Breaking: Break asphalt pavement along the marks using pavement shearing equipment, jack hammers or other suitable tools. Break concrete pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.
- D. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.
- E. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
- F. Sidewalk: Remove and replace any sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.
- G. Curbs: Tunnel under or remove and replace any curb disturbed by construction to the nearest undisturbed joint.

3.02 REPLACING PAVEMENT

- A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory selected by the Owner. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.
 - 1. The existing street pavement or surface shall be removed along the lines of the work for the allowable width specified for the trench or structure. After the installation of the sewerage or water works facilities and after the backfill has
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

been compacted suitably, the additional width of pavement to be removed, as shown on the Drawings, shall be done immediately prior to replacing the pavement.

2. Trench backfill shall be compacted for the full depth of the trench as specified.
3. Temporary trench backfill along streets and driveways shall include 6-inches of crushed stone or cherty clay as a temporary surfacing of the trenches. The Contractor shall maintain this temporary surface carefully at grade and dust-free until the backfill of the trench has thoroughly compacted in the opinion of the Owner and permission is granted to replace the street pavement.
4. When temporary crushed stone or chert surface is considered by the Owner to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

B. Pavement Replacement

1. Prior to replacing pavement, make a final cut in concrete pavement 12-inches back from the edge of the damaged pavement with a concrete saw. Remove asphalt pavement 12-inches back from the edge of the damaged pavement using pavement shearing equipment, jack hammers or other suitable tools.
 2. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.
 3. If the temporary crushed stone or chert surface is to be replaced, the top 6-inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.
 4. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.
 5. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

existing paving and new excavation shall be removed to the depth and width shown on the Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

6. Where driveways or roadways, constructed of specialty type surfaces, e.g., brick, stone or decorated sidewalks are disturbed or damaged, these driveways, roadways or sidewalks shall be restored utilizing similar materials. A specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

D. Pavement Striping: Pavement striping removed or paved over shall be replaced with the same type, dimension and material as original unless directed otherwise by the Engineer.

3.03 SIDEWALK AND CURB REPLACEMENT

A. Construction

1. All concrete sidewalks and curbs shall be replaced with concrete.
 2. Preformed joints shall be 1/2-inch thick, conforming to the latest edition of AASHTO M59 for sidewalks and AASHTO M 123 for curbs.
 3. Forms for sidewalks shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength, when in place, to hold the concrete true to line and grade without springing or distorting.
 4. Forms for curbs shall be metal and of an approved section. They shall be straight and free from distortions, showing no vertical variation greater than 1/8-inch in 10 feet and no lateral variation greater than 1/4-inch in 10 feet from the true plain surface on the vertical face of the form. Forms shall be of the full depth of the structure and constructed such to permit the inside forms to be securely fastened to the outside forms.
 5. Securely hold forms in place true to the lines and grades.
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

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6. Wood forms may be used on sharp turns and for special sections, as approved by the Owner. Where wooden forms are used, they shall be free from warp and shall be the nominal depth of the structure.
 7. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited
- B. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints.
- C. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.
- D. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2-inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material. Place 2-inches of porous crushed stone under all sidewalks and curbs and compacted thoroughly, then finish to a smooth, unyielding surface at proper line, grade and cross section.
- E. Joint for Curbs
1. Joints shall be constructed as indicated on the Drawings and as specified. Construct joints true to line with their faces perpendicular to the surface of the structure and within 1/4-inch of their designated position.
 2. Thoroughly spade and compact the concrete at the faces of all joints filling all voids.
 3. Install expansion joint materials at the point of curve at all street returns. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.
 4. Place contraction joints every 10 feet along the length of the curbs and gutters. Form contraction joints using steel templates or division plates, which conform to
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or they shall be notched to permit the reinforcement to be continuous through the joint. Contraction joints shall be a minimum of 1-1/2- inches deep.

- F. Expansion joints shall be required to replace any removed expansion joints or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2-inch of the top of finished concrete surface.
- G. Finishing
1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.
 2. Finish the face of the curbs at the top and bottom with an approved finishing tool.
 3. Finish edges with an approved finishing tool having a 1/4-inch radius.
 4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.
 5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.
- H. Driveway and Sidewalk Ramp Openings
1. Provide driveway openings of the widths and at the locations indicated on the Drawings and as directed by the Owner.
 2. Provide sidewalk ramp openings as indicated on the Drawings, in conformance with the applicable regulations and as directed by the Owner.
- I. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles,
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SECTION 02575-REMOVING AND REPLACING PAVEMENT

animals, rain, the Contractor's operations and the Contractor, at no additional expense to the Owner, shall repair the like.

3.04 MAINTENANCE

The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project. Maintenance shall include replacement, scraping, reshaping, wetting and rerolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Engineer. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.05 SUPERVISION AND APPROVAL

- A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.
- B. Obtain the Engineer's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.
- C. Complete pavement restoration as soon as possible after backfilling.
- D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

3.06 CLEANING

The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition.

END OF SECTION

SECTION 02602

SANITARY SEWER MATERIALS

1 GENERAL

1.1 SCOPE

- A. All material and equipment incorporated into the work shall be new from an approved manufacturer conforming to applicable industry standards and specifications. It shall be of the size, make, type and quality specified, or as specifically approved in writing by the Engineer.
- B. Except as otherwise noted or specified in writing, the Contractor shall furnish all materials and equipment incorporated in the project.

1.2 SUBMITTALS

- A. Contractor shall submit complete shop drawings and product data on all materials to the Engineer in accordance with the requirements of Section 01300 of these Specifications.

1.3 PRODUCT HANDLING

- A. Use all means necessary to protect the materials before, during and after installation and to protect the work and materials of all other trades.
- B. Pipe, fittings, and valves are to be stored in a manner to ensure that dirt or other debris does not contaminate the inside of the product.
- C. Gaskets, bolts, lubricant and other small accessories are to be stored in containers off the ground, under a shelter or cover out of the weather.
- D. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
- E. Immediately on delivery, inspect shipments to ensure compliance with requirements of contract documents and approved submittals, and that products are properly protected and undamaged.

2 PRODUCTS

2.1 GRAVITY SEWER PIPE

- A. All sanitary sewer pipe shall be either Polyvinyl Chloride (PVC) or Ductile Iron Pipe (DIP) as shown on the drawings and specified herein.
- B. Ductile Iron Pipe (DIP)
 - 1. Ductile iron pipe shall be manufactured and tested in accordance with AWWA C151. All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4-12	350
14-20	250
24	200
Over 24	150

- 2. Ductile iron pipe shall normally be of the bell and spigot type with push-on joints, conforming to ANSI Specification A21.11, unless otherwise noted.

3. Flanged pipe with a Class 53 wall thickness shall be installed at aerial stream crossings or other locations where flanged pipe is shown on drawings. Gaskets for flanged joints shall be American Toruseal Flange Gasket or approved equal. Flanged joints shall be bolted with through-bolts except where threaded taps and stud bolts are required. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1. Bolts for flanges shall be stainless steel alloy machine bolts conforming to ASTM A-193. Nuts shall be stainless steel, heavy hex conforming to ASTM A-194.
 4. Ductile iron pipe shall be manufactured by ACIPCO, U.S. Pipe or McWane.
 5. Provide fittings as shown on plans and conforming to ANSI A21.10 or ANSI A21.11.
 6. Provide joint restraint at all fittings on pressure pipe using mechanical joint with Megalug Series 1100 retainer glands by Ebaa Iron Sales, Inc., Eastland, TX, ONE-LOK Series SLDE by Sigma Corporation, Cream Ridge, NJ, or approved equal.
 7. Solid sleeves may be used where connecting plain end ductile iron pipe. Solid sleeves shall meet the requirements of ANSI/AWWA C110 for long pattern and have a minimum pressure rating of 250 psi or a rating equal to that of the adjoining pipe, whichever is greater. Solid sleeves shall have mechanical joints.
 8. The exterior of pipe and fittings for buried service shall be factory coated with an asphaltic coating conforming to AWWA C151/ANSI 21.51 for ductile iron pipe, AWWA C115/ANSI 21.15 for flanged pipe and AWWA C110/ANSI 21.10 for fittings.
 9. Pipe and fittings that will be exposed or submerged shall receive surface preparation at the factory consisting of a near-white surface blasting in accordance with SSPC-SP10 followed by cleaning and coating with a two-coat factory-applied epoxy paint coating of Tnemec Series 66 epoxy or approved equal.
 10. Pipe and fittings shall be cement-lined in accordance with AWWA C104/ ANSI A21.4, standard thickness, unless specified on the plans as "Protecto 401", in which case lining for ductile iron pipe and fittings shall be a factory-applied ceramic epoxy interior lining of 40 mil nominal dry film thickness. The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment equal to Protecto 401. Surface preparation, paint materials, application and quality control testing of the lined pipe shall be conducted in accordance with published specifications of the Protecto 401 lining system.
 11. Coating of Bell Sockets and Spigot Ends - the gasket area and spigot end up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum using Protecto Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.
- C. Polyvinyl Chloride (PVC) Sewer Pipe
1. PVC pipe and fittings shall meet the requirements of ASTM D3034 (Latest Revision) for 4-inch through 15-inch diameter pipe and ASTM F679 (Latest Revision) for larger pipe. PVC pipe shall be of a thickness sufficient to meet loading conditions shown on the plans with the installed bedding and without exceeding five percent allowable deflection of the pipe. Minimum wall thickness shall be SDR 26 for pipe 15-inch and smaller per ASTM D3034 and Pipe Stiffness (PS) 115 for pipe 18-inch and larger per ASTM F679.
 - a. Pipe and fittings shall have bell joints consisting of an integral wall section with elastomeric gasket joint that provides a watertight seal. Gaskets shall conform to ASTM F 477 and shall meet ASTM D 3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seal". The pipe shall be capable of passing all tests which are

detailed in this specification.

- b. Fittings: All fittings and accessories shall be manufactured and furnished by the pipe supplier. They shall have bell and/or spigot configurations compatible with that of the pipe.
- c. The manufacturer shall furnish written certification that each lot of pipe shipped to the project has been inspected, tested and meets applicable ASTM Specifications. At least one sample from each 100 pieces of pipe furnished shall be subjected to each test outlined under Section 8 of ASTM D3034. The cost of all testing shall be included in the Contractor's bid proposal and no pipe shall be installed until the testing is complete and approved by the Engineer. Pipe and fitting joints shall comply with ASTM D3212 for "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals". Joint assemblies shall not leak when subjected to both an internal and external hydrostatic test at equivalent pressures of 10.8 psi gauge for a period of one hour. Pipes shall be tested in straight alignment, axially deflected position, and by shear load test as otherwise defined in paragraphs 7.2, 7.3, and 7.4 of ASTM D3212.

2.2 SANITARY FORCE MAINS

A. High Density Polyethylene Pipe (HDPE)

- 1. HDPE pipe shall be designed and manufactured in accordance with ASTM F714.
- 2. HDPE materials shall conform to cell classification PE 445574C for PE 4710 under ASTM D3350.
- 3. Physical Characteristics of Pipe Material:
 - a. Density: 0.959 to 0.961 g/cm³ per ASTM D1505
 - b. Melt Index: <0.15 g/10 min per ASTM D1238
 - c. Hydraulic Design Basis: 1,600 PSI @ 73°F and 1,000 PSI @ 140°F per ASTM D2837
 - d. UV Stabilizer: 2-3% carbon black per ASTM D3350
 - e. Tensile Strength: >3,500 PSI per ASTM D638
 - f. Elongation at Break (2 in/min): >700% per ASTM D638
 - g. Flexural Modulus: >110,000 PSI per ASTM D790
 - h. Shore D Hardness: >65 per ASTM D2240
 - i. Slow Crack Growth (Pent Test): >500 hours per ASTM F1473
 - j. Brittleness Temperature: < -103°F per ASTM D746
 - k. Vicat Softening Temperature: >255°F per ASTM D1525
 - l. Coefficient of Thermal Expansion: 1x10⁻⁴ in/in/°F per ASTM D696
- 4. HDPE pipe shall be SDR-17.
- 5. HDPE shall be ductile iron pipe size (DIPS) and shall have a green stripe to indicate sewer service.
- 6. HDPE pipe shall be marked either continuously or on intervals not to exceed five (5) feet by indirect printing with the following information:
 - a. Name and/or trademark of manufacturer.
 - b. Nominal pipe size.
 - c. Dimension ratio.
 - d. The letters PE followed by the polyethylene grade per ASTM D3350, followed by the Hydrostatic Design Basis in 100's of PSI.
 - e. Manufacturing Standard Reference.

f. Production Code from which time and date of manufacturer can be determined.

- B. HDPE fittings shall be in accordance with ASTM D3261 and shall be manufactured from pipe that is at least one SDR heavier pipe than the piping system. Fittings shall be pressure rated to match the piping system pressure.

2.3 DUCTILE IRON PIPE

- A. Ductile iron pipe shall be designed and manufactured in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.
- B. Ductile iron used to manufacture ductile iron pipe shall meet the following minimum physical properties.
1. Minimum Tensile Strength – 60,000 PSI
 2. Minimum Yield Strength – 42,000 PSI
 3. Minimum Elongation – 10 percent
- C. Ductile iron pipe shall be Pressure Class 350 in accordance with ANSI/AWWA C150/A21.50.
- D. Joints
1. Non-Restrained Joints
 - a. Push-on joints in accordance with ANSI/AWWA C111/A21.11.
 2. Restrained Joints
 - a. Flex-Ring joints by American Cast Iron Pipe Company
 - b. TR Flex joints by U.S. Pipe and Foundry Company
 - c. Owner Approved Equal
- E. Gaskets
1. Plain rubber gasket in accordance with ANSI/AWWA C111/A21.11.
- F. Coatings
- a. Interior
 - 1) Protecto 401.
 - b. Exterior
 - 1) Asphaltic coating in accordance with ANSI/AWWA C151/A21.51.
- G. Acceptable manufacturers of ductile iron pipe and fittings:
1. American Cast Iron Pipe Company
 2. U.S. Pipe and Foundry Company
 3. McWane Ductile

2.4 DUCTILE IRON FITTINGS

- A. Standard ductile iron fittings shall be designed and manufactured in accordance with ANSI/AWWA C110/A21.10.
- B. Compact ductile iron fittings shall be designed and manufactured in accordance with ANSI/AWWA C153/A21.53.
- C. Ductile iron used to manufacture ductile iron fittings shall meet the following minimum physical properties.
1. Minimum Tensile Strength – 70,000 PSI
 2. Minimum Yield Strength – 50,000 PSI
 3. Minimum Elongation – 5 percent
- D. Joints

1. Buried Fittings

- a. Mechanical joints in accordance with ANSI/AWWA C111/A21.11.
- b. Mechanical joints that require restraining shall be restrained with wedge type mechanical joint retainer glands for ductile iron pipe. Retainer glands shall be manufactured from high strength ductile iron in accordance with ASTM A536, Grade 65-45-12. Retainer gland dimensions shall be in accordance with ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53.

c. Acceptable manufacturers of retainer glands:

- 1) Mega-Lug Series 1100
- 2) Sigma ONE-LOK Series D-SLDE
- 3) Uni-Flange Series 1400
- 4) Owner Approved Equal

2. Above Grade (Non-Buried) Fittings:

- a. Flanged joints in accordance with ANSI/AWWA C110/A21.10.

E. Gaskets

1. Mechanical Joints

- a. Plain rubber mechanical joint gasket in accordance with ANSI/AWWA C111/A21.11.

2. Flanged Joints

- a. Full face, 1/8" thick, gasket with bulb-type ring(s).
- b. Gaskets shall meet the dimensions of ANSI/AWWA C115/A21.15.

3. Hardware

a. Mechanical Joints

- 1) Bolts shall be low carbon steel, zinc plated, tee-head bolts in accordance with ANSI/AWWA C111/A21.11.
- 2) Nuts shall be low carbon steel, zinc plated in accordance with ANSI/AWWA C111/A21.11.

b. Flanged Joints

- 1) Bolts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A307, Grade B.
- 2) Nuts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A563, Grade A.
- 3) Washers shall be SAE flat washers, low carbon steel, zinc plated in accordance with ASTM F844.

4. Coatings

a. Buried Fittings

- 1) Interior
 - a) Protecto 401.
- 2) Exterior
 - a) Asphaltic coating in accordance with ANSI/AWWA C151/A21.51.

b. Above Grade (Non-Buried) Fittings

- 1) Interior
 - a) Protecto 401.
- 2) Exterior

a) Universal primer

- F. All ductile iron pipe and fittings used on a project shall be new and shall be the product of a single manufacturer, unless otherwise approved by the Owner.
- G. Acceptable manufacturers of ductile iron pipe and fittings:
 - 1. American Cast Iron Pipe Company
 - 2. U.S. Pipe and Foundry Company
 - 3. McWane
 - 4. Sigma

2.5 PRECAST MANHOLES

- A. Unless otherwise approved all new manholes shall be precast manholes manufactured in accordance with A.S.T.M. C478. Precast manholes shall be constructed of Portland cement concrete with a compressive strength of not less than 4,000 pounds per square inch at an age of 28 days. The minimum inside diameter shall be 4 feet; wall thickness shall be not less than 5 inches; manholes 0-16' deep shall have Class 3 reinforcing, 16-22' deep, Class 4 and 22-28' deep, Class 5. Joints in the wall shall be tongue and groove with preformed butyl rubber sealant equal to Kent Seal No. 2. The design, the materials used in the manufacturing process and the transportation of precast manhole shall be subject to inspection at any time by the Engineer. Materials found defective by the Engineer will not be delivered to the job site. Material on the job site that is found defective shall be moved immediately after being notified that such material is unacceptable. Drop type manholes shall be required where the invert of any incoming line will be higher than two feet from the invert of the outlet pipe.
- B. Exterior sealing of riser joints. Each manhole joint shall be sealed with an external rubber sleeve similar to the Infi-Shield Seal Wrap as manufactured by Sealing Systems, Inc. (763- 478-2057). The seal shall be made of EPDM (Ethylene Propylene Diene Monomer) rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with mastic. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 187 mils. The seal shall be designed to prevent leakage of water through the joint sections of the manhole.
- C. Connections to pipes. Pre-molded rubber boots with stainless steel bands shall be used for connecting sewer pipe to manholes. These may be either the lock-in "Kor-N-Seal" type as manufactured by National Pollution Control Systems, Inc. or the cast-in type as manufactured by Interpace Division of Ball Rubber, Inc. In all cases the boot shall be sized to suit the outside diameter of the type pipe being used.
- D. Manhole Steps. Manhole steps shall be slip-proof conforming to the applicable provisions of ASTM Specification C-478, latest edition, and shall be 0.5-inch minimum diameter deformed reinforcing steel, Grade 60 standards conforming to ASTM A-615, covered with polypropylene plastic or rubber and supplied with depth rings and other necessary appurtenances. Steps shall be "PS1-PF" by M. A. Industries, Inc. of Peachtree City, Georgia, or similar model as manufactured by American Step Company of Griffin, Georgia, or approved equal. The steps shall be factory built into the precast sections.
- E. Watertight Manhole Frame and Cover. All manholes on this project shall be furnished with a watertight frame and cover and shall be cast iron with a coat of asphaltic paint applied at the foundry and with a "bolted-down" lid. All covers shall have "Sewer" printed on them. Manhole frame and covers shall be as manufactured by Neenah Foundry Company R- 1915-F2 (435 lbs.) or approved equal. Manhole frames shall be cast in the cone or top slab for all manholes located in non-traffic areas. The minimum clear opening of the cover shall be 22 inches. On "loose-set" frame and covers, install Sealing Systems, Inc., "Flex- Seal Utility Sealant" to the interior surface of the chimney and frame area of the manhole per the manufacturer's recommendations after the frame has been grouted in-place.
- F. Inverts. Manhole inverts shall be constructed of Portland cement concrete conforming to the lines and dimensions shown on details.

2.6 STEEL CASING PIPE

- A. Casing pipe shall be seamless steel pipe in accordance with ASTM A139, Grade B.
 - 1. Minimum Thickness: ¼" or as required by DOT or other governing body having jurisdiction over the crossing.
 - 2. Minimum Tensile Strength: 60,000 PSI
 - 3. Minimum Yield Strength: 35,000 PSI
 - 4. Minimum Elongation in 2 Inches: 25%
 - 5. Casing pipe shall have no mid-welds.
- B. Steel casing pipe shall be coated on the interior and exterior with bituminous asphalt.

2.7 CASING SPACERS

- A. Casing spacers shall be Model CCS as manufactured by Cascade Waterworks Manufacturing Company of Yorkville, IL. Other acceptable manufacturers are BWM Company of Forest City, North Carolina, and Pipeline Seal & Insulator, Inc. of Houston, Texas. Two casing spacers shall be installed for each 18- to 20-foot long joint of pipe.

2.8 COMBINATION AIR/VACUUM VALVES

- A. Combination air/vacuum valves shall be suitable for sanitary sewage service. Note short body valves may be needed to fit valve into manhole without lowering the force main.
- B. Valve body shall be Type 316 stainless steel.
- C. Maximum Operating Pressure: 250 PSI
- D. Operating Range: 0 to 250 PSI
- E. Air Release Capacity: 260 CFM
- F. Connection:
 - 1. 2" to 3": FNPT
 - 2. 4" and Larger: AWWA C115/ANSI B16.1
- G. Acceptable Manufacturers:
 - 1. GA Industries, Dezurik, Val-Matic

2.9 SURGE RELIEF VALVES

- A. General
 - 1. Surge relief valves shall be suitable for sanitary sewage service. Unless otherwise specified, surge relief valves shall be of a straight through "Wye" body configuration with external springs and hydraulic cushioning system and shall provide drip tight closure. Its function shall be to protect the pump system from destructive surge pressures resulting from abrupt flow stoppages. The main valve shall be capable of opening full port area with a minimum increase in inlet pressure. The cushion system shall permit a full range of adjustment for closing speeds to prevent hammer or bang.
- B. Valve body shall be of cast iron ASTM A126, Grade B. Flanges shall be flat-faced and flange drilling shall be in accordance with ANSI B16.1 Class 125.
- C. Valve disc shall be of cast iron ASTM A126, Grade B. The disc movement shall be guided for proper alignment throughout its stroke.
- D. Valve shall have a resilient replaceable seat firmly held in place by a bronze ASTM B62 ring fastened to the disc with screws.
- E. Valve external springs shall be enclosed in protective casings and shall be in compression. Springs that appear to be under extension are not permitted.
- F. Acceptable Manufacturers:
 - 1. GA Industries.

2. Ross Valve
3. Engineer Approved Equal.

2.10 BALL VALVES

- A. Threaded, 2-piece, standard port ball valves.
- B. Body: Type 316 stainless steel (CF8M)
- C. Ball: Type 316 stainless steel (ASTM A276)
- D. Stem: Type 316 stainless steel (ASTM A276)
- E. Packing: PTFE
- F. Cold Working Pressure: Minimum 600 PSI
- G. End Connections: FNPT x FNPT
- H. Lever: Type 304 stainless steel with vinyl cover
- I. Manufacturers
 1. Conbraco Industries, Apollo Valves
 2. Nibco, Inc.
 3. Owner Approved Equal.

2.11 SWING CHECK VALVES

- A. VALVES 3-INCHES AND LARGER:
 1. Manufacturers:
 - a. Dezurik
 - b. Val-Matic Swing-Flex (Series 502)
 - c. APCO Series 100 as manufactured by Valve & Primer Corp., Schaumburg, Illinois.
 - d. American Flow Control, Series 2100
 - e. Or approved equal.
- B. The rubber flapper swing check valve shall have a heavily constructed ductile iron body and cover. The body shall be long pattern design (not wafer), with integrally cast-on end flanges. The flapper shall be Buna-N having an "O" ring seating edge and be internally reinforced with steel.
- C. The flapper to be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position during flow through the valve. The flapper shall be easily removed without the need to remove the valve from the line. Check valves to have full pipe size flow area. The seating surface to be on a 45-degree angle requiring the flapper to travel only 35 degrees from closed to fully open position, for minimum head loss and non-slam closure.
- D. Provide Type 316 stainless steel bolts and nuts for all flanged connections.

2.12 PLUG VALVES

- A. Eccentric plug valve.
- B. Valve body shall be ASTM A126, Class B ductile iron.
- C. Valve plug shall be Type 316 stainless steel with resilient coating.
- D. Valve stem shall be Type 316 stainless steel.
- E. Minimum 175 PSI working pressure for valves less than or equal to 12" in size.
Minimum 150 PSI working pressure for valves greater than 12" in size.
- F. Operators:

1. In Vault: Handwheel.
2. Buried: Square Nut, Worm Gear Actuator
- G. Rotary type actuator
- H. End Connections:
 1. Buried Valves: MJ x MJ
 2. Non-Buried Valves: FLG x FLG
- I. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating.
- J. Acceptable Manufacturers:
 1. M&H Valve Company
 2. Val-Matic Valve & Manufacturing Corporation
 3. Owner Approved Equal

2.13 BACKFILL MATERIAL - GENERAL

- A. Soil backfill material within one foot of the pipe shall be clean, dry soil free of topsoil, organic matter, dirt clods, rocks or stone larger than two inches, trash or any other foreign material.
- B. Soil backfill material outside of the one-foot zone from the pipe shall normally be native soil material that was removed from the trench, except in paved areas or developed areas where use of such material could cause a problem. In cases where the native material is not suitable for backfill, select soil backfill will be hauled in and placed for trench backfill. In no case shall any organic material such debris from trees or other trash be placed in the backfill. Backfill materials shall be subject to the approval of the Engineer.
- C. Details of pipe bedding and backfill are included in the Drawings. Soil and granular materials are per the Unified Soil Classification System (ASTM D2487), with the exception that bedding/backfill adjacent to the pipe is limited to 2" maximum particle size per ANSI/AWWA C600 as described in Paragraph A above.

2.14 TRENCH AND STRUCTURAL BACKFILL

- A. Subgrade stabilizer shall consist of crushed stone meeting size and gradation requirements for Georgia DOT Standard Specification Section 800, #57 or #78 designation.

2.15 SERVICE CONNECTIONS

- A. Service connections to PVC sewer mains shall utilize a PVC wye fitting or saddle tee with gasketed joints matching those of PVC sewer pipe.
- B. Service connections to Ductile Iron Pipe shall be made by either of the following methods:
 1. By coring a precise hole in the DIP main at 30 to 45 degrees from the top and installing a watertight compression fitting with a bell hub and stainless-steel band for transition to PVC service pipe such as the assembly by INSERTA Fittings Company or approved equal.
 2. An alternate method is to utilize a PVC wye fitting with a one-foot long section of plain end pipe inserted in the bell end and having two transition adapters (Fernco or equal) from PVC to DIP.

2.16 TRANSITION ADAPTERS

- A. Transition from Ductile Iron Pipe to PVC, or any differing types of pipe, shall be accomplished with a watertight coupling. Couplings shall be made of flexible rubber to fit over plain ends of pipe and have stainless steel bands for tightening to a completely watertight joint. Couplings for transition from DIP to PVC shall be Fernco Style 1051 or approved equal.

2.17 ASPHALT

- A. Asphalt paving installed in conjunction with sewer construction shall be Hot Mix Asphaltic

Concrete conforming to Georgia DOT Specification 828. The particular mix type shall be based on the application thickness and shall be subject to approval by Engineer.

2.18 CONCRETE

- A. Concrete installed in conjunction with sewer construction shall be Portland Cement Concrete having 3,000 psi design strength and meeting Georgia DOT Specification 500 for Class A concrete.

2.19 LOCATOR TAPE

- A. All buried PVC or other non-metallic sewer pipe shall be marked continuously with metalized locator tape placed approximately 18 inches below grade directly above the top of the pipe. Locator tape shall be green and shall be labeled "Sewer".

3 EXECUTION

- A. Refer to Section 02612 of these technical specifications.

**** END OF SECTION ****

SECTION 02612

SANITARY SEWER CONSTRUCTION

1 GENERAL

1.1 WORK INCLUDED

- A. The work covered in this section includes furnishing all labor, tools, equipment, materials and incidentals necessary to construct sewer lines and associated work as shown on the drawings and as specified herein.

1.2 RELATED WORK

- A. Also see the following section which contains provisions that apply specifically to the work described in this section.
- B. Section 02000, General Construction Requirements, which applies to all activities under this section.

2 PRODUCTS

(See Section 02602 and other sections of these specifications)

3 EXECUTION

3.1 CLEARING AND GRUBBING

- A. Where necessary, the Contractor shall clear and grub a sufficient width along the pipeline to permit installation of the work. Except at locations noted on the drawings, the minimum width of the cleared and grubbed area shall be the width of the permanent easement and the maximum shall be the width of the construction easement. In certain areas where a 30- foot permanent width is shown, Contractor may clear a 20-foot width only if this width is adequate to install the pipeline. Disposal of all trees, shrubs and debris shall be the responsibility of the Contractor who shall comply with all state and local laws and regulations including any burning bans in effect at the time of construction. The Contractor shall clear only that area of the construction site that has adequate erosion and sedimentation control in place.
- B. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. In no case shall any material or debris be left on the project, placed on abutting private properties or buried on the project. Trees, stumps, brush or other clearing debris may be used within the construction easement only if ground into wood chips and used as mulch for erosion and sedimentation control.

3.2 TRENCH AND MANHOLE EXCAVATION

- A. It is the responsibility of those installing sanitary sewers to conform to OSHA regulations, 29 CFR Part 1926, Subpart P, Paragraph 1226.650 through A26.653 and any other applicable sections during trench excavation. All excavations shall be adequately guarded with barricades and lights in compliance with all OSHA and Georgia Department of Transportation requirements so as to protect the public from hazard. Excavations adjacent to existing or proposed buildings and structures or in paved streets or alleys shall be sheeted, shored and braced adequately to prevent undermining or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in a safe condition.
- B. Excavation shall be by open cut from the ground surface, unless otherwise called for on the plans or allowed by the Engineer. Pipe trench shall be excavated straight and true to grade and line. Trench preparation shall proceed in advance of pipe installation only so far as can be backfilled the same day. Trench shall not be excavated more than 300 feet in advance of pipe installation.

- C. Trench widths for sewer pipe shall have a maximum width, measured at the center line of the pipe, equal to the nominal diameter of the pipe, plus 2'-0". The trench may have a greater width than this, beginning at one foot above the top of the pipe and extending to the top of the ground, if such width is necessary or desirable.
- D. Rock Excavation
 - 1. Trench rock is defined as any material which cannot be excavated with a backhoe having a bucket curling force rated at 25,700 pounds (Caterpillar Model 225 or equivalent), and occupying an original volume of at least one-half cubic yard.
 - 2. Rock in trenches shall be excavated over the horizontal limits of excavation to a minimum of 4 inches on all sides and under the pipe to provide a cushion of #57 crushed stone.
 - 3. Blasting operations shall be conducted in strict accordance with all existing ordinances and regulations and shall be done by persons licensed to use explosives. No blasting shall be done less than 50 feet in advance of the completed work. Contractor shall be responsible for obtaining any blasting permits required.
 - 4. All exposed structures shall be carefully protected and where necessary, the blast shall be covered with suitable mats. Any damage caused by blasting shall be promptly repaired by the Contractor at his expense. Explosives and other blasting supplies shall be stored in accordance with all federal, state and local ordinances.
- E. Subgrade Stabilizer
 - 1. In the event that the subgrade under the pipe or other structure does not provide a suitable foundation for the pipe or other structure and when so directed by the Engineer, the said subgrade shall be stabilized by undercutting below the normal trench bottom to remove unstable material. Stabilizer stone, Georgia DOT no. 57 crushed granite, shall be placed to the depth required to stabilize the trench bottom.
- F. Wherever streets, roads, or driveways are cut, they shall be immediately backfilled and compacted after the pipe is installed and shall be maintained in first-class condition and passable at all times until re-surfaced. Reasonable and satisfactory provisions shall be made by the Contractor to allow travel on walkways and driveways by installing temporary crossings.
- G. Excavation materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to fire hydrants and water valve boxes.
- H. Backfilling, compaction, dressing and clean-up shall be kept as close to the line-laying crew as is practical, and negligence in this feature of the work will not be tolerated.

3.3 PIPE BEDDING AND HAUNCHING

- A. Trenches shall be kept free of water. Pipe shall not be installed in water or unstable foundation. All water pumped, bailed or otherwise removed from the trench or other excavation shall be conveyed in a proper manner to a suitable place of discharge where it will not cause injury to the public health or to public or private property or to work completed or in progress, or to the surface of the streets or cause any interference with the use of same by the public. The contractor will be required to provide and operate any equipment necessary to keep the trenches free from water while pipe is being laid and the joints made.
- B. The trench shall have smooth, even bottom affording the pipe support throughout its length between bell holes. Bell holes shall be dug sufficiently large for proper joining of the pipe. Blocking under the pipe to bring the pipe to grade or any other method that causes point loading shall not be allowed.
- C. Pipe bedding (the area below the bottom of the pipe barrel) shall be as shown on the drawings. The bedding shall be placed on a flat trench bottom with a minimum thickness

beneath the pipe of one-eighth the outside pipe diameter, but not less than 4 inches and sliced under the haunches of the pipe with a shovel or other suitable tool to a height of one-half the outside pipe diameter. For ductile iron pipe, the pipe bedding shall be in accordance with the following table and the details shown on the drawings, except that restrained joint pipe shall use Type 4 bedding, unless the depth of cover is exceeded, in which case Type 5 shall be used.

Size in.	Pressure Class	LAYING CONDITIONS Maximum Depth of Cover in Feet		
		Type 3	Type 4	Type 5
4	350	69.0	85.0	100.0
6	350	37.0	47.0	65.0
8	350	25.0	34.0	50.0
10	350	19.0	28.0	45.0
12	350	19.0	28.0	44.0
14	250	15.0	23.0	36.0
16	250	15.0	24.0	34.0
18	250	14.0	22.0	31.0
20	250	14.0	22.0	30.0
24	200	12.0	17.0	25.0

3.4 INSTALLATION OF SEWER PIPE

- A. Pipe and accessories shall at all times be handled with care to avoid damage. Whether moved by hand, skidways or hoists, material shall not be dropped or bumped. The interior of all pipe shall be kept free from dirt and foreign matter at all times. Each joint of pipe shall be unloaded near the place where it is to be laid in the trench.
- B. All pipe and accessories shall be inspected prior to lowering into the trench. Material that is defective in manufacture or has been damaged in transit or after delivery shall be removed from the job site.
- C. Sewer pipe shall be joined by "push-on" joints using elastomeric gaskets to effect the pressure seal. The ends of pipe to be joined and the gaskets shall be cleaned immediately before assembly, and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the pipe manufacturer. Sewer pipes shall be laid in the uphill direction with the bells pointing upgrade.
- D. Pipe grades shall be maintained by the use of a laser and verified with a surveying level and rod on an ongoing basis. The Contractor shall be responsible for staking both line and grade and the correctness thereof. Subsidiary lines and grades shall be laid out by the Contractor from the controlling lines and bench marks established by the Engineer, or from the measurements shown. All lines and grades shall be subject to checking by the Engineer, but that checking shall in no way relieve the Contractor from the responsibility for maintaining correct line and grade. The Contractor shall provide such stakes, materials, survey instruments, labor and assistance as the Engineer may require in laying-out work, establishing bench marks, and checking and measuring the work.
- E. No section of pipe shall be laid until the preceding section has been belled and bedded.
- F. When pipe laying is not in progress, the open ends of installed pipe shall be plugged by approved means to prevent entrance of trench water or debris into the line.
- G. Wyes and/or service connections and stubouts from manholes shall be placed where shown on plans and as directed by the Engineer. Stubouts shall be made with PVC pipe unless otherwise shown on the drawings. All such connections shall be plugged with suitable plug or stopper and made watertight with hydraulic grout, if necessary, and shall be marked at ground level with a suitable marker for future location.

- H. Sewer lines should be installed at least 10 feet horizontally from existing or proposed water mains. Sewers crossing water mains should be installed to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer.
- I. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.
- J. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.
- K. Mechanical joining will be used where the butt fusion method cannot be used. Mechanical joining will be accomplished by either using a HDPE flange adapter with a Ductile Iron back-up ring or HDPE Mechanical Joint adapter with a Ductile Iron back-up ring.
- L. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

3.5 BACKFILLING

- A. Backfilling shall be carried along as closely to pipe laying as possible. Not more than 100 feet on trench shall be opened on any line in advance of pipe laying. The length of the trench to be opened in advance of the completed work shall be reduced where appropriate for the convenience and safety of the persons residing in the vicinity of the work. The maximum length of trench left open overnight shall not exceed three times the depth of the trench. All openings shall be surrounded by barricades at night with blinker lights not more than ten feet apart around the opening.
- B. As each section of the line is completed, the trench shall be carefully backfilled. No length of pipe shall be installed until one preceding it shall have sufficient quantity of backfill tamped around it to hold it firmly in place. Pipe haunching (the area above the bottom of the barrel of the pipe up to a line one-half of the pipe outside diameter) and initial backfill (the area above the haunching material and below a plane 12 inches above the top of the barrel of the pipe) shall be as shown on the drawings. Material used for pipe haunching shall be shovel sliced or otherwise placed to provide uniform support for the pipe barrel and to fill completely all voids under the pipe.
- C. When sheeting or a trench box is used during excavation, before the sheeting or trench box is removed, it shall be raised in place to just above the pipe crown to safely allow the Contractor to completely fill any voids left in the pipe zone.
- D. No excavation shall be made under highways, streets, alleys or private property until satisfactory arrangements have been made with the State, City, County, or Owners of the property to be crossed.
- E. Final backfill (the area above a plane 12 inches above the top of the pipe) shall be placed in 6" layers and tamped so that after consolidation, the dry weight shall be not less than 85% of the maximum laboratory dry weight per cubic foot as determined by ASTM Method D-698. The soil in trenches within roadways (including shoulders) and paved areas shall be compacted to a dry density of 95% of ASTM Method D-698. The standard maximum dry density and the optimum moisture shall be determined by the same method.

3.6 STEEL CASING INSTALLATION

- A. Steel Casing pipe shall be installed by the "Jack and Bore" procedure, the "Open-Cut" method or by microtunneling. Steel casing pipe shall be installed at the specific locations called for on the plan sheets and the installation method shall be by the "Jack and Bore" or microtunneling procedure unless specifically stated to be installed by the "Open-Cut" method.
- B. The "Jack and Bore" installation procedure shall be by the dry-bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking. Lengths of pipe are to be continuously welded the full circumference of the pipe diameter to the preceding section installed. Excavation material will be removed and placed at the top of the working pit. Backfill materials and methods of backfilling and tamping shall be as required under BACKFILLING.
- C. The "Open-Cut" method consists simply of excavating the trench along the pipeline route and placing the steel casing in the trench. Special care shall be taken not to damage any existing utilities as the sections of casing are maneuvered into the open trench. Lengths of pipe are to be continuously welded the full circumference of the pipe diameter to the adjacent sections. Backfill materials and methods of backfilling and tamping shall be as required under BACKFILLING.
- D. Casing spacers shall be used while installing the sewer inside the casing. Spacers shall be located within 2' of each end of the casing and spaced no more than 10' apart within the casing. After the sewer is installed in the casing, a check shall be made to ensure that the carrier pipe is not touching the casing at any point. The ends of the casing pipe shall be sealed with a three course mortared brick wall, one course of which shall be erected inside the casing.
- E. Construction techniques required to provide access for casing shall be such as to ensure the safety of the work. Final dimensions of access pits selected by Contractor shall conform as with minimum dimensions required to permit the installation of the work. The contractor shall be required to properly support all excavations and to prevent all movement of the soil, pavement, utilities or structures outside of the excavation. All pits shall conform to applicable Local Safety Standards, OSHA Standards, trenching and shoring standards. Provide surface drainage during the period of construction to protect the work.
- F. Casing will be installed in accordance with the line and grade shown on contract drawings.
- G. The contractor is totally responsible for the performance of the equipment and methods selected for this phase. Each pipe section shall be jack forward as the excavation progresses in such a way to provide complete and adequate ground support at all times. Lubrication shall be applied to the external surface of the pipe to reduce skin friction. A jacking frame shall be positioned to develop a uniform distribution of ramming forces around the periphery of the pipe. The Contractor is responsible for monitoring ground movements associated with the work and making suitable changes in the construction methods to control ground movements and prevent damage or detrimental movement to the work and adjacent structures and pavements. A lubrication system shall be provided that injects an approved lubricant on the inside and outside of the pipe to lower the friction developed on the sides of the pipe during jacking. The overcut on the pipe shall not exceed 1 inch. The annular space created by the overcut shall be filled with a lubricant that has been proved suitable for the particular soil conditions.
- H. Welds shall be complete around the casing joints and smooth to permit the passage of carrier spacers. The line and grade shall not vary within the overall casing. The installation shall permit the continuous installation of the carrier pipe with spacers.

3.7 MANHOLE INSTALLATION

- A. The manhole base shall be set upon a 6 inch (minimum thickness) mat of #57 crushed stone.

- B. The invert of manholes shall be constructed of either brick and mortar or 2500 psi concrete and shall have a cross section of the exact shape of the invert of the sewer which it connects, changes in size and grade being made gradually and evenly. Changes in the direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit. Drop manholes will be required where the invert of any incoming line will be higher than two feet from the invert of the outlet pipe. All manholes shall be water tight when completely built.
- C. Masonry work shall be allowed to set for a period of not less than 24 hours. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.
- D. The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the masonry. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be shimmed, if necessary, to conform to the exact slope, crown and grade of the existing adjacent pavement. Shims shall be one of the manufactured systems designed for this purpose, or properly constructed masonry that provides full support to the manhole frame. In unpaved areas, manhole frames and covers shall be cast into the cone or top sections of the precast manholes, and the top shall be terminated higher (from a few inches in mowed areas to 18 inches in wooded areas) than surrounding grade and the soil shall be graded to drain away from the manhole.
- E. All manholes shall be water tight when completely built.

3.8 CONNECTION OF SEWER MAINS

- A. An approved Shear Band Fernco Adaptor shall be used for connecting sewer pipes in any situation where a gasketed bell to spigot connection is not possible. The adapter shall provide a fully watertight connection. Care shall be taken not to disturb the original bedding of the existing pipe outside the area required for the proper installation of the adaptor. The adaptor shall be bedded and covered with #57 stone.

3.9 CONNECTION OF SEWER SERVICE LINES

- A. All existing sewer service lines connected to the existing sewer main shall be located by internal televising of the main. Televising will be performed by a qualified company routinely engaged in this type work. A written log will be prepared during the televising operation listing the location and position of each service connection and recording, either digital or tape, will be provided for a permanent record of the televising. Unless otherwise directed, all existing service connections will be reconnected to the new sewer main.
- B. Service connections to the main will be made using the materials outlined in Section 02602 at the main. Connection of new service pipe to existing service pipe will use PVC pipe of the same size as the existing service and an approved Shear-band Fernco adaptor.
- C. Where sewer services are installed at vacant lots under this contract, the Contractor shall install a 2" x 2" pressure treated wooden stake, 3-feet long, as a visual marker directly above the end point of the sewer service. The marker shall extend 2 feet above ground and be painted orange.

3.10 PLACING OF STEEL CASING PIPE

- A. Steel casing pipe shall be installed by the "Jack and Bore" procedure unless otherwise stated at any specific location on the drawings.
- B. The "Jack and Bore" installation procedure shall be by the dry-bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking. Lengths of pipe are to be adequately welded to the preceding section installed. Excavation material will be removed and placed at the top of the working pit. Backfill materials and methods of backfilling and tamping shall be as called for elsewhere in this section.

- C. For locations other than the crossing under Interstate 20, prior to installation of the steel casing pipe, the contractor shall dig or drill exploratory test holes to determine the existence of solid rock. The testing procedures may be accomplished by either test drilling or excavation at the proposed location of the bore and to at least three feet below the proposed depth. As a minimum, these tests are to be conducted at each end of each proposed casing location. Where the casing length exceeds 100 feet or where rock is evidenced, there shall be additional exploratory test holes placed along the length such that the average distance between holes is not more than 50 feet. Contractor shall provide Engineer with written results of exploratory drilling prior to mobilizing for the boring operation. Failure of the Contractor to comply with this provision will make the contractor ineligible for any compensation associated with encountering of rock in the attempted bore.
- D. If exploratory drilling indicates rock in the line of the bore, then an alternate location will be selected by the Engineer for the bore or other provisions will be chosen. After a suitable location is chosen and the placing of casing pipe begins, Contractor shall immediately notify Engineer if rock is encountered.
- E. Bore pits for cased bores and uncased bores shall be constructed as needed to avoid conflicts with existing utilities and still remain in the limits of the construction area. Bore pits shall be constructed, marked and barricaded to comply with applicable safety regulations.
- F. Casing spacers shall be placed on the carrier pipe to center it and restrain it in position inside the casing. Two spacers per joint of pipe shall be attached within one foot of the pipe joint. Spacers shall be of an approved design and manufacturer and shall be made of stainless and/or dense polymer, and shall be capable of the load applied by the pipe when full of water with a safety factor of at least 2.0.
- G. If required by local or state authorities, casings installed under roadways shall be grouted to fill the annular space between the casing and the carrier pipe. Grout shall be pumped through small pipes inserted into the space to ensure full penetration and filling. Grout for this purpose may be one of the special mixtures of low density, air-entrained grout designed for pumping.

3.11 AERIAL STREAM CROSSINGS

- A. Aerial crossings of streams are to be constructed at locations shown on drawings and in accordance with the following requirements:
 - 1. Excavations for concrete piers shall extend down to firm soil, at least one foot below the elevation of the stream bed. Contractor shall coordinate a geotechnical inspection to confirm soil bearing, and after soil bearing is confirmed shall place an 18 inch thick bedding of no. 57 stone approximately 6 feet in diameter. Dewatering will be performed as needed to provide a stable foundation for the work.
 - 2. Concrete for the piers shall meet the requirements specified under Section 2602 of these specifications. Forming for the piers shall be treated paper fiber Sonotube or approved equal forming product.
 - 3. Vertical reinforcing steel for each pier shall be eight no. 5 bars spaced evenly around a circle of 12 inch radius. Vertical bars shall be enclosed with standard hoop rings of no. 4 bars spaced at 10 inches apart.
 - 4. Tops of piers will terminate one inch below the outside bottom of the sewer pipe. Pipes shall be anchored to piers with $\frac{3}{4}$ inch diameter, all-thread, 316 stainless steel bolts embedded 6 inches into concrete. A stainless steel strap, 2" wide x $\frac{3}{8}$ " thick and curved to cradle the pipe, will be placed below the pipe on leveling nuts for vertical adjustment. A similar strap curved to cover half the pipe diameter will be placed over the top of the pipe and bolted to the anchor bolts.
 - 5. Pipe for aerial crossings shall be flanged pipe as specified in Section 02602.
 - 6. Rip-rap and filter fabric shall be placed as shown on drawings, ensuring that the flow path beneath the pipe remains unobstructed at least to its original profile and cross section.

3.12 FIELD TESTING OF SEWERS

A. Field Testing

1. After completion of any section of gravity pipeline and before placing a section into operation the grades, joints, and alignment shall be true to line and grade. Joint surfaces shall be smooth. There shall be no visual leakage and the sewer shall be completely free from any cracks and from protruding joint materials, deposits of sand, mortar, or other materials on the inside.
2. As a minimum the completed pipeline will be subjected to the following tests:
 - a. Leakage test
 - b. Visual straightness test
 - c. Slope measurement
 - d. Mandrel test for PVC pipe
3. The Contractor will be required to furnish pipe plugs, weirs, cords, mandrels and any other customary devices needed to carry out the above-listed tests at no added cost. He will also furnish supervision and labor to carry out these tests in the presence of the Engineer.

B. Leakage Testing

1. Infiltration or exfiltration testing in accordance with ASTM C-1091, may be used in lieu of air testing provided the test is conducted with at least two feet of head above the top of the pipe being tested. Allowable infiltration or exfiltration shall not exceed 25 gallons per 24 hours per inch of diameter per mile of pipe. Contractor shall furnish all supplies, materials, labor, and services needed to make infiltration or exfiltration tests including water. No separate payment will be made for equipment, supplies, material, water, or services.
2. Any leakage exceeding the allowable amount shall be corrected by an approved method until the pipelines meet the requirements of the allowable leakage specifications. Any visible flow (not including seepage) in manholes shall be repaired.
3. Infiltration tests shall be made when groundwater level is 18-inches or more above the top of the outside of the pipe.
 - a. When normal groundwater does not stand at a level outside the pipe to enable infiltration tests to be made to the satisfaction of the Engineer, the Contractor shall make exfiltration tests by filling the pipe or sections thereof with water to a head of not less than 2 feet above the top of the outside of the pipe and observing the amount of water required to maintain this level.
 - b. Low pressure air testing may be used in lieu of infiltration testing at the Contractor's request. A Low Pressure Air Test shall be made in accordance with ASTM F 1417, as indicated below:
 - 1) Clean pipe to be tested by propelling snug-fitting inflated rubber ball through pipe with water.
 - 2) Plug all pipe outlets with suitable test plugs. Brace each plug securely to prevent blowouts. As a safety precaution, pressurizing equipment shall include a regulator set at slightly above test pressure to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manhole during testing.
 - 3) If the pipe to be tested is submerged in groundwater, insert a pipe probe by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to groundwater submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

- 4) Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
- 5) After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
- 6) When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. Minimum permissible pressure holding times for runs of single pipe diameter are indicated in the table below in seconds. Times for mixed pipe sizes of varying lengths should be calculated as described in ASTM C 828-76T using formula $t = K \times d/q$ ($q = 0.0020$).

Minimum Test Time for Various Pipe Sizes			
Nominal Pipe Size (inches)	T (time) Min/100 feet	Nominal Pipe Size (inches)	T (time) min/100 feet
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
Minimum Test Time for Various Pipe Sizes			
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

C. Leakage Testing of Manholes

1. Prior to testing manholes for watertightness, all lift holes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced. Each manhole shall pass one of the following tests:
 - a. Exfiltration Tests: The manhole, after proper preparation as noted above, shall be filled with water. The maximum allowable leakage shall be 0.1 gallon per hour per foot of diameter per foot of depth. Tests shall last a minimum of eight hours. The manholes may be backfilled prior to testing.
 - b. Vacuum Tests: The manhole, after proper preparation as noted above, shall be vacuum tested prior to backfilling, in accordance with ASTM C-1244. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to effect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than 60 seconds for 48-inch diameter manholes. If the manhole fails the initial test, repairs shall be made with non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment manufactured by P.A. Glazier, Inc. or approved equal.

D. Visual Straightness Test

1. Straightness of the completed sewer will be checked visually using reflected light or lanterns. Each segment between manholes must show at least 80 percent of the full pipe circle visible when looking from manhole to manhole.

E. Slope Measurement

1. Slope of the completed pipeline will be checked at each manhole to verify conformance with planned grade. Any variance in slope which in the Engineer's opinion is detrimental to the functional ability of the pipe will be cause for rejection. The Contractor is responsible for checking slope of pipe with a level at least every 100 feet as the job progresses and maintaining calibration of laser equipment. With each monthly pay request, the Contractor shall submit a copy of his survey notes showing actual elevation at each manhole and slope of each segment between manholes.

F. Mandrel Test

1. Each segment of completed pipeline will be checked by the Contractor pulling a mandrel of specified dimensions through the pipe. Vertical deflection shall not exceed five (5) percent of the undeflected diameter measured in accordance with ASTM Standards D3034 and F679, as applicable. The test shall be conducted at least 30 days after installation to allow for settlement of the pipeline.
2. Failure to satisfy any of the above tests will be reported promptly to the Engineer who, in consultation with the Owner and Contractor, may recommend additional tests or corrective action.

3.13 FIELD TESTING OF FORCE MAINS

- A. Field hydrostatic testing shall be in accordance with Section 02667 of these specifications.

3.14 CLEAN-UP AND MAINTENANCE

- A. All surplus materials, tools, temporary structures, excess dirt, rubbish and debris shall be removed by the Contractor and the site of construction shall be left in a clean and neat condition, satisfactory to the Engineer.

3.15 FINAL ACCEPTANCE

- A. No pipeline installation or hydraulic structure shall be accepted until all known and visible leaks have been repaired, whether or not the leakage is within the maximum allowable limits. Location and repair of leaks shall be performed by the Contractor at no additional expense to the Owner.
- B. The Contractor will certify that all required tests have been successfully completed before the work is accepted.
- C. Any pipe which has its alignment, grade, or joints disturbed after installation shall be removed and re-installed.

3.16 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

**** END OF SECTION ****

SECTION 02660 FLOW METERS

1 GENERAL

1.1 DESCRIPTION

- A. Furnish all labor, tools, equipment, materials and miscellaneous hardware to install and set in operation flow meters and transmitters as indicated on the drawings, as specified herein and in accordance with Section 01625.

1.2 RELATED WORK

N/A

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Shop Drawings
 - 2. Product data and catalog sheet, including meter accuracy information
- B. Submit Operation and Maintenance Manuals in accordance with Section 01730.

1.4 DELIVERY, STORAGE AND HANDLING

In accordance with Section 01610 and 01620.

1.5 WARRANTY

Provide in accordance with Section 01740.

2 PRODUCTS

2.1 MANUFACTURERS

- A. Magnetic Flow Meters
 - 1. 2 meters - 8" and 12"
 - 2. Krohne, equivalent model
 - 3. Or approved equal

2.2 SERVICE CONDITIONS

- A. Each meter shall have a stainless steel metering tube and a non-conductive liner of Hard Rubber, suitable for the liquid being metered. End connections shall be steel flanged for sizes 1/2" and greater, ANSI Class 150#, for meter sizes up to 24" and AWWA Class B or D for meters larger than 24". The housing shall be epoxy coated steel welded at all joints. Bolted coil enclosures shall not be acceptable.
- B. The field coils of the meter shall be supplied with a precisely adjusted bi-polar direct current. The coils must be located on the outside of the flow tube.
- C. There shall be no electronic components on the primary flowhead. Coil drive power shall be supplied by an integral or remote converter. Output signal from the primary shall be fed through 'DS' proprietary cable supplied with the meter for remote signal converters.
- D. The Primary Flowhead shall have a housing rated for Complete Submergence NEMA 6P (IP68) (Factory)

- E. Electrode material shall be corrosion resistant Hasteloy C.
- F. The instrument shall be manufactured in an ISO 9001 approved facility.
- G. The meter shall be provided with Type 316 stainless steel grounding rings. Grounding electrodes shall not be acceptable.
- H. Meter calibration shall be performed by a direct volumetric comparison method. A calibration certificate shall accompany each meter. Calibration facility shall be certified to 0.02% accuracy and be traceable to NIST standards.
- I. The Magnetic Flowmeter Converter shall be remote mounted and provide precisely controlled and regulated, bipolar DC primary field excitation pulses at a keyed frequency of 1/6, 1/16, or 1/32 of line frequency digitally selectable. It shall convert the primary flowmeter signal into a mA DC and pulse output directly proportional to the flow rate.
- J. The full-scale measuring range shall be a direct digital input in gpm and shall be fully adjustable over a range from 1.0 to 40 ft/sec.
- K. Each converter shall contain self-diagnostics, automatic data integrity checking, and be completely interchangeable with other converters of the same type without need for recalibration. No auxiliary test meter or primary simulator shall be required for commissioning, zeroing, or interchanging of flow meter/converter.
- L. Each converter shall contain the following features as standard equipment:
 - 1. Simultaneous analog output (500 ohm load) and a scaled pulse output.
 - 2. Adjustable damping of analog signal from 0.2 to 99 seconds.
 - 3. Low flow cutoff.
 - 4. Forward/reverse flow measurement capabilities.
 - 5. Integral rate of flow indicator and 7-digit LCD totalizer.
 - 6. Capability of testing analog and frequency outputs.
 - 7. The converter shall be capable of interfacing with an IBM compatible PC via a RS 232 converter.
 - 8. Ten-year data retention without the need for auxiliary power.
 - 9. Engineering units for display and programming; flow and total shall be user programmable in any engineering unit of measure.
 - 10. A remote configuration module shall be provided.
 - 11. All adjustments and changes of above features shall be by direct digital input.
 - 12. Repeatability shall be 0.1% of rate.
 - 13. Accuracy of the system (Primary Flow Head and Converter) shall be:
 - Meter sizes 3/8" - 24" +/-0.3% of actual flow rate (for velocities of 1.3 - 40 ft/sec)
 - Meter sizes 28" - 40" +/-0.5% of actual flow rate (for velocities of 0.8 - 40 ft/sec)
 - 14. The converter shall have HART smart protocol. It shall use the HART protocol via FSK along the analog signal wire to remotely configure, read flow rate, total and diagnose problems without affecting the measurement signal. The intelligence must reside within the converter.

2.3 SHOP TESTING

Volumetric testing of all meters must be performed and approved prior to shipment. The test shall be conducted near minimum, intermediate, and maximum flow ranges of the meter, as specified by the manufacturer. The amount of water used to conduct the test must be left on the totalizer. Prior to shipping, a tag shall be attached to the meter showing the totalizer reading after the test. The test facility must be certified annually to an accuracy of $\pm 0.2\%$ and be traceable to the National Institute of Standards and Technology. If desired, the test shall be witnessed by the Engineer or their selected agent and a copy of the certified accuracy test record must be furnished at no charge to the Owner, if requested.

2.4 SHOP PAINTING

In accordance with Section 09900.

3 EXECUTION

3.1 INSTALLATION

Install equipment in accordance with Section 01625.

3.2 FIELD PAINTING

Provide in accordance with Section 09900.

3.3 CLEANING AND PROTECTION OF COMPLETED WORK

Clean and protect work in accordance with Section 01710.

3.4 CONTRACT CLOSEOUT

Provide in accordance with Section 01700.

END OF SECTION

SECTION 02667
TESTING OF PRESSURE PIPELINES

1 GENERAL

1.1 SCOPE OF WORK

- A. Perform hydraulic leakage and pressure test at a pressure of 1.5 times the working pressure on the entire force main piping from the pump station to the discharge point. Any leakage in the segment installed under this contract shall be repaired by CONTRACTOR.
- B. Testing of gravity sewers and manholes is included in Section 02612 of these Technical Specifications.

2 PRODUCTS

2.1 WATER FOR TESTING

- A. The CONTRACTOR shall furnish all equipment, piping and required labor to transport water from an existing hydrant or designated tank on-site to the test location for use in testing. The OWNER will provide the water required for testing the Work from a fire hydrant as directed by the OWNER. Contractor shall provide a fire hydrant meter to measure water usage.

2.2 TEST EQUIPMENT

- A. The CONTRACTOR shall provide all labor and equipment, including required pumps with regulated bypass meters and gauges, for conducting tests.

3 EXECUTION

3.1 GENERAL

- A. The entire length of all pressurized pipelines shall be field tested for tightness by a test as described hereinafter.
- B. The CONTRACTOR shall furnish all labor and equipment, including required pumps with regulated bypass meters and gauges, for conducting pipeline tests.
- C. The CONTRACTOR shall furnish all equipment, piping and required labor to transport water from its source to the test location for use in testing.
- D. Timing and sequence of testing shall be scheduled by the CONTRACTOR, subject to the approval of the ENGINEER. The CONTRACTOR shall provide the ENGINEER with a minimum of 24-hours notice prior to the start of any test. All tests must be observed by the ENGINEER.
- E. The CONTRACTOR shall repair any leaks discovered during the initial filling of the pipeline and during the testing sequence. All known and visible leaks shall be repaired whether or not the leakage rate is within allowable limits.

3.2 TEST PROCEDURES FOR PRESSURE PIPELINES

- A. General:
 - 1. All pipelines shall be pressure tested in accordance with the specifications following for each type of service.
 - 2. All meters, fixtures, devices or applications which are connected to the pipeline system and which might be damaged if subjected to the specified test pressure shall be disconnected and the ends of the branch lines plugged or capped during the test procedures. Items that are damaged during the testing procedure shall be repaired or replaced by the CONTRACTOR at no expense to the OWNER.

3. Where any section of a pipeline is provided with concrete reaction blocking, the pressure test shall not be made until at least five days have elapsed after installation of the blocking.
4. Clean and test lines before requesting final acceptance. Where any obstruction is met, clean the lines by means of rods, swabs, or other instruments. When requested by the ENGINEER, flush out lines and manholes before final inspection.

B. Pressure Piping:

1. All sections of pipeline subject to internal pressure shall be pressure tested in accordance with AWWA C600. A section of line will be considered ready for testing after completion of all thrust restraint and backfilling, subject to curing of concrete blocking as specified herein.
2. Test Preparation:
 - a. Flush pipeline section thoroughly at flow velocities greater than 2.5 feet per second, to remove debris from pipe and valve seats. Partially operate valves and hydrants to clean out seats. Provide correctly sized temporary outlets in number adequate to achieve flushing velocities.
 - b. Provide temporary blocking, bulkheads, flanges and plugs to assure all new pipe, valves and appurtenances will be pressure tested.
 - c. Applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Unless permanent air vents are in place, insert temporary corporation stops at highpoints to expel air as line is filled with water.
 - d. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure. Differential pressure at valves and hydrants shall equal the maximum possible but shall not exceed manufacturer's pressure rating. Provide temporary back pressure to meet the differential pressure restrictions.
 - e. Valves and hydrants shall not be operated in either the opening or closing direction at differential pressures above their rated pressure.
3. The test pressure shall be applied to the lowest point in the test segment and shall be maintained for a minimum of two hours.
4. The test pressure shall not vary by more than 5 psi for the test duration. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure. Provide an accurate pressure gauge with graduation not less than 5 psi.
5. Leakage: Leakage shall be defined as the quantity of water that must be pumped into the test section equal to the sum of the water, to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.
6. Test Results: No test section of steel or ductile-iron pipe shall be accepted if the leakage exceeds the limits determined under Section 4 of AWWA C600. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results. Allowable leakage in PVC pipe, if used on the project, shall be 11.65 gallons per inch of nominal diameter per mile over a 24-hour period.
7. Completion: After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

C. Miscellaneous Pressure Piping:

1. Upon completion of each piping system or sub-system, blow the lines free of dirt and debris and test in the presence of the ENGINEER. Wherever possible, test before the trench is backfilled. Drain piping shall be tested prior to encasement in concrete. The

minimum test duration shall be one hour. The pipeline shall fail the test if a measurable pressure drop is observed.

3.3 REPAIRS - PIPELINES

- A. If the leakage exceeds the specified allowable limits, the point or points of leakage shall be sought out and remedied by the CONTRACTOR at no additional cost to the OWNER. Repair methods must be approved by the ENGINEER.

3.4 CLEANUP

- A. After completing each section of the pipeline, the CONTRACTOR shall remove all debris, construction materials, and equipment from the site of the work, grade and smooth over the surface on both sides of the line and leave the entire right-of-way in a clean, neat, and serviceable condition.

3.5 FINAL ACCEPTANCE

- A. No pipeline installation or hydraulic structure shall be accepted until compliance with allowable leakage limits.
- B. The CONTRACTOR will certify that all required tests have been successfully completed before the work is accepted.

**** END OF SECTION ****

SECTION 02936

GRASSING

1 GENERAL

1.1 SCOPE

- A. This section covers preparation of subsoil, placing of topsoil, grassing construction, protection, maintenance, guarantee and replacement of grassing, and related items necessary for the establishment of a suitable stand of grass in areas disturbed by the construction.

1.2 SUBMITTALS

- A. Certification of Grass Seed: Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.3 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.4 MAINTENANCE

- A. Provide service and maintenance of seeded areas until final completion and closeout of the project.
- B. Maintenance includes re-fertilization, weeding, mowing, watering, clean up, repair of all washouts, and gullies.

1.5 ACCEPTANCE

- A. Establish a uniform stand of the specified grass with scattered bare spots, none of which is larger than one square foot, allowed up to a maximum of 3% of any grassed area.
- B. It shall be the responsibility of the Contractor to repair any erosion damage to the grassed area until the date of final acceptance.

2 PRODUCTS

2.1 MATERIAL STANDARDS

- A. Use materials that meet the requirements of the following Georgia Department of Transportation Standard Specifications:
 - 1. Wood Fiber Mulch DOT Sec. 718.2
 - 2. Emulsified Asphalt DOT Sec. 822
 - 3. Agricultural Lime DOT Sec. 882.2.01
 - 4. Seed DOT Sec. 890.2.01
 - 5. Sod DOT Sec. 890.2.02
 - 6. Fertilizer DOT Sec. 891.2.01
 - 7. Plant Topsoil DOT Sec. 893.2.01
 - 8. Mulch DOT Sec. 893.2.02
 - 9. Inoculants DOT Sec. 893.2.04
 - 10. Tackifiers DOT QPL 33

2.2 SEED MIXTURE

- A. The seed mixture will be selected based on the geographic zone, the time of planting and the desired species of permanent grassing. This project is located in DOT Zone 2. Whenever seeds are specified by their common names, use the strains indicated by their botanical names. Use inoculants as required based on the type of seed. See Section 700 of Georgia DOT Standard Specifications for required seed mixture and planting times to achieve the permanent types of grass for each area of the project listed below.
- B. Permanent grassing species to be Common Bermuda. A permanent stand of grass is required on all exposed slopes and areas adjacent to the approach road and turn-around. Areas below water level and areas around the edge of the river and reservoir do not require permanent grassing.
- C. Temporary Grassing may be required if planting is needed at a time when the desired permanent grassing cannot be seeded according to Section 700 of Georgia DOT Standard Specifications. Any temporary grassing must be approved by Engineer.
- D. When grassing right-of-way adjacent to existing lawns, use the same type of grass as is present on the lawn.

2.3 SOIL MATERIALS

- A. Conserve and stockpile the best topsoil from the site for use on grassed areas. If necessary to achieve the specified stand of grass, Contractor shall haul in topsoil from offsite.

2.4 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry.
- B. Fertilizer: Use a balanced commercial fertilizer mixed grade such as 10-10-10, 6-12-12, 5- 10-15, or other analysis and apply at the rate per acre needed based on soil test results.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. Erosion Fabric: Where required to contain erosion, install a biodegradable matting
- E. Lime: Use agricultural lime.

2.5 TESTS

- A. Soil samples shall be taken and tested to determine grade and rate of application rates of fertilizer and lime.

3 EXECUTION

3.1 EQUIPMENT

- A. Use grassing equipment able to produce the required results.

3.2 PREPARATION OF SOIL

- A. Prepare the ground by plowing under any temporary grass areas and preparing the soil as follows:
 - 1. Slopes 3:1 or Flatter:
 - a. Plow shoulders and embankment slopes to between 4 in and 6 in deep. In cut areas, plow to no less than 6 in deep. After plowing, thoroughly disk the area until pulverized to the plowed depth.
 - 2. Slopes Steeper Than 3:1
 - a. Prepare the ground to develop an adequate seed bed using any of the following methods: Plow to whatever depth is practicable. Use a spiked chain. Walk with a cleated track dozer. Scarify.

- B. Remove boulders, stumps, large roots, large clods, and other objects that interfere with grassing or mowing.
- C. Spread topsoil stockpiled during grading evenly over cut and fill slopes after preparing the ground and just before seeding is scheduled.
 - 1. Slopes on the dam shall have topsoil to a minimum depth of 4 inches.
 - 2. If sufficient topsoil is available, it shall be spread over areas of the roadway that are to receive grass. Take care to notch out shoulders or leave below grade so that topsoil does not cause ponding against the edge of the travel surface.

3.3 FERTILIZER AND LIME

- A. Apply fertilizer and lime at the recommended rate per acre in accordance with soil test results. Mix thoroughly in the top several inches of soil using harrows, tillers or other suitable equipment.

3.4 SEEDING

- A. Inoculate Seed.
 - 1. Inoculate each kind of leguminous seed separately with the appropriate commercial culture according to the manufacturer's instructions for the culture. When hydroseeding, double the inoculation rate. Protect inoculated seed from the sun and plant it the same day it is inoculated.
- B. Sowing
 - 1. Weather permitting, sow seed within 24 hours after preparing the seed bed and applying the fertilizer and lime.
 - 2. Sow seed uniformly at the rates specified in the GA DOT Seeding Table for the specified type of permanent stand of grass.
 - 3. Use approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or other equipment to uniformly apply the seed. Do not distribute by hand.
 - 4. To distribute the seeds evenly sow seed types separately, except for similarly sized and weighted seeds.
- C. Rolling
 - 1. Roll seeded areas before applying mulch, except on steep slopes where rollers cannot operate satisfactorily. On slopes inaccessible to compaction equipment, cover the seeds by dragging spiked chains over them or by using other methods.
 - 2. Do not sow during windy weather, when the prepared surface is crusted, or when the ground is frozen, wet, or otherwise non-tillable.
- D. Hydroseeding
 - 1. Hydroseeding may be used on any grassing area. Under this method, spread the seed, fertilizer, and wood fiber mulch in the form of slurry. Seeds of all sizes may be mixed together. Inoculate the seeds at double the rate for seeds not being hydroseeded. Apply hydroseeding as follows:
 - a. Use wood fiber mulch as a metering agent and seed bed regardless of which mulching method is chosen.
 - b. Apply wood fiber mulch at approximately 1,500 lbs/acre.
 - c. Prepare the ground for hydroseeding as for conventional seeding.
 - d. Use specially designed equipment to mix and apply the slurry uniformly over the entire seeding area.
 - e. Agitate the slurry mixture during application.
 - f. Discharge slurry within one hour after being combined in the hydroseeder. Do not hydroseed when winds prevent an even application.

- g. Closely follow the equipment manufacturer's directions.
- h. Mulch the entire hydroseeded area.

3.5 MULCHING

- A. Evenly apply straw or hay mulch between 3/4 in and 1-1/2 in deep, according to the texture and moisture content of the mulch material.
- B. Mulch shall allow sunlight to penetrate and air to circulate as well as shade the ground, reduce erosion, and conserve soil moisture. If the type of mulch is not specified on the Plans or in the Proposal, use any of the following as specified.
 - 1. Mulch with Binder. Apply mulch with binder regardless of whether using sowing or hydroseeding methods for seeding. Apply manually or with special blower equipment designed for the purpose. When using a blower, thoroughly loosen baled material before feeding it into the machine so that it is uniformly coated with binder and broken up. After distributing the mulch initially, redistribute it to bare or inadequately covered areas in clumps dense enough to prevent new grass from emerging. Do not apply mulch on windy days. Apply enough binder to the mulch to hold it in place. Immediately replace mulch that blows away. When using a power blower to distribute the mulch, spray the binder onto the mulch as the mulch is ejected from the machine. If distributing the mulch by hand, immediately apply the binder uniformly over the mulched areas. Use one of the following binders: Emulsified asphalt, SS-1h or SS-1 (DOT Section 822); or use a tackifier listed in the Laboratory Qualified Products Manual. Follow manufacturer's recommended rates.
 - 2. Mixed-in-Place Mulch. Apply mixed-in-place mulch on flat areas or slopes 3:1 or less and treat as follows:
 - a. Immediately work the mulch into the soil with appropriate equipment to produce a loose soil and mulch mixture 3 in to 3.5 in (75 mm to 90 mm) deep.
 - b. After mixing mulch and soil and restoring areas to line and grade, seed as specified in this Section.
 - 3. Walked-in-Mulch
 - a. Apply walked-in-mulch on slopes ranging in steepness from 5:1 to 2:1 and treat as follows:
 - b. Immediately walk it into the soil with a cleated track dozer. Make dozer passes vertically up and down the slope.
 - c. Where walked-in-mulch is used, do not roll or cover the seeds.
- C. Cover seeded slopes where grade is 2:1 or greater with an approved erosion fabric installed according to manufacturer's recommendations.

3.6 MAINTENANCE

- A. After the grass has grown to a height of 2 inches and before final acceptance, one additional application of nitrogen at the rate of 50 lbs/acre must be applied.
- B. Apply nitrogen with mechanical hand spreaders or other approved spreaders capable of uniformly covering the grassed areas. Do not apply nitrogen on windy days or when the foliage is damp. Do not apply nitrogen between October 15 and March 15 except in Zone 4. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- C. Water to prevent grass and soil from drying out.
- D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- E. Immediately reseed areas that show bare spots.
- F. Apply fertilizer at approximately 600 lbs/acre each spring after initial plant

establishment until Final Acceptance.

- G. The Engineer may require replanting of an area that shows unsatisfactory growth for any reason at any time. Except as otherwise specified or permitted, prepare replanting areas according to the Specifications as if they were the initial planting areas. Grassed areas will be considered acceptable when a viable stand of grass covers at least 98% of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion.

**** END OF SECTION ****

SECTION 03100

CONCRETE

FORMWORK

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03200 - Reinforcing Steel.
- B. Section 03250 - Concrete Accessories.
- C. Section 03290 - Joints in Concrete.
- D. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. International Building Code.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 301 - Specifications for Structural Concrete for Buildings.
 - 4. ACI 347 - Recommended Practice for Concrete Formwork.
 - 5. U.S. Product Standard for Concrete Forms, Class I, PS 1.
 - 6. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Manufacturer's data on proposed form release agent.
 - 2. Manufacturer's data on proposed formwork system including form ties.

1.05 QUALITY ASSURANCE

- A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 - PRODUCTS

2.01 FORMS AND FALSEWORK

- A. All forms shall be smooth surface forms unless otherwise specified.
- B. Wood materials for concrete forms and falsework shall conform to the following requirements:
1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
- C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

- A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.
- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.
- C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 - EXECUTION

3.01 FORM DESIGN

- A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.
- B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be $1/240$ of the span between structural members.
- C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

- A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.
- B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.
- C. Forms shall be true to line and grade, and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.
- D. Forms shall be mortar tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form.
- E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the

thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

- F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.
- G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.
- H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.
- I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.
- J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
- K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

- A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.

- B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.
- C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and bench marks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- D. Regardless of the tolerances specified, no portion of the building shall extend beyond the legal boundary of the building.

3.04 FORM ACCESSORIES

- A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.
- B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to wastewater or enclosed surfaces above the wastewater, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as detailed in the specifications. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION - FORM RELEASE AGENT

- A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

- A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

- A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

- A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has achieved 28-day compressive strength, unless approved by Engineer. Additional concrete test cylinders used for shoring removal, as required, shall be cured on site. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.
- B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

Minimum Time Forms are to Remain in Place:

Part of Structure	Average Air Temperature* During Period	
	40 - 50 degrees F	>50 degrees F
Walls, columns and sides of beam (hours)	72	24
Bottom forms for slabs, beams arches not reshored (days)	12	7
Bottom forms for slabs, beams and arches if reshored (days)	7	4

* Air temperature near form.

- C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.
- D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall be available for inspection at all times at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

- A. When reshoring is permitted or required the operations shall be planned in advance and subjected to approval by the Engineer.
- B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.
- C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.
- D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.
- E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

END OF SECTION

SECTION 03200

REINFORCING STEEL

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.
- B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork.
- B. Section 03250 - Concrete Accessories.
- C. Section 03300 - Cast-in-Place Concrete.
- D. Section 03420 – Precast Concrete.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. International Building Code
 - 2. CRSI - Concrete Reinforcing Institute Manual of Standard Practice
 - 3. ACI SP66 - ACI Detailing Manual
 - 4. ACI 315 - Details and Detailing of Concrete Reinforcing
 - 5. ACI 318 - Building Code Requirements for Structural Concrete
 - 6. WRI - Manual of Standard Practice for Welded Wire Fabric
 - 7. ASTM A 185 - Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcing
 - 8. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.
2. Mill test certificates - 3 copies of each.
3. Description of the reinforcing steel manufacturer's marking pattern.
4. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
5. Proposed supports for each type of reinforcing.
6. Request to use splices not shown on the Drawings.
7. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.
8. Request for placement of column dowels without the use of templates.
9. Request and procedure to field bend or straighten partially embedded reinforcing.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

PART 2 - PRODUCTS

2.01 REINFORCING STEEL

- A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade.
- B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 185 and the details shown on the Drawings.
- C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in

the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.

- D. Field welding of reinforcing steel will not be allowed.
- E. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

- A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Slab bolsters shall have gray plastic-coated legs.
- B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

- A. Mechanical couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcing bars being spliced at each splice. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.
- C. Hot-forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

2.04 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and reinforcing bar. Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar, unless noted otherwise on the Drawings. The adhesive system shall be "HILTI RE500 - SD" or "HILTI-HY 200" as manufactured by HILTI. Epcon System C6 or G5" as manufactured by ITW Redhead. "SET Epoxy-Tie" or "SET-XP" as manufactured by Simpson Strong-Tie Co. or "PE- 1000 SD" and "T308" by Powers Fasteners. Engineer's approval is required for use of this system in locations other than those shown on the Drawings. Fast-set epoxy formulations shall not be acceptable.

- B. Where identified on the Contract Drawings or for installation of concrete where anchorage failure could present a life-threatening hazard, the adhesive system shall be "PE-1000 SD" by Powers Fasteners, "SET-XP" by Simpson Strong-Tie Co. or "Epcon System G5" as manufactured by ITW Redhead. Alternate adhesive systems shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories, must comply with the latest revision of ICC- ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. Installation of adhesive system shall be per manufacturer's recommendations and as required in Item A above.

PART 3 - EXECUTION

3.01 TEMPERATURE REINFORCING

- A. Unless otherwise shown on the Drawings or in the absence of the concrete reinforcing being shown, the minimum cross sectional area of horizontal and vertical concrete reinforcing in walls shall be 0.0033 times the gross concrete area and the minimum cross sectional area of reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

3.02 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.
- C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved by the Engineer to be bent in the field. Reinforcing bars shall not be straightened or rebent in a manner that will injure the material. Heating of bars will not be permitted.
- D. Welded wire fabric shall be furnished in flat sheets only.

3.03 DELIVERY, STORAGE AND HANDLING

- A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.
- B. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

- C. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and if necessary recleaned.

3.04 PLACING

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.
- B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.
- E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.
- F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.
- G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.
- H. Reinforcing shall not be straightened or rebent unless specifically shown on the drawings or authorized in writing by the Engineer. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.
- I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's recommendations. A representative of the manufacturer must be on site when required by the Engineer. At least 25 percent of the dowels installed shall be proof tested to 1.33 times the allowable load specified by the manufacturer, or as indicated on the Drawings. If the dowels are

required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.

3.05 SPLICING

- A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.
- B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.
- C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer.
- E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.06 INSPECTION

- A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.
- B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

END OF SECTION

SECTION 03250

CONCRETE ACCESSORIES

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Furnish all materials, labor and equipment required to provide all concrete accessories including waterstops, expansion joint material, joint sealants, expansion joint seals, contraction joint inserts, epoxy bonding agent, and concrete anchors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork.
- B. Section 03290 - Joints in Concrete.
- C. Section 03300 - Cast-in-Place Concrete.
- D. Section 07900 - Joint Sealers.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Federal Specification TT-S-00227 E (3)
2. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
3. ASTM D412 Standard Tests for Rubber Properties in Tension.
4. ASTM D 624 Standard Test method for Rubber Property - Tear Resistance.
5. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.
6. ASTM D1751 Standard Specifications for Preformed Expansion Joint fillers for Concrete Paving and Structural Construction (nonextruding and resilient bituminous types).
7. ASTM D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
1. Manufacturer's literature on all products specified herein including material certifications.
 2. Proposed system for supporting PVC waterstops in position during concrete placement
 3. Samples of products if requested by the Engineer.

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) WATERSTOPS

- A. PVC waterstops for construction joints shall be flat ribbed type with center bulb, 6 inches wide with a minimum thickness at any point of 3/8 inches.
- B. Waterstops for expansion joints shall be ribbed with a center bulb. They shall be 9 inches wide with a minimum thickness at any point of 3/8 inch unless shown or specified otherwise. The center bulb shall have a minimum outside diameter of 1 inch and a minimum inside diameter of 1/2 inch.
- C. The waterstops shall be manufactured from virgin polyvinyl chloride plastic compound and shall not contain any scrap or reclaimed material or pigment whatsoever. The properties of the polyvinyl chloride compound used, as well as the physical properties of the waterstops, shall exceed the requirements of the U.S. Army Corps. of Engineers' Specification CRD-C572. The waterstop material shall have an off-white, milky color.
- D. The required minimum physical characteristics for this material are:
1. Tensile strength - 1,750 psi (ASTM D-638).
 2. Ultimate elongation - not less than 280% (ASTM D-638).
- E. No reclaimed PVC shall be used for the manufacturing of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.
- F. PVC waterstops shall be as manufactured by DuraJoint, Vinylex Corp., Greenstreak, Inc.
- G. All waterstop intersections, both vertical and horizontal, shall be made from factory fabricated corners and transitions. Only straight butt joint splices shall be made in field.

2.02 RETROFIT WATERSTOPS

- A. Retrofit waterstops shall be used where specifically shown on Drawings for sealing joints between existing concrete construction and new construction.

- B. Retrofit waterstops shall be PVC waterstops fabricated from material as described in Section 2.01 of this Specification.
- C. Retrofit waterstop shall be attached to existing concrete surface as shown on Drawings.
- D. Use of split waterstop in lieu of specially fabricated retrofit waterstop will not be acceptable.
- E. Retrofit Waterstop manufacturer must provide a complete system including all Waterstop, stainless steel anchoring hardware, and epoxy for installation.
- F. For construction joints, retrofit waterstop shall be style number 609 by Sika Greenstreak, RF-638 by BoMetals, Inc., Type 18 kit by DuraJoint Concrete Accessories, or approved equal. For expansion joints, retrofit waterstop shall be style number 667 by Sika Greenstreak, Type 18-9 kit by DuraJoint Concrete Accessories, or approved equal.

2.03 CHEMICAL RESISTANT WATERSTOPS

- A. Where specifically noted on Contract Drawings, chemical resistant waterstops shall be used instead of PVC waterstops.
- B. Chemical resistant waterstops for construction joints shall be ribbed with a center bulb. They shall be 6 inches wide with a minimum thickness at any point of 3/16 inches.
- C. Chemical resistant waterstops for expansion joints shall be ribbed tear web. They shall be 9 inches wide with a tear web designed to accommodate 1 inch of free movement minimum.
- D. Chemical resistant retrofit waterstop shall be a minimum of 2½" wide along the ribbed side and a minimum 5" wide along the side attached to the existing concrete surface. Retrofit waterstop shall include a centerbulb and shall have a minimum thickness of 3/16". Retrofit waterstop manufacturer shall provide a complete system including waterstop, stainless steel anchoring hardware and epoxy for installation.
- E. Chemical resistant waterstops shall be manufactured from a fully crosslinked thermoplastic vulcanizate rubber.
- F. Waterstops shall be TPE-R by BoMetals, Inc., Earth Shield TPV/TPE-R by JP Specialties, Inc., Westec TPE-R by Westec Barrier Technologies, or TPE-R by DuraJoint Concrete Accessories.

2.04 HYPALON RUBBER WATERSTOPS

- A. Hypalon rubber waterstops shall be Sikadur Combiflex by Sika Corporation or approved equal. Minimum width of waterstop material shall be twelve (12) inches unless shown otherwise on Contract Drawings.

2.05 EXPANDING RUBBER WATERSTOP

- A. Expanding rubber shall be designed to expand under hydrostatic conditions. Waterstops shall be Adeka Ultra Seal MC-2010M by Adeka Ultra Seal/OCM, Inc., or Hydrotite CJ-1020-2K by Sika

Greenstreak, for concrete thickness greater than nine inches. For thicknesses less than nine inches, Adeka Ultra Seal KBA-1510FF or Hydrotite CJ-1020-2K shall be used.

- B. Waterstop shall be a chemically modified natural rubber product with a hydrophilic agent.
- C. Waterstop has a stainless steel mesh or coextrusion of non-hydrophilic rubber to direct expansion in the thickness direction and restrict the expansion in the longitudinal direction.

2.06 WATERSTOP ADHESIVE

- A. Adhesive between waterstops and existing concrete shall be 20+F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by JGF Adhesives, Sikadur 31 Hi-Mod Gel by Sika Corporation, DP-605 NS Urethane Adhesive by 3M Adhesive Systems.

2.07 JOINT SEALANTS

- A. Joint sealants shall comply with Section 07900, Joint Sealers.

2.08 EXPANSION JOINT MATERIAL

- A. Preformed expansion joint material shall be non-extruding, and shall be of the following types:
 - 1. Type I - Sponge rubber, conforming to ASTM D1752, Type I.
 - 2. Type II - Cork, conforming to ASTM D1752, Type II.
 - 3. Type III - Self-expanding cork, conforming to ASTM D1752, Type III.
 - 4. Type IV - Bituminous fiber, conforming to ASTM Designation D1751.

2.09 EXPANSION JOINT SEAL

- A. Expansion Joint Seal System shall consist of a preformed neoprene profile, installed using the same dimensions as the joint gap, bonded with a two-component epoxy adhesive and pressurized during the adhesive cure time.
- B. The expansion joint system shall be Hydrozo/Jeene Structural Sealing joint system by Hydrozo/Jeene, Inc, or equal.

2.10 CONTRACTION JOINT INSERTS

- A. Contraction joint inserts shall be ZipCap Control Joint former by Greenstreak Plastic Products.

2.11 EPOXY BONDING AGENT

- A. Epoxy bonding agent shall conform to ASTM C881 and shall be Sikadur 32 Hi-Mod, Sika Corporation, Lyndhurst, N.J.; Euco #452 Epoxy System, Euclid Chemical Company, Cleveland, OH, Concrese LV1 by BASF Construction Chemicals.

2.12 EPOXY RESIN BINDER

- A. Epoxy resin binder shall conform to the requirements of ASTM C-881, Type III, Grade 3, Class B and C for epoxy resin binder and shall be Sikadur 23, Low-Mod-Gel, manufactured by the Sika Corporation, Lyndhurst, N.J., Flexocrete Gel manufactured by Tamms Industries Co. or Euco #352 Gel, Euclid Chemical Company, Concreseive Paste LPL or SPL by BASF Construction Chemicals.

2.13 CONCRETE ANCHORS

A. Mechanical Anchors:

1. Wedge Anchors: Wedge anchors shall be "Kwik Bolt TZ" by Hilti, Inc., "TruBolt +" by ITW Redhead, "Strong-Bolt" or "Strong-Bolt 2" by Simpson Strong-Tie Co. or "Powerstud SD-1" or "Powerstud SD-2" by Powers Fasteners.
2. Screw Anchors: Screw anchors shall be "Kwik HUS-EZ" and "KWIK HUS-EZ-I" by Hilti, Inc., "Titen HD" by Simpson Strong-Tie Co., or "Wedge-Bolt +" by Powers Fasteners. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.
3. Sleeve Anchors: Sleeve anchors shall be "HSL-3 Heavy Duty Sleeve Anchor" by Hilti, Inc. or "Power-Bolt +" by Powers Fasteners.
4. Undercut Anchors: Undercut anchors shall be "HDA Undercut Anchor" by Hilti, Inc., "Torq- Cut Undercut Anchor" by Simpson Strong-Tie Co., "Atomic + Undercut Anchor" by Powers Fasteners

B. Adhesive Anchors:

1. Adhesive anchors shall be "Epcon G5" by ITW Redhead, "HIT HY-200" or RE 500-SD by Hilti, Inc., "SET-XP" by Simpson Strong-Tie Co., or "Powers 1000+" by Powers Fasteners.
2. Adhesive anchor systems shall be IBC compliant and capable of resisting short term wind and seismic loads (Seismic Design Categories A through F) as well as long term and short term sustained static loads in both cracked and uncracked concrete in all Seismic Design Categories. Structural adhesive anchor systems shall comply with the latest revision of ICC- ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. No "or equal" products will be considered unless prequalified and approved by the Engineer and Owner.

C. Concrete Anchor Materials:

1. Concrete anchors used to anchor structural steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted

otherwise. Where steel to be anchored is galvanized, concrete anchors shall also be galvanized unless otherwise indicated on the Drawings.

2. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater concrete anchors shall be Type 316 stainless steel.
3. Nuts, washers, and other hardware shall be of a material to match the anchors.

2.14 MASONRY ANCHORS

- A. Anchors for fastening to solid or grout-filled masonry shall be adhesive anchors as specified above for concrete anchors.
- B. Anchors for fastening to hollow masonry or brick shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system dispensed into a screen tube inserted into the masonry. The adhesive system shall use a two-component adhesive mix and shall inject into the screen tube with a static mixing nozzle. Thoroughly clean drill holes of all debris and drill dust with nylon (not wire) brush prior to installation of adhesive and anchor. Contractor shall follow manufacturer's installation instructions. The adhesive system shall be "Epcon System A7 or C6" as manufactured by ITW Ramset/Redhead, "HIT HY-70 System" as manufactured by Hilti, Inc., "SET Epoxy-Tie" or "AT Acrylic-Tie" as manufactured by Simpson Strong-Tie Co., or "AC100+ Gold by Powers Fasteners.
- C. Masonry anchors used to anchor steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, masonry anchors shall also be galvanized.
- D. Masonry anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater anchors shall be Type 316 stainless steel.

2.15 MANHOLE STEPS

- A. Manhole or access steps shall be plastic, constructed of copolymer polypropylene meeting the requirements of ASTM D 2146 for Type II, Grade 16906 material. Step shall be reinforced with ASTM A 615, Grade 60, #4 deformed steel reinforcing bar, be 9" deep, 14" wide, provided with notched tread ridge, foot retainer lugs on each side of tread and penetration stops for press fit installation. Plastic steps shall be PS2-PF as manufactured by M.A. industries, Inc., Peachtree City, Georgia. Steps shall be installed by drilling 1" diameter holes, minimum 3-3/4 inches deep into the wall, and then driving steps into hole to the penetration stop, resulting in a press fit condition.

PART 3 - EXECUTION

3.01 PVC AND CHEMICAL RESISTANT WATERSTOPS

- A. PVC and chemical resistant waterstops shall be provided in all construction and expansion joints in water bearing structures and at other such locations as required by the Drawings.
- B. Waterstops shall be carefully positioned so that they are embedded to an equal depth in concrete on both sides of the joint. They shall be kept free from oil, grease, mortar or other foreign matter. To ensure proper placement, all waterstops shall be secured in correct position at 12" on center along the length of the waterstop on each side, prior to placing concrete. Such method of support shall be submitted to the Engineer for review and approval. Grommets or small pre-punched holes as close to the edges as possible will be acceptable for securing waterstops.
- C. Splices in PVC waterstops and chemical resistant waterstops shall be made with a thermostatically controlled heating element. Splices in chemical resistant waterstops may also be made with adhesive system approved by manufacturer of waterstop. Only straight butt joint splices will be allowed in the field. Factory fabricated corners and transitions shall be used at intersections. Splices shall be made in strict accordance with the manufacturer's recommended instructions and procedures. At least three satisfactory sample splices shall be made on the site. The Engineer may require tests on these splices by an approved laboratory. The splices shall exhibit not less than 80 percent of the strength of the unspliced material.
- D. All splices in waterstops will be subject to rigid review for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which will pass said review and all faulty material shall be removed from the site and disposed of by the Contractor at no additional cost to the Owner.
- E. Retrofit waterstops shall be installed as shown on Contract Drawings using approved waterstop adhesive and Type 316 stainless steel batten bars and expansion anchors.
- F. Waterstop installation and splicing defects which are unacceptable include, but are not limited to the following:
 - 1. Tensile strength not less than 80 percent of parent material.
 - 2. Overlapped (not spliced) Waterstop.
 - 3. Misalignment of Waterstop geometry at any point greater than 1/16 inch.
 - 4. Visible porosity or charred or burnt material in weld area.
 - 5. Visible signs of splice separation when splice (24 hours or greater) is bent by hand at sharp angle.

3.02 HYPALON RUBBER AND EXPANDING RUBBER WATERSTOPS

- A. Waterstops shall be installed only where shown on the Drawings.
- B. Waterstops shall be installed in strict accordance with manufacturer's recommendations.

3.03 WATERSTOP ADHESIVE

- A. Adhesive shall be applied to both contact surfaces in strict accordance with manufacturer's recommendations.
- B. Adhesive shall be used where waterstops are attached to existing concrete surfaces.

3.04 INSTALLATION OF EXPANSION JOINT MATERIAL AND SEALANTS

- A. Type I, II, or III shall be used in all expansion joints in structures and concrete pavements unless specifically shown otherwise on the Drawings. Type IV shall be used in sidewalk and curbing and other locations specifically shown on the Drawings.
- B. All expansion joints exposed in the finish work, exterior and interior, shall be sealed with the specified joint sealant. Expansion joint material and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Drawings.
- C. Expansion joint material that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The material shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
- D. A bond breaker shall be used between expansion joint material and sealant. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surfaces shall present a clean and even appearance.
- E. Type 1 joint sealant shall be used in all expansion and contraction joints in concrete, except where Type 7 or Type 8 is required as stated below, and wherever else specified or shown on the Drawings. It shall be furnished in pour grade or gun grade depending on installation requirements. Primers shall be used as required by the manufacturer. The sealant shall be furnished in colors as directed by the Engineer.
- F. Type 8 joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and wherever else specified or shown on the Drawings.
- G. Type 7 joint sealant shall be used for all joints in chlorine contact tanks and wherever specified or shown on the Drawings.

3.05 EXPANSION JOINT SEAL

- A. The expansion joint seal system shall be installed as shown on the Drawings in strict accordance with the manufacturer's recommendations.

3.06 CONTRACTION JOINT INSERTS

- A. For contraction joints in slabs, inserts shall be floated in fresh concrete during finishing.
- B. For contraction joints in walls, inserts shall be secured in place prior to casting wall.
- C. Inserts shall be installed true to line at the locations of all contraction joints as shown on the Drawings.
- D. Inserts shall extend into concrete sufficient depth as indicated on the Drawings or specified in Section 03290, Joints in Concrete.
- E. Inserts shall not be removed from concrete until concrete has cured sufficiently to prevent chipping or spalling of joint edges due to inadequate concrete strength.

3.07 EPOXY BONDING AGENT

- A. The Contractor shall use an epoxy bonding agent for bonding all fresh concrete to existing concrete as shown on the Drawings.
- B. Bonding surface shall be clean, sound and free of all dust, laitance, grease, form release agents, curing compounds, and any other foreign particles.
- C. Application of bonding agent shall be in strict accordance with manufacturer's recommendations.
- D. Fresh concrete shall not be placed against existing concrete if epoxy bonding agent has lost its tackiness.

3.08 EPOXY RESIN BINDER

- A. Epoxy resin binder shall be used to seal all existing rebar cut and burned off during demolition operations. Exposed rebar shall be burned back 1/2-inch minimum into existing concrete and the resulting void filled with epoxy resin binder.

3.09 ANCHOR INSTALLATION

- A. Concrete Anchors and Masonry Anchors
 - 1. Overhead adhesive anchors, and base plates or elements they are anchoring, shall be shored as required and securely held in place during anchor setting to prevent movement during anchor installation. Movement of anchors during curing is prohibited.

2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.
3. Concrete anchors shall not be used in place of anchor bolts without Engineer's approval.
4. All stainless steel threads shall be coated with antiseize lubricant.

B. Concrete Anchors

1. Concrete at time of anchor installation shall be a minimum age of 21 days.
2. All concrete anchors shall be installed in strict conformance with the manufacturer's printed installation instructions. A representative of the manufacturer shall be on site when required by the Engineer.
3. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. No cored holes shall be allowed unless specifically approved by the Engineer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and threaded rod/bolt unless otherwise recommended by the manufacturer. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. Wipe rod free from oil that may be present from shipping or handling.

C. Other Bolts

1. All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal.
2. All stainless steel bolts shall be coated with antiseize lubricant.

END OF SECTION

SECTION 03290

JOINTS IN CONCRETE

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Provide all materials, labor and equipment required for the construction of all joints in concrete specified herein and shown on the Drawings.
- B. Types of joints in concrete shall be as follows:
 - 1. Construction Joints - Joints between adjacent concrete placements continuously connected with reinforcement.
 - 2. Expansion Joints - Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.
 - 3. Contraction Joints - Joints formed in concrete to provide a weakened plane in concrete section to control formation of shrinkage cracks.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork.
- B. Section 03250 - Concrete Accessories.
- C. Section 03300 - Cast-in-Place Concrete.
- D. Section 07900 - Joint Sealers.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. ACI 301 - Specifications for Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.

1. Layout drawings showing location and type of all joints to be placed in each structure.
2. Details of proposed joints in each structure.

PART 2 - MATERIALS

2.01 MATERIALS

- A. All materials required for joint construction shall comply with Section 03250 - Concrete Accessories, and Section 07920 - Joint Sealants.

PART 3 - EXECUTION

3.01 CONSTRUCTION JOINTS

- A. Construction joints shall be as shown on the Drawings. Otherwise, Contractor shall submit description of the joint and its location to Engineer for approval.
- B. Unless noted otherwise on the Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.
- C. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0". For exposed walls with fluid or earth on the opposite side, the spacing between vertical and horizontal joints shall be a maximum of 25'-0" or as shown on plans.
- D. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.
- E. All reinforcing steel and welded wire fabric shall be continued across construction joints. Keys and inclined dowels shall be provided as shown on the Drawings or as directed by the Engineer. Longitudinal keys shall be provided in all joints in walls and between walls and slabs or footings, except as specifically noted otherwise on the Drawings. Size of keys shall be as shown on the Drawings.
- F. All joints in water bearing structures shall have a waterstop. All joints below grade in walls or slabs which enclose an accessible area shall have a waterstop.

3.02 EXPANSION JOINTS

- A. Size and location of expansion joints shall be as shown on the Drawings.

- B. All expansion joints in water-bearing structures shall have a center-bulb type waterstop. All expansion joints below grade in walls or slabs which enclose an accessible area shall have a center-bulb type waterstop. Waterstop shall be as shown on Drawings and specified in Section 03250, Concrete Accessories.

3.03 CONTRACTION JOINTS

- A. Location of contraction joints shall be as shown on the Drawings.
- B. Contraction joints shall be formed with contraction joint inserts as specified in Section 03250, Concrete Accessories.
- C. Sawcutting of contraction joints in lieu of forming will not be allowed unless otherwise noted on the Drawings. Where sawcutting is allowed, joints shall be sawed as soon as the concrete can support foot traffic without leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.
- D. Unless noted otherwise on Drawings, depth of contraction joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

3.04 JOINT PREPARATION

- A. No concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
- B. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.
- C. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.
- D. All joints shall be sealed as shown on the Drawings and specified in Section 03250, Concrete Accessories.

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.
- B. All water holding structures shall be tested for leakage by the Contractor. The contractor shall provide at his own expense all labor, material, temporary bulkheads, pumps, water measuring devices, etc., necessary to perform the required tests. Each unit shall be tested separately and the leakage tests shall be made prior to backfilling and before equipment is installed. Testing water shall be from any potable non-potable, or natural moving source such as a river or stream, but not from any still water source such as a lake or pond, and not from any wastewater source other than the discharge from a permitted wastewater treatment facility.
- C. The requirements in this section shall apply to the following types of concrete:
 - 1. Class A1 Concrete: Normal weight structural concrete to be used in all structures, sidewalks and pavements, except where noted otherwise in the Contract Documents. All concrete shall be Class A1 concrete unless another class is specifically called for on Contract Documents or specified herein.
 - 2. Class A2 Concrete: Normal weight structural concrete to be used for interior slabs where a concrete hardener is required for application after placement of slab.
 - 3. Class A3 Concrete: Normal weight structural concrete to be used where specifically called for on Contract Drawings or where specifically requested by Contractor and approved by Engineer. Class A3 concrete shall be similar to Class A1 except Class A3 concrete shall contain a mandatory addition of high range water reducer to aid in placement of concrete.
 - 4. Class A4 Concrete: Normal weight structural concrete to be used where specifically called for on Contract Drawings or areas where specifically requested by Contractor and approved by Engineer. Class A4 concrete is identical to Class A1 concrete except that coarse aggregate specified in Article 2.05 below shall be Size #8 in accordance with ASTM C33. Class A4 concrete may also require a mandatory addition of high range water reducer to aid in placement of concrete.
 - 5. Class B Concrete: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, and other areas where specifically noted on Contract Drawings.

6. Class C Concrete: Normal weight concrete to be used where specifically called for on Contract Drawings for fill below structures.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork.
- B. Section 03200 - Reinforcing Steel.
- C. Section 03250 - Concrete Accessories.
- D. Section 03290 - Joints in Concrete.
- F. Section 03370 - Concrete Curing.
- G. Section 03600 – Grout.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

- 1. International Building Code
- 2. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete.
- 3. ACI 301 Specifications for Structural Concrete for Buildings.
- 4. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- 5. ACI 305 Hot Weather Concreting.
- 6. ACI 306 Cold Weather Concreting.
- 7. ACI 309 Recommended Practice for Consolidation of Concrete.
- 8. ACI 318 Building Code Requirements for Structural Concrete.
- 9. ACI 350 Code Requirements for Environmental Engineering Concrete Structures.
- 10. ACI 350.1 Specification for Tightness Testing of Environmental Engineering Concrete Structures.
- 11. ASTM C 31 Standard Methods of Making and Curing Concrete Test Specimens in the Field.

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| 12. ASTM C 33 | Standard Specification for Concrete Aggregates. |
| 13. ASTM C 39 | Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. |
| 14. ASTM C42 | Obtaining and Testing Drilled Cores and Sawed Beams of Concrete. |
| 15. ASTM C 88 | Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate. |
| 16. ASTM C 94 | Standard Specification for Ready-Mixed Concrete. |
| 17. ASTM C 114 | Standard Test Method for Chemical Analysis of Hydraulic Cement. |
| 18. ASTM C 136 | Standard Method for Sieve Analysis of Fine and Coarse Aggregate. |
| 19. ASTM C 138 | Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete. |
| 20. ASTM C 143 | Standard Test Method for Slump of Portland Cement Concrete. |
| 21. ASTM C 150 | Standard Specification for Portland Cement. |
| 22. ASTM C 172 | Standard Method of Sampling Fresh Concrete. |
| 23. ASTM C 192 | Standard Method of Making and Curing Concrete Test Specimens in the Laboratory. |
| 24. ASTM C 231 | Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method. |
| 25. ASTM C 260 | Standard Specification for Air-Entraining Admixtures for Concrete. |
| 26. ASTM C 295 | Standard Guide for Petrographic Examination of Aggregates for Concrete. |
| 27. ASTM C 457 | Standard Recommended Practice for Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete. |
| 28. ASTM C 494 | Standard Specification for Chemical Admixtures for Concrete. |
| 29. ASTM C 595 | Standard Specification for Blended Hydraulic Cements. |
| 30. ASTM C 618 | Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete. |

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| 31. ASTM C 989 | Standard Specification for Slag Cement for Use in Concrete and Mortars. |
| 32. ASTM C1077 | Recommended Practice for Labs Testing Concrete. |
| 33. ASTM C 1567 | Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method). |

1.04 SUBMITTALS

A. Product Data

For each manufactured material and product utilized under this section including, but not limited to, aggregates, admixtures, method of adding admixtures, materials and method of curing, method of developing bond at joints, joint materials, waterstops, and vapor barriers.

B. Design Mixes

For each concrete mix indicated.

C. Shop Drawings

Include details of steel reinforcement placement including material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports. Shop drawings to include the proposed construction and control joint locations.

D. Material Certificates

E. Testing agency to perform service required in ACI 301.

F. Laboratory Tests on Concrete

G. If ready-mixed concrete is used, provide the following:

1. Physical capacity of mixing plant.
2. Trucking facilities available.
3. Estimated average amount which can be produced and delivered to the site during a normal 8-hour day excluding the output to other customers.
4. Delivery Tickets and Batch Tickets: Furnish to Engineer copies of all delivery tickets and batch tickets for each load of concrete delivered to the site. Provide items of information as specified in ASTM C 94.

H. Submit the following in accordance with Section 01300, Submittals.

1. Sources of all materials and certifications of compliance with specifications for all materials.
2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used.
3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.
4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, aggregate soundness tests, petrographic analysis, mortar bar expansion testing per ASTM C 1567, etc.
5. Manufacturer's data on all admixtures stating compliance with required standards.
6. Concrete mix design for each class of concrete specified herein.
7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.
8. Testing procedures for structures to be leak tested.
9. Testing report upon completion of leak testing. Report shall include test summary, test data and calculations.

1.05 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be required as specified in PART 2 -- PRODUCTS. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.
- B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.
- C. Field quality control tests, as specified in Article 3.10, unless otherwise stated, will be performed by a testing laboratory employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.

PART 2 - PRODUCTS

2.01 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C 150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.02 or 2.03 respectively.
2. When potentially reactive aggregates as defined in Article 2.05 are to be used in concrete mix, cement shall meet the following requirements:
 - a. For concrete mixed with only Portland Cement, the total alkalis in the cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.40%.
 - b. For concrete mixed with Portland Cement and an appropriate amount of fly ash (Article 2.02) or slag cement (Article 2.03) the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%.
3. When non-reactive aggregates as defined in Article 2.05 are used in concrete mix, total alkalis in the cement shall not exceed 1.0%.
4. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.
2. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
3. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.
4. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 and 2.03, respectively.
5. When reactive aggregates as defined in Article 2.05 are used in concrete mix, the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%. The percentage of fly ash or slag cement shall be set to meet provisions of Article 2.05.G.2.

C. Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.

D. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.02 FLY ASH

A. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.

B. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.

C. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash. The percentage of fly ash shall be set to meet the provisions of Article 2.05.G.2.

D. For concrete to be used in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.03 SLAG CEMENT

A. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.

B. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag. The percentage of slag cement shall be set to meet the provisions of Article 2.05.G.2.

C. For concrete to be used in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

D. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

2.04 WATER

A. Water used for mixing concrete shall be clear, potable and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts and other impurities.

B. Water shall not contain more than 100 PPM chloride.

C. Water shall not contain more than 500 PPM dissolved solids.

D. Water shall have a pH in the range of 4.5 to 8.5.

2.05 AGGREGATES

A. All aggregates used in normal weight concrete shall conform to ASTM C 33.

B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33.

C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.

D. For Class A4 concrete, coarse aggregate shall be Size #8M in accordance with ASTM C33.

E. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.

F. Aggregates shall be tested for soundness in accordance with ASTM C 88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using magnesium sulfate.

G. Non-reactive aggregates shall meet the following requirements:

1. A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:

- a) Optically strained, microfractured, or microcrystalline quartz, 5.0%, maximum.

- b) Chert or chalcedony, 3.0%, maximum.

- c) Tridymite or cristobalite, 1.0%, maximum.

- d) Opal, 0.5%, maximum.

- e) Natural volcanic glass in volcanic rocks, 3.0%, maximum.

2. Proposed concrete mix including proposed aggregates shall be evaluated by ASTM C-1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.

H. All aggregates shall be considered reactive unless they meet the requirements above for non-reactive aggregates. Aggregates with a lithology essentially similar to sources in the same region

found to be reactive in service shall be considered reactive regardless of the results of the tests above.

- I. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.

2.06 ADMIXTURES

- A. Air entraining agent shall be added to all concrete unless noted otherwise. The agent shall consist of a neutralized vinsol resin solution or a purified hydrocarbon with a cement catalyst which will provide entrained air in the concrete in accordance with ASTM C 260. The admixture proposed shall be selected in advance so that adequate samples may be obtained and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.
- B. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set. Admixtures permitted shall confirm to the requirements of ASTM C 494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.
 1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are "Eucon Series" by the Euclid Chemical Company, "Pozzolith Series" by BASF, and "Plastocrete Series" by Sika Corporation.
 2. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G. The high range water reducer shall be added to the concrete at either the batch plant or at the job site and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are "Eucon 37" or Plastol 5000 by the Euclid Chemical Company, "Rheobuild 1000 or Glenium Series" by BASF, and "Daracem 100 or Advaflo Series" by W.R. Grace.
 3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are "Accelguard 80/90 or NCA" by the Euclid Chemical Company and "Daraset" by W.R. Grace.
 4. A water reducing retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are "Eucon NR or Eucon Retarder 100" by the Euclid Chemical Company, "Pozzolith Retarder" by BASF, and "Plastiment" by Sika Corporation.

- C. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.
- D. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review by the Engineer.

2.07 CONCRETE MIX DESIGN

- A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed. Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.
- B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.
 - 1. Compressive Strength (28 day)

a. Concrete Class A1, A2, A3,A4	4,500 psi (minimum) 6,500 psi (maximum)
b. Class B	3,000 psi (minimum)
c. Class C	2,000 psi (minimum)
 - 2. Maximum water/cementitious materials ratio, by weight

a. Concrete Class A1, A2, A3,A4	0.42
b. Class B	0.50
c. Class C	0.75
 - 3. Slump range
 - a. 4" nominal unless high range water reducing admixture is used.
 - b. 3" maximum before addition of high range water reducing admixture.
 - c. Except, 3-6" for Class C concrete

4. Air Content

- | | |
|-----------------------------|----------|
| a. Concrete Class A1, A3,A4 | 6% ±1.5% |
| b. Class A2, B | 3% Max |
| c. Class C | N/A |

2.08 FLOWABLE FILL

Flowable Fill is considered Class F concrete for filling spaces as permitted and direction by the Engineer. Flowable fill must have proportions by volume in agreement with the following table:

Concrete Class	F
28-day Compressive strength, psi Laboratory Trial Batch for Selecting Concrete Proportions, average 28-day	50-100
Compressive Strength, psi, design mix	N/A
Cement Content per cubic yard of concrete, sacks minimum/maximum **	0.4-3.0 12/16.0**
Water/Cement Ratio by weight, minimum/maximum	0.40/0.75
Air Content, percent by volume	NA
Slump at point of placement, inches	NA

**For concrete with fly ash, values are total of cement plus fly ash (Except Class F).

PART 3 - EXECUTION

3.01 TRIAL MIXES

- A. When trial mixes are used to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350, an independent testing laboratory designated by the Contractor and acceptable to the Engineer shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.

- B. An independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143), air content (C 231) and unit weight (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No.

_____, Product _____." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 PRODUCTION OF CONCRETE

- A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready mix plant or from a site mixed plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.
- B. Ready-Mixed Concrete
1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
 2. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
 3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
 4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed

of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed before the drum has been revolved 300 revolutions and within the time requirements stated in Article 3.03 of this Section.
6. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:
 - a. Date and truck number
 - b. Ticket number
 - c. Mix designation of concrete
 - d. Cubic yards of concrete
 - e. Cement brand, type and weight in pounds
 - f. Weight in pounds of fine aggregate (sand)
 - g. Weight in pounds of coarse aggregate (stone)
 - h. Air entraining agent, brand, and weight in pounds and ounces
 - i. Other admixtures, brand, and weight in pounds and ounces
 - j. Water, in gallons, stored in attached tank
 - k. Water, in gallons, maximum that can be added without exceeding design water/cement ratio
 - l. Water, in gallons, actually used (by truck driver)
 - m. Time of loading
 - n. Time of delivery to job (by truck driver)
7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.
8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.

C. Site Mixed Concrete

1. Scales for weighing concrete ingredients shall be accurate when in use within ± 0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.
2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

a. Cement, fly ash, or slag cement	± 1 percent
b. Water	± 1 percent
c. Aggregates	± 2 percent
d. Admixtures	± 3 percent
3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.
4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.
5. Mixers with a rate capacity of 1 cu.yd. or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.
6. Except as provided below, batches of 1 cu. yd. or less shall be mixed for not less than 1 minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.
7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C 94 indicate that the time is sufficient to produce uniform concrete.
8. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.
9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.
10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added

in solution may be weighed or may be measured by volume if so recommended by the manufacturer.

11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.
12. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.
13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C 94.

3.03 CONCRETE PLACEMENT

- A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.
- B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures which are subsequently required.
- C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. This concrete shall be worked well into the irregularities of the hard surface.
- D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.
- E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided that the design water-cement ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix that meets all specified requirements.
- F. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients. It shall be so deposited that rehandling will be

unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.09 of this Section.

- G. Where concrete is conveyed to position by chutes, a practically continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such as to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise by Engineer.
- H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in all forms in such way as to prevent any segregation.
- I. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.
- J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet and a sufficient number shall be placed in the form to ensure the concrete is kept level at all times.
- K. When placing concrete which is to be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.
- L. Concrete shall be placed so as to thoroughly embed all reinforcement, inserts, and fixtures.
- M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. To achieve this, concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.
- N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.
- O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator,

and slump of concrete, the length of time must therefore be determined in the field. Vibration, however, shall not be continued in any one location to the extent that pools of grout are formed.

- P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall be such as to ensure that each layer is placed while the previous layer is soft or plastic, so that the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.
- Q. To prevent feathered edges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.
- R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and waterstops, and/or any proposed deviations from the aforementioned to the Engineer for review and approval.
- S. Concrete shall not be placed during rains sufficiently heavy or prolonged to wash mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.04 PLACING FLOOR SLABS ON GRADE

- A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the Engineer.
- B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50°F long enough to remove all frost from the subgrade.
- C. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall be no free water standing on the subgrade nor any muddy or soft spots when the concrete is placed.
- D. Thirty-pound felt paper shall be provided between edges of slab-on-grade and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.

- E. Contraction joints shall be provided in slabs-on-grade at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03290 - Joints in Concrete.

3.05 ORDER OF PLACING CONCRETE

- A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.06 CONCRETE WORK IN COLD WEATHER

- A. Cold weather concreting procedures shall conform to the requirements of ACI 306.
- B. In addition to the requirements of ACI 306, concrete placed at any time when air temperature is 40°F or lower shall have a minimum temperature, as placed, of 55°F for placements less than 12" thick, 50°F for placements 12" to 36" thick, and 45°F for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.
- C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature in excess of 100°F in order to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.07 CONCRETE WORK IN HOT WEATHER

- A. Hot weather concreting procedures shall conform to the requirements of ACI 305.
- B. When air temperatures exceed 85°F., or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand and in position prior to each placing operation.
- C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.
- D. The temperature of the concrete mix when placed shall not exceed 90°F.

- E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being taken into account. Stockpiled aggregates shall, if necessary, be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, it must be entirely melted prior to addition of the water to the dry mix.
- F. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.
- H. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.08 QUALITY CONTROL

A. Field Testing of Concrete

- 1. The Contractor shall coordinate with the Owner's testing firm personnel as required for concrete testing.
- 2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the testing laboratory in obtaining samples. The Contractor shall dispose of and clean up all excess material.
- 3. For every placement of concrete that is 10 cubic yards or less, the following tests shall be performed (as described in paragraphs B through E below):
 - a. Consistency
 - b. Unit Weight
 - c. Air content
 - d. Compressive Strength
 - e. Temperature
- 4. For every placement of concrete that is larger than 10 cubic yards, the following tests shall be performed for every 50 cubic yards (as described in paragraphs B through E below):
 - a. Consistency – test the first truck and one additional truck randomly selected by the Owner's Resident Project Representative (RPR).
 - b. Unit Weight – test one truck randomly selected by the RPR
 - c. Air content - test the first truck and one additional truck randomly selected by the RPR.
 - d. Compressive Strength - test one truck randomly selected by the RPR
 - e. Temperature - test one truck randomly selected by the RPR

The sampling of concrete is approved at the truck discharge. If a concrete pump is employed, the Contractor is advised that 1.5-3.0% air is lost in pumping and such should be accounted for at the point of testing. Therefore, the air content should be adjusted to ensure that the air content meets the specification at the point of placement.

The first truck is defined as the first truck as accepted by the RPR. The RPR shall have the authority of the Owner to accept or reject all concrete.

5. Sampling is at the discretion of the RPR.
6. Additional testing may be required as deemed necessary by the Owner.

B. Consistency

1. The consistency of the concrete will be checked by the Owner's testing firm by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Owner or Engineer may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.
2. Slump tests shall be made in accordance with ASTM C 143.
3. Concrete with a specified nominal slump shall be placed having a slump within 1" (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Unit Weight

1. Samples of freshly mixed concrete shall be tested for unit weight by the Owner's testing firm in accordance with ASTM C 138.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the Owner's testing firm in accordance with ASTM C 231.
2. In the event test results are outside the limits specified, additional testing shall occur. Upon discovery of incorrect air entrainment, the concrete shall be removed from the jobsite.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the Owner's testing firm and tested for compressive strength in accordance with ASTM C 172, C 31 and C 39, except as modified herein.
2. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the

container. The Owner's testing firm will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.

3. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders for testing. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C 31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds and such that all specimen are shielded from direct sunlight and/or radiant heating sources. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.
4. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of test specimens with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day curing box contains test specimens. Temperature shall be recorded a minimum of three times a day with one recording at the start of the work day and one recording at the end of the work day.
5. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.
2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.
 - a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.07).
 - b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.
 - c. No more than 10% of the compressive tests have strengths greater than the maximum strength specified.
3. In the event any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.

4. In the event that condition 2B is not met, additional tests in accordance with Article 3.10, paragraph H shall be performed.
5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
 - a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
 - b. Maintain or add temporary structural support as required.
 - c. Correct the mix for the next concrete placement operation, if required to remedy the situation.
6. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at no additional cost to the Owner.

H. Additional Tests

1. In the event the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.10, paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.
 - a. Three cores shall be taken by the Owner's testing firm for each sample in which the strength requirements were not met.
 - b. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.
2. Concrete placed with compressive strengths greater than the maximum strength specified shall be removed and replaced or repaired as deemed necessary by the Engineer.

3.09 WATERTIGHTNESS TESTING OF CONCRETE STRUCTURES

A. Test Preparation

1. The design capability of the structure to withstand testing shall be verified for the pressures to be applied. Another type of test shall not be substituted for hydrostatic tightness testing without approval of the Engineer.
2. The structure shall not be tested before all elements of the structure which resist any portion of the retained liquid pressure are in place and the concrete has attained its specified compressive strength.

3. Unless otherwise specified, coatings shall not be applied until after the hydrostatic tightness testing is complete. Liners that are mechanically locked to the surface during the placement of the concrete shall be installed before the hydrostatic tightness testing. Interior liners shall be visually examined for deficiencies (pinholes, tears and partially fused splices) and must pass integrity testing. Deficiencies shall be prepared.
4. Clean the exposed concrete surfaces of the structure, including the floor, of all foreign material and debris. Prior to testing, standing water in or outside of the structure that would interfere with the inspection of the exposed concrete surfaces of the structure shall be removed.
5. The concrete surfaces and concrete joints shall be thoroughly inspected for potential leakage points. Areas of potential leakage shall be repaired before filling the containment structure with water.
6. All openings, fittings, and pipe penetrations in the structure shell shall be inspected at both faces of the concrete, if practical. Defective or cracked concrete shall be repaired prior to testing. All structural penetrations and inlet/outlets shall be securely sealed to prevent the loss of water from the structure during the test. All structural penetrations shall be monitored before and during the test to determine the watertightness of these appurtenances. If the structure is to be filled using the inlet/outlet pipe, positive means shall be provided to check that water is not entering or leaving through this pipe once the structure is filled to the test level. Leakage at these inlet/outlets shall be repaired prior to testing. No allowance shall be made in test measurements for uncorrected known points of leakage
7. The flow from any underdrain system, if a system is provided, shall be monitored during this same period, and any increase in flow shall be recorded and considered for information as a part of the hydrostatic tightness testing.
8. The ground water level shall be brought to a level below the top of the base slab and kept at that elevation or at a lower elevation during the test.
9. No backfill shall be placed against the walls or on the wall footings of the structure to be tested unless otherwise specified.

B. Procedure

1. The initial filling of a new structure should not exceed a rate of 4 ft/h. Filling shall be continued until the water surface is at the design maximum liquid level, or either 1 in. below any fixed overflow level in covered containment structure or 4 in. in open structure, whichever is lower.
2. The exterior surfaces of the structure shall be inspected during the period of filling the structure. If any flow of water is observed from the structure exterior surfaces, including joints or cracks, the defect causing the leakage shall be repaired prior to testing.
3. Water tightness Test - Part 1: Qualitative Criteria

- a. The water shall be kept at the test level for at least 3 days prior to Part 2 of the testing.
 - b. The exterior surfaces of the structure shall be observed in both the early mornings and later afternoons during the 3-day period before Part 2 of the test. If any water is observed on the structure exterior surfaces, including joints, repaired honeycombed areas and cracks, where moisture can be picked up on a dry hand, the containment structure shall be considered to have failed Part 1 of the test.
 - c. Wet areas on top of wall footing shall not be cause to fail Part 1 of the test unless the water can be observed to be flowing.
 - d. Part 2 of the test may begin prior to completion of repairs for Part 1. However, all defects causing the failure of Part 1 shall be repaired before the structure is accepted.
4. Water tightness Test - Part 2: Quantitative Criteria
- a. The test measurements shall not be scheduled for a period when the forecast is for a difference of more than 35°F between the ambient temperature readings at the times of the initial and final level measurements of the water surface. The test shall also not be scheduled when the weather forecast indicates the water surface would be frozen before the test is completed.
 - b. The vertical distance to the water surface shall be measured to within 1/16 in. from a fixed point on the structure above the water surface. Measurements shall be recorded at 24-hour intervals. Measurements taken at the same time of day will reduce the probability of temperature difference.
 - c. Measurements shall be taken at two locations, 180° apart, which will minimize the effect of differential settlement. Measurements shall be taken at the same locations to reduce the probability of measurement differences.
 - d. The test period shall be at least the theoretical time required to lower the water surface 3/8 in. assuming a loss of water at 0.050% of the water volume per 24-hour period. The test period shall not be longer than five days.
 - e. The water temperature shall be recorded at a depth of 18 in. below the water surface at the start and end of the test.
 - f. A floating, restrained, partially filled, calibrated, open container for evaporation and precipitation measurement should be positioned in open structures and the water level in the container recorded at 24-hour intervals. Determination of evaporation by a shallow pan-type measuring device is not acceptable due to possible heating of the bottom of the shallow pan resulting in accelerated evaporation.

C. Evaluation

1. The containment structure shall continue to be observed in both the early mornings and late afternoons to verify compliance with Part 1 of the test during Part 2.
2. At the end of the test period, the water surface shall be recorded to within 1/16-in at the location of original measurements. The water temperature and the evaporation and precipitation measurements shall be recorded.
3. The allowable loss of water for tightness tests shall not exceed 0.050% of the test water volume in 24 hours.
4. The change in water volume in the structure shall be calculated and corrected, if necessary, for evaporation, precipitation, and temperature based on the change recorded in the water level from the open container. If the loss exceeds the allowable loss, the structure shall be considered to have failed the test.
5. During Part 2 of the test, observed flow or seepage of water from the exterior surface, including that from cracks and joints, should be considered as a failed test. The structure shall also be considered to have failed the test if moisture can be transferred from the exterior surface to a dry hand. Dampness or wetness on top of a footing shall not be considered as a failure test.

D. Retesting

1. A restart of the test shall be required when test measurements become unreliable due to unusual precipitation or other external factors.
2. The Contractor shall be permitted to immediately retest when no visible leakage is exhibited. If the structure fails the second test or if the Contractor does not exercise the option of immediately retesting after the first test failure, the interior of the structure shall be inspected by a diver or by other means to determine probable areas of leakage. The structure shall only be retested after the most probable areas of leakage are repaired.
3. If the leakage exceeds the allowable limit, the work shall be corrected by methods approved by the Engineer.
4. Upon completion of the necessary remedial work, the leakage test shall be repeated until it is successfully passed.

E. Notification by Engineer

1. If any leaks, in excess of the specified amount, are not remedied by the Contractor within four (4) weeks of notification by the Engineer, regardless of whether the cause of these leaks is or is not determined, the Engineer shall have the authority to have these leaks repaired by others. The cost of repairs, by others, shall be deducted from monies due or to become due to the General Contractor.

3.10 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.
- B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed by the Engineer.
- C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed by the Engineer. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed by the Engineer.
- D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced, or repaired as directed by the Engineer. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the Engineer. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the Engineer, unless other means of repair are deemed necessary and approved by the Engineer. Extensive repair or replacement will be considered for concrete placed having compressive strengths greater than maximum strength specified. All repair work shall be performed at no additional cost to the Owner.
- E. Concrete which fails to meet the strength requirements as outlined in Article 3.10, paragraph F, will be analyzed by the Engineer as to its adequacy based upon loading conditions, resultant stresses and exposure conditions for the particular area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be directed by the Engineer.

3.11 MASS CONCRETE PLACEMENT

- A. The maximum temperature differential (MTD) between the interior and exterior concrete surfaces should not exceed 35 degrees F.
- B. To control the heat of hydration during the placement and curing process, the following shall be observed:
 - 1. When proportioning mass concrete mix design, the use of ground granulated blast furnace slag (GGBFS) may be considered.

2. Internal heat of concrete could be removed using an appropriate combination of cooling coils, adding cooled water to the mix, and spraying aggregate for evaporative cooling effect.
3. Insulation shall be provided for the exterior surface of concrete to prevent rapid cooling.
4. Concrete pours shall be placed in vertical lifts not exceeding 24 inches. Revibrate previously deposited concrete when new lifts are placed.
5. CONTRACTOR shall engage the services of a qualified testing laboratory to monitor the internal and surface temperature for at least 7 days after placement is completed.

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SECTION 03370

CONCRETE CURING

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork.
- B. Section 03300 - Cast-In-Place Concrete.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. ACI 301 - Specifications for Structural Concrete for Buildings.
 - 2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 3. ACI 305 - Hot Weather Concreting.
 - 4. ACI 306 - Cold Weather Concreting.
 - 5. ACI 308 - Standard Practice for Curing Concrete.
 - 6. ASTM C171 - Standard Specifications for Sheet Materials for Curing Concrete.
 - 7. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 8. Federal Specification TT-C-800.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Proposed procedures for protection of concrete under wet weather placement conditions.

2. Proposed normal procedures for protection and curing of concrete.
3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
4. Proposed method of measuring concrete surface temperature changes.
5. Manufacturer's literature and material certification for proposed curing compounds.

PART 2 - PRODUCTS

2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

- A. Clear curing and sealing compound shall be a clear styrene acrylate type complying with ASTM C 1315, Type 1, Class A with a minimum solids content of 30%. Moisture loss shall not be greater than 0.40 kg/m² when applied at 300 sq.ft./gal. Manufacturer's certification is required. Acceptable products are Super Diamond Clear VOX by the Euclid Chemical Company, Sonneborn Kure N Seal 30 by BASF Construction Chemicals, and Cure & Seal 30 Plus by Symons Corporation.
- B. Where specifically approved by Engineer, on slabs to receive subsequent applied finishes, compound shall conform to ASTM C 309. Acceptable products are "Kurez DR VOX" or "Kurez W VOX" by the Euclid Chemical Company. Install in strict accordance with manufacturer's requirements.

2.02 EVAPORATION REDUCER

- A. Evaporation reducer shall be BASF, "Confilm", or Euclid Chemical "Euco-Bar".

PART 3 - EXECUTION

3.01 PROTECTION AND CURING

- A. All freshly placed concrete shall be protected from the elements, flowing water and from defacement of any nature during construction operations.
- B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 5-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.
- C. Walls that will be exposed on one side with either fluid or earth backfill on the opposite side shall be continuously wet cured for a minimum of five days. Use of a curing compound will not be acceptable for applications of this type.

- D. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.
 - 1. Ponding or continuous fogging or sprinkling.
 - 2. Application of mats or fabric kept continuously wet.
 - 3. Continuous application of steam (under 150°F).
 - 4. Application of sheet materials conforming to ASTM C171.
 - 5. If approved by the Engineer, application of a curing compound in accordance with Article 3.04.
- E. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph D.
- F. Any of the curing procedures used in Paragraph 3.01-D may be replaced by one of the other curing procedures listed in Paragraph 3.01-D after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

- A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as placed temperatures specified in Section 03300, Cast-In-Place Concrete, for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20°F above the minimum as placed temperatures.
- B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.
- C. The methods of protecting the concrete shall be approved by the Engineer and shall be such as will prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.
- D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

- A. When air temperatures exceed 85°F, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.
- B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.
- C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1 or 2 listed in paragraph 3.01D is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.
- D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least four (4) additional days using one of the methods listed in paragraph 3.01D.
- E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

3.04 USE OF CURING COMPOUND

- A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side. A continuous wet cure for a minimum of five days is required for these applications. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.
- B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.
- C. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. Maximum coverage for the curing and sealing compound shall be 300 square feet per gallon for trowel finishes and 200 square feet per gallon for floated or broom surfaces. Maximum coverage for compounds placed where subsequent finishes will be applied shall be 200 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

3.05 EARLY TERMINATION OF CURING

- A. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

1. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.
2. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

END OF SECTION

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SECTION 03420
PRECAST REINFORCED CONCRETE STRUCTURES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide factory-built precast reinforced concrete underground structures as indicated and as specified.

1.2 RELATED WORK:

- A. Section 03200: Concrete Reinforcement
- B. Section 03300: Cast-in-Place Concrete

1.3 REFERENCES:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO: Standard Specifications for Highway Bridges.
- B. American Concrete Institute (ACI):
 - 1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete.
 - 2. ACI 301: Standard Specifications for Structural Concrete.
 - 3. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
 - 4. ACI 305R: Hot Weather Concreting
 - 5. ACI 306R: Cold Weather Concreting
 - 6. ACI 308: Standard Practice for Curing Concrete

7. ACI 309R: Guide for Consolidation of Concrete
8. ACI 318: Building Code Requirements for Structural Concrete and Commentary

C. American Society for Testing and Materials (ASTM) Publications:

1. ASTM A48: Specification for Sewer Manhole Frames and Covers
2. ASTM C31: Practice for Making and Curing Concrete Test Specimens in the Field
3. ASTM C33: Specification for Concrete Aggregates
4. ASTM C39: Test Method for Compressive Strength of Cylindrical Concrete Specimens
5. ASTM C143: Test method for Slump of Hydraulic Cement Concrete
6. ASTM C150: Specification for Portland Cement
7. ASTM C172: Practice for Sampling Freshly Mixed Concrete
8. ASTM C192: Practice for Making and Curing Concrete Test Specimens in the Laboratory
9. ASTM C231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
10. ASTM C260: Specification for Air-Entraining Admixtures for Concrete
11. ASTM C494: Specification for Chemical Admixtures for Concrete
12. ASTM C858: Specification for Underground Precast Utility Chambers
13. ASTM C1064: Test Method for Temperature of Freshly Mixed Portland Cement Concrete
14. ASTM D75: Practice for Sampling Aggregates

1.4 SUBMITTALS:

- A. Shop Drawings: Submit the following in accordance with Section 01300:

1. Completely detailed shop drawings for all precast concrete structures. Indicate all dimensions, details, reinforcing steel, inserts, connections, openings and lifting devices. Mark each component for identification. Show mark on erection plan and place legibly on unit at time of manufacture.
 2. Properly completed Certificate of Design as specified under Section 01300.
- B. Drawings of modifications or changes in features or details, which are necessitated by, design requirements. Make all such modifications without additional compensation.
- C. Do not fabricate precast concrete structures before shop drawings are accepted by the Engineer.
- D. A certificate of design shall be submitted to the Engineer prior to the production of the precast concrete structures. The certificate of design shall be signed and sealed by a Professional Structural Engineer employed by the structure manufacturer and holding current registration in the state in which the structure is to be installed.
- 1.5 QUALITY ASSURANCE:
- A. Provide in accordance with General Requirements specifications and as specified.
- B. Design Responsibility:
1. Complete the Certificate of Design form in Section 01300 and submit to Engineer prior to manufacture of precast reinforced concrete structures.
 2. Submit the following support data along with Certificate of Design:
 - a. Certification, signed and sealed by a Georgia Professional Engineer employed by the structure manufacturer and holding current registration in the state in which the structure is to be installed stating that all elements and connections are designed to withstand required loads and forces.
 - b. Codes and specifications to which structural design conforms.
- 1.6 DELIVERY, STORAGE AND HANDLING:
- A. Provide in accordance with General Requirements specifications and as specified herein.

- B. Coordinate the delivery, storage, handling and installation of the concrete structures.
- C. Store structures on clean blocking, off the ground and protected from rain and ground splatter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Oldcastle Precast, Inc.
- B. U.S. Precast Corp.
- C. Or equal.

2.2 MATERIALS:

- A. Concrete shall have a minimum concrete compressive strength of 5000 PSI at 28 days.
- B. Steel reinforcement shall conform to ASTM A615, Grade 60.
- C. Portland cement shall be ASTM C150, Type II.
- D. Admixtures causing accelerated setting of cement in concrete shall not be used.
- E. Butyl rubber-based sealants shall conform to AASHTO M198, Type B but with no bitumen content.
- F. Non-Shrink Grout:
 - 1. Masterflow 713 Grout by Master Builders, Cleveland, OH.
 - 2. Fire Star Grout by U.S. Grout Corp., Old Greenwich, CT.
 - 3. Upcon by Upcon Co., Cleveland, OH.
 - 4. Or equal.

2.3 PRECAST REINFORCED CONCRETE STRUCTURES:

A. Design Criteria:

1. Design precast reinforced concrete structure to withstand earth and groundwater loads. Groundwater elevation shall be assumed to be at the top of the structure. Provide design based on the geotechnical report information.
2. Design precast reinforced concrete structure to withstand an H-20 vehicle loading with an impact factor of 1.3. Design shall account for vehicle positions both above and alongside structure including directly on each manhole cover.
3. Design precast reinforced concrete structure ceiling to withstand additional concentrated loads from lifting hooks located directly above each valve, meter or other equipment. Each lifting hook shall be capable of supporting the appropriate load, but not less than 2,500 pounds.
4. Design and install structures to withstand hydrostatic uplift caused by a groundwater elevation at grade level or equal to the top of the structure, whichever produces the most severe condition. Use only the weight of the structure and hold-down slab to resist hydrostatic uplift with a minimum safety factor of 1.5. Do not include side friction of soil on walls.
5. Walls and floor slab shall be a minimum of 6 inches in thickness unless noted otherwise (UNO) in drawings. Cast lower wall section and floor slab together in one placement. Precast reinforced concrete structure roof shall be a minimum of 8 inches in thickness UNO.

B. Provide precast reinforced concrete structure as indicated on the drawings. Structure shall be a complete watertight enclosure including sumps and entrance tubes as indicated.

C. Fabricate precast reinforced concrete structure in sections as required for ease of installation and shipment.

D. Provide pipe sleeves with water stops, rubber pipe boots or other devices at pipe penetrations as indicated.

E. Manhole Frames and Covers:

1. Castings to be free from scale, lumps, blisters and sand holes.

2. Machine contact surfaces to prevent rocking.
3. Thoroughly clean and hammer inspect.
4. Capable of withstanding AASHTO H-20 loading unless otherwise indicated or specified.

F. Bituminous Waterproofing Material:

1. H.B. Tnemecol 46-46S by Tnemec Company, Inc.
2. Amercoat 78HB by Ameron International.
3. Bitumastic 300M by Carboline.
4. Or acceptable equivalent product.

G. Entrance Hatches:

1. Manufacturers:

- a. U.S. Foundry
- b. Bilco Co.
- c. Halliday
- d. Babcock-Davis Associates, Inc.
- e. Or equal.

2. Provide aluminum hatches of the type and size indicated and as follows:

- a. Fabricate hatch and frame with ¼ inch extruded aluminum frame and ¼ inch diamond checkered aluminum plate covers.
- b. Reinforce cover, with aluminum bars and angles welded to underside of covers, to withstand 300-lbs per square foot, unless AASHTO H-20 wheel loading indicated on drawings.
- c. Provide hatch with hinges, hold-open safety-lock bars and flush lift handles, factory assembled, and shipped complete for installation.
- d. Provide stainless steel hardware throughout. Hinge covers to frames with heavy duty stainless steel concealed hinges and stainless steel

pins. Attach hinges to covers and frames with countersunk/flathead stainless steel machine screws. Covers shall fit flush to frame.

- e. Provide slam latch, flush mounted grip handle, and removable plug and key wrench.
 - f. Provide ladder-up safety post.
 - g. Provide Type 316 Stainless Steel safety chains.
- H. Provide lifting hooks in the ceiling above pumps, valves and meters. Each hook shall have the capacity to hoist the equipment located below, but not less than 2,500 pounds).
- I. Apply waterproofing to outside of walls, floor, and ceiling.
- J. Provide aluminum access ladders as follows:
- 1. Fabricate from 1½ inch IPS, Schedule 80 aluminum pipe upright and 1 inch solid round aluminum rod rungs, mortised and welded to uprights. All welds shall be ground smooth. Tops of uprights shall be closed, sealed and ground smooth.
 - 2. Space aluminum rungs 12 inches on centers.
 - 3. Securely fasten ladder to entrance tube and precast reinforced concrete structures with aluminum brackets and ½ inch diameter stainless steel expansion bolts.
 - 4. Ladders shall conform to OSHA Standards 29 CFR Chapter 1926.1053.

PART 3 - EXECUTION

3.1 PROTECTION:

- A. Protect aluminum from contact with dissimilar metals, concrete, masonry or mortar.
- B. Before coating application, clean contact surfaces, remove dirt, grease, oil, foreign substances, followed by immersing in, or wipe thoroughly with, an acceptable solvent. Rinse with clean hot water and dry thoroughly.

3.2 FINISHES:

- A. Finishes: After fabrication, aluminum ladders and entrance tube hatches to receive an Aluminum Association Standard Anodic finish, Designation C22A31, followed

by a shop coat of methacrylate lacquer.

- B. Damaged or worn coating of methacrylate lacquer shall be recoated with a new coating of lacquer of the same type.

3.3 INSTALLATION:

- A. Install precast reinforced concrete structure, and related appurtenances in accordance with manufacturer's instructions.
- B. Place precast reinforced concrete structure onto level prepared bedding as indicated. Provide uniform bearing over entire base of structure.
- C. Seal all joints inside and out with specified sealant to ensure joints are waterproof.
- D. Repair or replace damaged waterproofing.
- E. Backfill structure excavation in such a manner so as not to damage the waterproofing.

3.4 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Furnish all materials, labor, and equipment required to provide all grout used in concrete work in accordance with the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. CRD-C 621 Corps of Engineers Specification for Non-shrink Grout.
2. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens).
3. ASTM C 531 Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacing.
4. ASTM C 579 Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing.
5. ASTM C 827 Standard Test Method for Early Volume Change of Cementitious Mixtures.
6. ASTM C 144 Standard Specification for Aggregate for Masonry Mortar.
7. ASTM C 1107 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals.
1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein.
 2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

1.04 QUALITY ASSURANCE

A. Field Tests (required for pump station and storage tank projects)

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. The specimens will be made by the Engineer or their representative.
 - a. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
 - b. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.
2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.
3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.
2. The minimum compressive strength at 28 days shall be 4,000 psi.
3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.

4. Sand shall conform to the requirements of ASTM C144.

B. Non-Shrink Grout

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28- day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, Conspec 100 Non-Shrink Non-Metallic Grout by Conspec, Masterflow 555 Grout by BASF Construction Chemicals.

C. Epoxy Grout

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, Conspec 1090 by BASF Construction Chemicals.
2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

D. Epoxy Base Plate Grout

1. Epoxy base plate grout shall be Sikadur 42, Grout-Pak by Sika Corporation, or Masterflow MP by BASF Construction Chemicals.

E. Mortar

1. Mortar shall be composed of one part cement or cement with fly ash to 2 parts mortar sand by volume. Add water in an amount not to exceed a water/cement ratio of 0.48/

2.02 CURING MATERIALS

- A. Curing materials shall be as specified in Section 03370, Concrete Curing for cement grout and as recommended by the manufacturer for prepackaged grouts.

PART 3 - EXECUTION

3.01 GENERAL

- A. The different types of grout shall be used for the applications stated below unless noted otherwise in the Contract Documents. Where grout is called for in the Contract Documents which does not fall under any of the applications stated below, non-shrink grout shall be used unless another type is specifically referenced.
1. Cement grout shall be used for grout toppings and for patching of fresh concrete.
 2. Non-shrink grout shall be used for grouting beneath base plates of structural metal framing and between the precast culvert sections and the footing.

3. Epoxy grout shall be used for bonding new concrete to hardened concrete.
4. Epoxy base plate grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy impact machinery, etc.
5. Mortar shall be used to fill the keyway between culvert sections.

- B. New concrete surfaces to receive cement grout shall be cleaned of all dirt, grease and oil-like films. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, including chipping or roughening the surface if a laitance or poor concrete is evident. The finish of the grout surface shall match that of the adjacent concrete. Curing and protection of cement grout shall be as specified in Section 03370, Concrete Curing.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

3.02 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow.

3.03 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3.04 GROUT INSTALLATION

- A. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer. For grouting beneath base plates, grout shall be poured from one side only and thence flow across to the open side to avoid air-entrapment.

END OF SECTION

SECTION 05500
MISCELLANEOUS METALS

1 GENERAL

1.1 DESCRIPTION

Provide all labor, materials and equipment required to install, test and put in operation all miscellaneous metals as indicated on the drawings, as specified herein.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Manufacturer's literature describing standard items.
2. Shop Drawings showing materials, sizes, finishes, locations, attached hardware and fittings, and details for manufactured items and fabricated metalwork, including field erection details showing cuts, copes, connections, holes, thread fasteners and welds. Indicate welds, both shop and field, by symbols conforming to AWS standards. Indicate coatings or other protection against corrosion.
3. Setting diagrams, erection plans, templates and directions for installation of backing plates, anchors, and other similar items.

2 PRODUCTS

2.1 FABRICATION AND MANUFACTURE

1. GENERAL

1. Materials shall conform to type, size and shapes shown on drawings and conform to the following standard specifications:
 - a. Steel Shapes and Plates: ASTM A36.
 - b. Steel Pipe: ASTM A53.
 - c. Nuts, Bolts, Rivets, Washers, and Anchorage Devices: ASTM A325 and AISC Specification.
 - d. Steel Sheets: Cold-rolled or hot-rolled carbon steel, ASTM A366, or ASTM A569.
2. High-Strength, Low Alloy Corrosion-Resistant Steel:
 - a. Plates, Shapes, and Bars: ASTM A242 or A588.
 - b. Sheet and Strip ASTM A606 Type 4.
3. Stainless Steel:
 - a. General: Type (or Grade) 304L or 316L for welding, otherwise Type 304 or 316, as specified.
 - b. Shapes and Bars: ASTM A276.
 - c. Plate, Sheet, and Strip: ASTM A167.
 - d. Tubing: ASTM A269.
 - e. Pipe: ASTM A312, Schedule 40S.
4. Aluminum:

Plates, rolled or extruded shapes, sheets or castings conforming (unless otherwise permitted or indicated) to the following Aluminum Association alloy and temper designations:

- a. Rolled structural sheets and plates: ASTM B209-6061-T6.
 - b. Rolled Structural Shapes: ASTM B308-6061.
 - c. Extruded structural shapes: ASTM B221-6063-T5.
 - d. Gratings
(bearing bars): ASTM B211-6061-T6 (crimp bars): ASTM B211-6061-T5
 - e. Castings: ASTM B26-214.
 - f. Sheets: ASTM B209-Alclad 3003-H14 and 3003.
 - g. Bolts and nuts: Alloy 2024-T4.
 - h. Pipe railings: ASTM B241-6063-T6.
 - i. Handrail stanchions: ASTM B241-6063-T6.
5. Fabricate true to shape, size and tolerances as indicated and specified with straight lines, square corners or smooth bends; free from twists, kinks, warps, dents, and other imperfections. Straighten work bent by shearing or punching.
 6. Dress exposed edges and ends of metal smooth, with no sharp edges and with corners slightly rounded. Construct connections and joints exposed to weather to exclude water.
 7. Provide sufficient quantity and size of anchors for the proper fastening of work.
 8. Fabricate details and connection assemblies in accordance with drawings and with projecting corners clipped and filler pieces welded flush.
 9. Weld shop connections, bolt or weld field connections, unless otherwise noted or specified.
 10. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.
 11. Use connections of type and design required by forces to be resisted, and to provide secure fastening.
 12. Welding:
 - a. Grind exposed edges of welds to a 1/8-inch minimum radius. Grind burrs, jagged edges and surface defects smooth.
 - b. Prepare welds and adjacent areas such that there is (1) no undercutting or reverse ridges on weld bead, (2) no weld spatter on or adjacent to weld or any other area to be painted, and (3) no sharp peaks or ridges along weld bead. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
 13. Bolting:
 - a. Draw up bolts or nuts tight and deform threads where possible. Use bolts of lengths required so that bolts do not project more than 1/4-inch beyond face of

nut. Do not use washers unless specified. Provide hexagonal head bolts with hexagonal nuts.

- b. Provide holes required for the connection of adjacent or adjoining work wherever noted on drawings. Locate holes for bolting equipment to support a tolerance of +/- 1/16-inch of exact dimensions indicated.

14. Fit work together in fabrication shop and deliver complete, or in parts, ready to be set in place.

15. Fabricated Products:

- a. Pipe Sleeves in Concrete Construction: Weld standard weight, black steel pipe, with anchors to exterior to accommodate passage of conduits, pipes ducts and similar items.
- b. Provide stainless steel stud bolts with heavy aluminum washer and nuts for fastening aluminum pipe railing and handrails. Provide galvanized stud bolts, nuts and washers for fastening steel pipe railing and handrail.

2. ALUMINUM ACCESS HATCHES

1. Lockable single and double leaf hatches shall be constructed of aluminum with a diamond pattern thread or other acceptable raised non-slip surface. They shall be single-leaf or double-leaf with capacity to support 300 pounds per square foot load as shown on the drawings and shall be Halliday Products series S1R or S2R or similar product by U.S.F. Fabrication, Inc., or approved equal.
2. Frames shall be 1/4-inch extruded aluminum formed to an angle frame approximately 3-inches wide, with an anchor flange around the perimeter. Containing frames shall be neatly made. Sufficient anchors shall be attached to the frames for proper anchoring into the concrete. Clear opening must not be reduced.
3. Doors shall be provided with a minimum of two heavy T-316 stainless steel hinges, stainless steel pins, and stainless attaching hardware. Doors shall be equipped with an outside flush lifting handle, stainless steel auto lock hold open arm with vinyl grip release handle.
4. Factory finish for exterior floor doors shall be mill finish with bituminous coating applied to all surfaces in contact with concrete.
5. All hardware shall be stainless steel, Type 316.
6. Unit shall have a lifetime guarantee against defects in material and workmanship.
7. The access hatches shall include a protective grating panel designed to prevent accidental fall into the wet well while the cover is open. Grating panel shall: (1) be designed to maintain 300 PSF rating, (2) be hinged and have a Type 316 stainless steel hold-open latch to lock it in the upright position, (3) have a safety orange powder coat finish, (4) be 6063-T6 aluminum "I" bar, (5) be lockable in the closed position by means of an owner-supplied padlock, and (6) contain Type 316 stainless steel hardware throughout.

3. ALUMINUM HANDRAIL

1. Handrail shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.

2. Handrails shall be designed to withstand a 200# concentrated load applied in any direction to the top rail.
3. The manufacturer shall submit calculations to the Engineer for approval. Testing of base casting or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.
4. Post spacing shall be a maximum of 6'-0". Posts and railings shall be a minimum of 1 1/2" schedule 40 aluminum pipe, alloy 6105-T5, ASTM B-429 or B-221. The handrail manufacturer shall show that their posts are of adequate strength to meet the loading requirements. If the manufacturer's posts are not of adequate strength, the manufacturer may reduce the post spacing or add reinforcing dowels or do both in order to meet the loading requirements.
5. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toeplate and pipe must be submitted for approval. Components that are glued or pop-riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Handrail and components shall be "TUFRAIL" as manufactured by Thompson Fabricating Company (Birmingham, AL.) or approved equal.
6. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations (OSHA 1910.23) The top surface of the top railing shall be smooth and shall not be interrupted by a projecting fitting.
7. The midrail at a corner return shall be able to withstand a 200# load without loosening. The manufacturer is to determine this dimension for their system and provide physical tests from a laboratory to confirm compliance.
8. Expansion bolts shall be spaced 10d apart and 5d edge distance for no reduction in pullout strength. A safety factor of 4 shall be used on expansion bolt pullout values published by the manufacturer. Expansion bolts shall be stainless steel type 303 wedge bolts and shall be furnished by the handrail manufacturer.
9. Toeplate shall conform to OSHA standards. Toeplate shall be a minimum of 4" high and shall be an extrusion that attaches to the posts with clamps which allow for expansion and contraction between posts. Toeplate shall be set 1/4" above the walking surface. Toeplates shall be provided on handrails as required by OSHA and/or as shown on the drawings. Toeplate shall be shipped loose, in stock lengths with pre-manufactured corners, for easy field installation.
10. Side mount handrail post stanchions, to concrete. Weld to extruded aluminum brackets. Secure brackets to concrete with four 1/2-inch diameter stainless steel expansion bolts.
11. Anchor handrail top and bottom rails to concrete wall with aluminum square flanges secured to concrete wall with four 3/8-inch diameter stainless steel expansion bolts.
12. Finish shall be Aluminum Association M10C22A41 (215-RI) clear anodized. The pipe shall be plastic wrapped. The plastic wrap shall be removed after erection.
13. Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a mylar isolator, bituminous paint or other approved material.

14. Provide removeable guard chains at openings in aluminum pipe railings. Fabricate from 1/4-inch wrought, non-welded aluminum chain having 12 links per foot. Secure chains to aluminum eyes bolted or welded to pipe stanchions at one end of opening. Provide free ends of the chains with hooks formed from 1/4-inch diameter solid aluminum rod for attaching to similar eyes in the pipe stanchion or wall at the opposite end of the opening.

4. ALUMINUM GRATING

1. Where Aluminum grating or stair tread is shown on plans, it shall meet the requirements outlined below.
2. Aluminum grating shall be fabricated of I-shaped bars, alloy 6063-T6, with swaged cross bars spaced on 4" centers. Bearing bars shall be at least 1 1/4" in depth; spacing shall not exceed 13/16" on center. Top surface of bearing bars shall be striated to provide a nonslip surface.
3. Grating shall be designed to support a uniform load of 300 pounds per square foot with a maximum deflection of 1/4". The maximum fiber stress shall not exceed that which is allowed by the Aluminum Association.
4. Standard installation clearances and tolerances shall conform to the requirements of the current Metal Bar Grating Manual published by the National Association of Architectural Metal Manufacturers.
5. Install aluminum clamps or clips to anchor the grating securely to supports. A minimum of 4 fasteners per panel shall be provided, unless otherwise shown on the drawings.
6. Cutouts for circular obstructions are to be at least 2" larger in diameter than the obstruction. Cutouts for all piping 2" in diameter or less shall be made in the field. Band all ends of grating.
7. Aluminum shelf angles shall be anchored to the concrete using stainless steel (type 18-8) wedge anchors.
8. Paint all aluminum surfaces in contact with concrete or dissimilar metals with a shop coat of bituminous paint.
9. Submit loading tables from the manufacturer verifying span, load and deflection for the proposed system components.

5. ALUMINUM LADDERS

1. Rails shall be constructed of 3/8" X 2 1/2" flat aluminum bar and spaced 16" apart.
2. Wall mounted standoffs shall be 3/8" X 2 1/2" flat aluminum bar and welded to the rails at a maximum of 60" on center. The standoffs shall be a minimum of 7" and manufactured to fit flush with the wall.
3. 1-3/8" diameter slip resistant ribbed rungs shall be spaced 12" on center and shall be welded to the inside of each rail.
4. Units shall be as manufactured by Halliday Products, Series L1B; Thompson Fabricating Company, or approved equal.
5. An aluminum ladder safety post shall be provided on the wall side of the fixed ladder below the hatch cover and shall be as manufactured by Halliday Products, series L1E or approved equal. The device shall have a finish and shall be designed with

telescoping tubular section that locks automatically when fully extended. To engage the ladder extension, grasp aluminum post above the top stainless steel channel clamp and pull straight up until the lower stainless steel pin is seated. The unit shall be completely assembled with fasteners for securing to the ladder rung in accordance with the manufacturer's instructions.

6. MISCELLANEOUS ITEMS

Provide items of miscellaneous metalwork not particularly specified, of the shape, size, material and detail indicated and suitable for the purpose intended.

3 EXECUTION

3.1 INSTALLATION

1. Accurately set and properly secure in place. Where bolted connections are used, draw closely together and draw nuts tightly.
2. Locate anchors and anchor bolts and build into connecting work. Insert expansion bolts into drilled holes.

3. ACCESS HATCHES

1. Access hatches shall be installed as shown on the drawings and in accordance with the approved manufacturer's shop drawings and printed instructions. All doors and covers shall operate freely without binding and shall close without forcing or springing. The exterior of the frames and anchors of those portions coming in contact with the concrete, shall be painted with a heavy coating of asphalt or bituminous material prior to their installation.
2. Protect frames and doors from damage to surface or profile.

4. ALUMINUM PIPE RAILINGS

1. Attach railing rails to face of concrete using aluminum flange and S.S. bolts as indicated.
2. Attach railing posts to edge of concrete using welded aluminum bracket and S.S. bolts as indicated.

5. ALUMINUM GRATINGS AND FRAMES

Anchor aluminum angles to existing concrete walls with S.S. expansion anchors.

6. LADDERS

1. Anchor uprights to wall with angles or bent plates, weld to uprights and use S.S. expansion bolts to wall. Ground smooth all welds.
2. Secure interior ladders to floor slabs with floor flanges.
3. Provide safety post system as indicated.

7. CHAIN HOLDER

Fasten chain holder hook assembly to concrete with S.S. expansion bolts.

3.2 PROTECTION

1. After erection, protect hatches and frames, ladders, and debris baskets from damage due to installation of other work or from lime, acid, cement, or other harmful compounds.

2. Replace damaged hatches and frames, ladders, and debris baskets as determined by the Engineer with new items and at no additional expense to the Owner.
3. Clean aluminum with mild soap and water, followed by clear water rinse, after erection.

END OF SECTION

SECTION
09900
PAINTING

1 GENERAL

1.1 DESCRIPTION

- A. The work covered by this section includes furnishing all labor, materials, and equipment required to accomplish all painting as specified herein and shown on the Drawings.

1.2 SCOPE OF WORK

- A. In general, work included under this section shall include the surface preparation, shop priming, field priming, and/or field painting of all exposed items and surfaces throughout the project, unless otherwise indicated.
- B. All exposed items and surfaces shall be painted using the appropriate paint system as specified herein. Coating system schedules and finish schedules may be provided herein and/or on the Drawings, which identify specific paint systems and paint colors to be used on specific items and surfaces. However, these schedules do not necessarily cover all items to be painted. Where the selection of a specific painting system for a particular application is not clear, it shall be the responsibility of the Contractor to request clarification from the Engineer.
- C. Surface preparation, priming, and coats of paint specified are in addition to shop priming and surface pretreatment specified in other sections, unless otherwise indicated.
- D. All exposed surfaces shall be painted except where the natural finish of the material is obviously intended to be the finished surface or if the surface is specifically noted not to be painted.
- E. In general, items to be painted include:
1. All exposed exterior surfaces including:
 - a. Concrete block.
 - b. Equipment supports.
 - c. Pipe, valves, fittings, hydrants, and appurtenances.
 - d. Ductwork and appurtenances.
 - e. Non-galvanized conduit and appurtenances.
 - f. Interior and exterior surfaces of ferrous metal tankage.
 - g. Ferrous metals.
 - h. All factory primed steel doors and equipment.
 - i. Exposed untreated wood.
 - j. All other surfaces subject to corrosion.
 2. All exposed interior surfaces including:
 - a. All wall surfaces in all spaces unless specifically noted not to be painted.
 - b. All columns, equipment pads, pipe supports, and appurtenances.
 - c. Pipe, valves, fittings, hydrants, and appurtenances.
 - d. Ductwork and appurtenances.
 - e. All electrical conduit unless specifically noted not to be painted.
 - f. All hangers and supports for overhead items.
 - g. Ferrous metals.
 - h. All factory primed steel doors and equipment.

- i. Exposed untreated wood.
 - j. All other surfaces subject to corrosion.
- 3. Equipment that does not have an approved final coat or does not have the appropriate finished color as directed by the Engineer.
- 4. Touch up all equipment that has been damaged by the existing construction as directed by the Engineer.
- 5. Touch up all existing or new items and surfaces damaged by construction as directed by the Engineer.
- F. In general, items NOT to be painted include:
 - 1. Items with Engineer approved factory finish.
 - 2. Electrical equipment unless specifically noted.
 - 3. Surfaces hidden from view including piping, conduit, ducts, and insulation. Note, the manufacturer's standard coatings, if any, may remain.
 - 4. Stainless steel surfaces except piping or tubing.
 - 5. Aluminum surfaces except:
 - a. Where specifically noted to be painted.
 - b. Where embedded in or in contact with concrete.
 - c. Where in contact with dissimilar metals.
 - d. Piping or tubing.
 - 6. Fiberglass surfaces except piping and piping appurtenances.
 - 7. Interior of pipe, ductwork, and conduits.
 - 8. Moving parts of mechanical and electrical units where painting would interfere with the operation of the unit.
 - 9. Code labels and equipment identification and rating plates.
 - 10. Exterior concrete or pre-cast concrete surfaces.
 - 11. Galvanized metal surfaces except interior conduit.
 - 12. Face brick, ceramic tile, plastic laminate.
 - 13. Concealed deck except where specifically specified to be painted.
 - 14. Pre-finished metal.
 - 15. Interior and exterior of concrete basins, vaults, and tanks unless noted otherwise.

1.3 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.4 SUBMITTALS

- A. The Contractor shall submit shop drawings and product data to the Engineer in accordance with the requirements of the section titled "Submittals" of these specifications.
- B. At a minimum, the submittals shall contain, but not be limited to, the following information to establish compliance with these specifications:
 - 1. Product Data
 - a. Submit Manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.
 - 2. Color Samples

- a. Submit Manufacturer's color samples showing full range of standard colors.

C. Manufacturer's Quality Assurance

- 1. Submit Manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.

D. Warranty

- a. Submit a complete description of the warranty to be provided.

E. Painting Schedule

- 1. Contractor shall submit a schedule of all items (structures, equipment, pipe, etc.) to be painted prior to beginning painting operations. Schedule shall include, but not be limited to, items to be painted, surface preparation, paint system, and color. The schedule shall be submitted to the Engineer for approval at which time the Engineer will select the colors to be used that are not specified herein or on the Drawings.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications

- 1. Specialize in manufacture of coatings with a minimum of 10 years successful experience.
- 2. Able to demonstrate successful performance on comparable projects.
- 3. Single Source Responsibility
 - a. Coatings and coating application accessories shall be products of a single manufacturer.

B. Applicator's Qualifications

- 1. Experienced in application of specified coatings for a minimum of 5 years on projects of similar size and complexity to this work.
- 2. Applicator's Personnel
 - a. Employ persons trained for application of specified coatings.

C. Pre-application Meeting

- 1. Convene a pre-application meeting two weeks before start of application of coating systems. Attendance of parties directly affecting work of this section, including Contractor, Engineer, Applicator, and Manufacturer's representative, is required. The meeting shall cover, but not be limited to, the following:
 - a. Environmental requirements.
 - b. Protection of surfaces not scheduled to be coated.
 - c. Surface preparation.
 - d. Application.
 - e. Repair.
 - f. Field quality control.
 - g. Cleaning.
 - h. Protection of coating systems.
 - i. One-year inspection.
 - j. Coordination with other work.

D. Manufacturer's Representative during Painting Operations

- 1. An authorized Manufacturer's representative shall be present at the start-up and weekly during painting operations. Such representative shall instruct and observe the Contractor's and Applicator's work and shall, at the completion of work, certify in writing

to the Engineer that the Manufacturer's application recommendations have been adhered to. The cost of this work shall be borne by the Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:
 - a. Coating or material name.
 - b. Manufacturer.
 - c. Color name and number.
 - d. Batch or lot number.
 - e. Date of manufacture.
 - f. Mixing and thinning instructions.

B. Storage

1. Store materials in a clean dry area and within temperature range in accordance with Manufacturer's instructions.
2. Keep containers sealed until ready for use.
3. Do not use materials beyond Manufacturer's shelf-life limits.

C. Handling

1. Protect materials during handling and application to prevent damage or contamination.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Weather

1. Air and Surface Temperatures
 - a. Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with Manufacturer's instructions.
2. Surface Temperature
 - a. Minimum of 5 °F (3 °C) above dew point.
3. Relative Humidity
 - a. Prepare surfaces and apply and cure coatings within relative humidity range in accordance with Manufacturer's instructions.
4. Precipitation
 - a. Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
5. Wind
 - a. Do not spray coatings if wind velocity is above manufacturer's limit.

B. Ventilation

1. Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D 102.

C. Dust and Contaminants

1. Schedule coating work to avoid excessive dust and airborne contaminants.
2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

1.8 TESTING EQUIPMENT

- A. The Contractor shall furnish and make available to the Engineer the following items of testing equipment for use in determining if requirements of this section are being satisfied.

Specified items of equipment shall be available for the Engineer's use at all times when field painting or surface preparation is in progress.

- a. Wet film gauge.
- b. Surface thermometer.
- c. Keane-Tator surface profile comparator.
- d. Set of National Association of Corrosion Engineers (NACE) visual standards.
- e. Holiday (pin hole) detector (low voltage).
- f. Sling-psychrometer.
- g. Magnetic dry film gauge.

2 PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturers include:

1. Tnemec
2. Induron
3. Carboline

B. Unless otherwise indicated, product names and numbers specified herein are manufactured by Tnemec. Equivalent materials produced by approved Manufacturer's shall be acceptable subject to prior review by the Engineer.

2.2 PAINTING SCHEDULE

- A. General: The Painting Schedule presented below summarizes the painting systems to be applied to the various surfaces.
- B. Exposure terms refer to the environmental conditions to which different surfaces may be exposed. A surface may exist in more than one exposure, e.g. an exterior wall can be categorized not only as "Exposed", but also as "Buried", where the exposure is below the grade line.
- C. In addition to the major items listed in the Painting Schedule, the Contractor shall paint safety warnings and notices as outlined in these specifications.

PAINTING SCHEDULE						
Exposure	System Type	Surface Prep	Prime Coat	Intermediate Coat	Finish Coat	Total DFT
CONCRETE FLOORS – interior concrete floor slabs						
Interior Exposed	Epoxy/urethane	SSPC-SP 13/NACE 6, followed by abrasive blast	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	Tnemec Series 291 CRU, 2 to 3 mils DFT	6 to 9 mils
Severe Chem. exposure	Aggregate filled epoxy	SSPC-SP 13/NACE 6, followed by abrasive blast	Series 201 Epoxoprime, 6 to 8 mils DFT	Series 221 Lami-Tread, double broadcast, 1/8-inch DFT	Series 280 Tnemec-Glaze, 6 to 8 mils DFT	Greater than 1/8-inch
Decorative Floors	Ceramic-filled epoxy	SSPC-SP 13/NACE 6, followed by abrasive blast	Series 201 Epoxoprime, 4 to 6 mils DFT	Series 222 Deco-Tread, double broadcast, 1/8-inch DFT	Series 284 Deco-Clear, 6 to 8 mils DFT	Greater than 1/8-inch

PAINTING SCHEDULE						
Exposure	System Type	Surface Prep	Prime Coat	Intermediate Coat	Finish Coat	Total DFT
Severe Chem., Abrasion, Traffic	High solids epoxy	SSPC-SP 13/NACE 6, followed by abrasive blast	Series 201 Epoxoprime, 6 to 8 mils DFT	Series 231 Chemtread, trowel applied, 1/4-inch DFT	Series 280 Tneme-Glaze, 8 to 12 mils DFT	Greater than 1/4-inch
CONCRETE – cast-in-place or precast concrete						
Exterior Exposed (incl walls & tops of walls on open tanks)	Acrylate	SSPC-SP 13/NACE 6, Clean and Dry	Thoroseal Cementitious Waterproofing w/Acryl 60 3 Lb/SY	Tnemec Series 157 Enviro-Crete, 6 to 9 mils DFT	Tnemec Series 157 Enviro-Crete, 6 to 9 mils DFT	8 to 16 mils
Interior Exposed (interior walls and ceiling not otherwise listed)	Epoxy	SSPC-SP 13/NACE 6, Brush-off blast	Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	8 to 12 mils
Exterior below grade walls	Coal tar epoxy	SSPC-SP 13/NACE 6, Clean and Dry			46H-413 Hi-Build Tneme-Tar, 14 to 20 mils DFT	14 to 20 mils
Severe Atmosphere Secondary containment	Vinyl ester	SSPC-SP 13/NACE 6, Abrasive blast	Tnemec Series 120-5002 Vinester 12 to 18 mils DFT		Tnemec Series 120-5001 Vinester 12 to 18 mils DFT	24 to 36 mils
CONCRETE MASONRY UNITS						
Interior Exposed (interior walls exposed to view)	Epoxy	SSPC-SP 13/NACE 6, clean and dry	Tnemec Series 54-660 Masonry filler 75 to 100 sq ft/gal	Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	8 to 12 mils
Exterior Exposed (exterior walls exposed to weather)	Acrylate	SSPC-SP 13/NACE 6, Clean and Dry	Tnemec Series 130 Envirofill 60 to 80 sq ft/gal	Tnemec Series 156 Enviro-Crete 4 to 8 mils DFT	Tnemec Series 156 Enviro-Crete 4 to 8 mils DFT	8 to 16 mils plus filler.
STEEL - STRUCTURAL, TANKS, PIPE, AND EQUIP – pump supports, anchorage, misc. steel.						
Exterior Exposed (outside structure)	Epoxy/urethane	SSPC-SP 6	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	Tnemec Series 73 Endura-Shield 2 to 5 mils DFT	7 to 13 mils
Interior Exposed (inside structure)	Epoxy	SSPC-SP 6	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	7 to 11 mils
Immersion (non-potable water)	Coal tar epoxy	SSPC-SP 10	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		46H-413 Hi-Build Tneme-Tar, 14 to 20 mils DFT	17 to 25 mils
Severe Atmosphere	Vinyl ester	SSPC-SP 5 w/ min. 3 mil profile	Tnemec Series 120-5002 Vinester 12 to 18 mils DFT		Tnemec Series 120-5001 Vinester 12 to 18 mils DFT	24 to 36 mils

PAINTING SCHEDULE						
Exposure	System Type	Surface Prep	Prime Coat	Intermediate Coat	Finish Coat	Total DFT
Below Grade	Coal tar epoxy	SSPC-SP 10	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		46H-413 Hi-Build Tnemec-Tar, 14 to 20 mils DFT	17 to 25 mils
High Temperature	High heat silicone	SSPC-SP 10	Thurmalox 210 Primer (Dampney Co.) 2 to 3 mils DFT		Thurmalox 200 Primer (Dampney Co.) 2 to 3 mils DFT	4 to 6 mils
FACTORY PRIMED OR GALVANIZED STEEL – doors, frames, exposed metal deck on ceilings, miscellaneous equipment						
Exterior Exposed	Epoxy/urethane	Clean and Dry	Factory Primed	Tnemec Series 27 Typoxy 2 to 3 mils DFT	Tnemec Series 73 Endura-Shield 2 to 3 mils DFT	4 to 6 mils
Interior Exposed	Epoxy	Clean and Dry	Factory Primed	Tnemec Series 27 Typoxy 2 to 3 mils DFT	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	4 to 6 mils
Immersion (inside wet well)	Epoxy	SSPC-SP 1, followed by abrasive blast	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	7 to 11 mils
DUCTILE OR CAST IRON - PIPE, PUMPS, AND VALVES						
Exterior Buried (below ground)	Pipe Mfgr Asph Coating	Per Mfgr. specs				N/A
Interior Exposed (Inside building.)	Epoxy	Per Mfgr. specs	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	7 to 11 mils
Exterior Exposed	Epoxy/urethane	Per Mfgr. specs	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT	Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	Tnemec Series 73 Endura-Shield 2 to 3 mils DFT	9 to 14 mils
Immersion Inside tanks, vaults, buildings)	Coal tar epoxy	Per Mfgr. specs	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		46H-413 Hi-Build Tnemec-Tar, 14 to 20 mils DFT	17 to 25 mils
Severe Atmosphere	Vinyl ester	Per Mfgr. specs	Tnemec Series 120-5002 Vinester 12 to 18 mils DFT		Tnemec Series 120-5001 Vinester 12 to 18 mils DFT	24 to 36 mils
High Temperature	High heat silicone	SSPC-SP 10	Thurmalox 210 Primer (Dampney Co.) 2 to 3 mils DFT		Thurmalox 200 Primer (Dampney Co.) 2 to 3 mils DFT	4 to 6 mils
GALVANIZED STEEL AND NONFERROUS METAL – Pipe and miscellaneous fabrications						
Exterior Exposed	Epoxy/urethane	Per Mfgr. specs	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT		Tnemec Series 73 Endura-Shield 2 to 3 mils DFT	4 to 6 mils

PAINTING SCHEDULE						
Exposure	System Type	Surface Prep	Prime Coat	Intermediate Coat	Finish Coat	Total DFT
Interior Exposed	Epoxy	Per Mfgr. specs	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	4 to 6 mils
Immersion	Epoxy	SSPC-SP 1, followed by abrasive blast	Tnemec Series 66 Hi-Build Epoxoline, 3 to 5 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 4 to 6 mils DFT	7 to 11 mils
PVC						
Exterior Exposed	Epoxy/urethane	Scarify	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT		Tnemec Series 73 Endura-Shield 2 to 3 mils DFT	4 to 6 mils
Interior Exposed	Epoxy	Scarify	Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT		Tnemec Series 66 Hi-Build Epoxoline, 2 to 3 mils DFT	4 to 6 mils
INSULATED PIPE						
Interior/Exterior Exposed	Acrylic	Clean and Dry	Series 6 Tneme-Cryl 2 to 3 mils DFT		Series 6 Tneme-Cryl 2 to 3 mils DFT	4 to 6 mils
PLASTER AND GYPSUM BOARD						
Interior Exposed	Vinyl-acrylic/acrylic-epoxy	Clean and Dry	Tnemec Series 51-792 PVA Sealer 1 to 2 mils DFT		Tnemec Series 113 H.B. Tneme-Tufcoat 4 to 6 mils DFT	5 to 8 mils

D. Coatings shall be applied per the manufacturer's instructions for the conditions specified.

2.3 ACCESSORIES

A. Coating Application Accessories

1. Accessories required for application of specified coatings in accordance with manufacturer's instructions, including thinners.
2. Products of coating manufacturer.

3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.2 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.
- B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.3 SURFACE PREPARATION OF STEEL

- A. Prepare steel surfaces in accordance with Manufacturer's instructions.

B. Fabrication Defects

1. Correct steel and fabrication defects revealed by surface preparation.
2. Remove weld spatter and slag.
3. Round sharp edges and corners of welds to a smooth contour.
4. Smooth weld undercuts and recesses.
5. Grind down porous welds to pinhole-free metal.
6. Remove weld flux from surface.

C. Ensure surfaces are dry.

D. Immersed or Below Grade Surfaces

1. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 10/NACE 2.

E. Exterior Exposed or Interior Exposed Surfaces

1. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3.

F. Interior or Immersed Surfaces, Severe Atmospheres

1. Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 5/NACE 1.

G. Abrasive Blast-Cleaned Surfaces

1. Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.

H. Shop Primer

1. Prepare shop primer to receive field coat in accordance with manufacturer's instructions.

3.4 SURFACE PREPARATION OF GALVANIZED STEEL AND NONFERROUS METAL

A. Prepare galvanized steel and nonferrous metal surfaces in accordance with Manufacturer's instructions.

B. Ensure surfaces are dry.

C. Remove visible oil, grease, dirt, dust, protective mill coatings, and other soluble contaminants in accordance with SSPC-SP 1 or Manufacturer's instructions as specified for coating system.

D. Immersed Service

1. Clean surfaces by abrasive blasting.

E. Remove Rust from Galvanized Steel

1. Remove white rust from galvanized steel by hand or power brushing.
2. Remove rust from old galvanized steel in accordance with SSPC-SP 2 or SP 3.
3. Do not damage or remove galvanizing.

F. Increase mechanical adhesion under moderate to severe conditions, such as exterior exposure or chemical environments, by abrasive blast and/or chemical cleaning.

3.5 SURFACE PREPARATION OF DUCTILE OR CAST IRON

A. Prepare ductile or cast iron surfaces in accordance with Manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.6 SURFACE PREPARATION OF PVC

A. Prepare PVC surfaces in accordance with Manufacturer's instructions.

- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Scarify PVC surfaces.

3.7 SURFACE PREPARATION OF INSULATED PIPE

- A. Prepare insulated pipe surfaces in accordance with Manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.8 SURFACE PREPARATION OF CONCRETE

A. Interior, Exposed

1. Prepare concrete surfaces in accordance with Manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.
2. Allow concrete to cure for a minimum of 28 days.
3. Test concrete for moisture in accordance with ASTM D 4263 and F 1869.
4. Abrasive blast surface to remove laitance and solid contaminants and to provide clean, sound substrate with uniform anchor profile.
5. Fill holes, pits, voids, and cracks with Tnemec 63-1500 Filler and Surfacers.
6. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

B. Exterior

1. Prepare concrete surfaces in accordance with Manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.
2. Allow concrete to cure for a minimum of 14 days.
3. Test concrete for moisture in accordance with ASTM D 4263 and F 1869.
4. Level concrete protrusions and mortar spatter.
5. Fill hairline cracks less than 1/64 inch (0.4 mm) in accordance with Manufacturer's instructions.
6. Prepare cracks wider than 1/64 inch (0.4 mm), moving cracks, gaps, and expansion joints in accordance with Manufacturer's instructions.
7. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

3.9 SURFACE PREPARATION OF CONCRETE FLOORS

- A. Prepare concrete surfaces in accordance with Manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Allow concrete to cure for a minimum of 28 days before coating.
- D. Test concrete for moisture in accordance with ASTM D 4263 and F 1869.

3.10 SURFACE PREPARATION OF SECONDARY CONTAINMENT

- A. Prepare secondary containment surfaces in accordance with Manufacturer's instructions.
- B. Prepare concrete surfaces in accordance with Manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.
- C. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- D. Allow concrete to cure for a minimum of 28 days before coating.
- E. Test concrete for moisture in accordance with ASTM D 4263 and F 1869.

3.11 SURFACE PREPARATION OF POROUS CONCRETE MASONRY UNITS

- A. Prepare porous concrete masonry unit surfaces in accordance with Manufacturer's instructions and SSPC-SP 13/NACE 6.

- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Allow mortar to cure for a minimum of 28 days before coating.
- D. Level protrusions and mortar spatter.

3.12 SURFACE PREPARATION OF PLASTER

- A. Prepare plaster surfaces in accordance with Manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Allow plaster to cure and dry out for a minimum of 28 days before coating.
- D. Do not coat over plaster containing free water, lime, or other soluble alkaline salts.
- E. Remove plaster nibs and other protrusions.
- F. Patch voids and cracks with approved materials and after dry, sand flush with surface.

3.13 SURFACE PREPARATION OF GYPSUM BOARD

- A. Prepare gypsum board surfaces in accordance with Manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Sand joint compound smooth and feather edge.
- D. Avoid heavy sanding of adjacent gypsum board surfaces, which will raise nap of paper covering.
- E. Do not apply putty, patching pencils, caulking, or masking tape to drywall surfaces to be painted.
- F. Lightly scuff-sand tape joints after priming to remove raised paper nap. Do not sand through primer.

3.14 SURFACE PREPARATION OF WOOD

- A. Prepare wood surfaces in accordance with Manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, surface deposits of sap or pitch, and other contaminants.
- C. Seal knots and pitch pockets.
- D. Sand rough spots with the grain.
- E. Fill cracks and holes with approved materials after primer is dry. Sand flush with surface when filler is hard.
- F. Lightly sand between coats.

3.15 APPLICATION

- A. Apply coatings in accordance with Manufacturer's instructions.
- B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- C. Keep containers closed when not in use to avoid contamination.
- D. Do not use mixed coatings beyond pot life limits.
- E. Use application equipment, tools, pressure settings, and techniques in accordance with Manufacturer's instructions.
- F. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

3.16 REPAIR

A. Materials and Surfaces Not Scheduled To Be Coated

1. Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings

1. Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.

C. Coating Defects

1. Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.17 FIELD QUALITY CONTROL

A. Applicator's Services

1. Verify coatings and other materials are as specified.
2. Verify surface preparation and application are as specified.
3. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.
4. Coating Defects
 - a. Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - b. Check for holidays on interior steel immersion surfaces using holiday detector.
5. Report
 - a. Submit daily written reports describing work performed, inspections made, and actions taken to correct nonconforming work. Daily reports shall contain, but not be limited to, the following information:
 - 1) Start date and time of work in each area.
 - 2) Weather conditions.
 - 3) Date and time of application for each following coat.
 - 4) Moisture content of substrate prior to each coat.
 - 5) Provisions utilized to maintain temperature and humidity of work area with Manufacturer's recommended ranges.
 - b. Report nonconforming work not corrected.
 - c. Submit copies of report to Engineer and Contractor.

B. Manufacturer's Field Services

1. Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems and shall be available per paragraph 1.5.E.

3.18 CLEANING

- A. Remove temporary coverings and protection of surrounding areas and surfaces.

3.19 PROTECTION OF COATING SYSTEMS

- A. Protect surfaces of coating systems from damage during construction.

3.20 ONE-YEAR INSPECTION

- A. Owner will set date for one-year inspection of coating systems.
- B. Inspection shall be attended by Owner, Contractor, Engineer, and Manufacturer's representative.

- C. Repair deficiencies in coating systems as determined by Engineer in accordance with Manufacturers instructions.

3.21 PIPE CODING

- A. All process piping shall be color-coded. Pipe color and band color, when required, shall be in accordance with the Color Schedule of this section.
- B. Bands shall be spaced at maximum 6 feet on center. On pipe runs less than 6 feet in length, one band shall be located at the center of the run.
 - 1. Place bands:
 - a. Along continuous lines.
 - b. At changes in direction.
 - c. At changes in elevation.
 - d. On both sides of an obstruction.
 - 2. Band width shall be as follows:
 - a. For pipes up to 8" in diameter: 2" minimum.
 - b. For pipes 10" to 24" in diameter: 4" minimum.
 - c. For pipes 30" to 48" in diameter: 6" minimum.
 - d. For pipes greater than 48" in diameter: 8" minimum.
- C. Pipe Labels
 - 1. After painting of pipe work is completed, all pipe work shall have stenciled labels indicating the contents of the pipe (i.e. "RAW WASTEWATER").
 - 2. Labels shall be placed on each side of the pipe (180 degrees from each other) and spaced at maximum 20 feet on center. Labels shall be placed such that they are in direct line of site. For pipe runs less than 20 feet, label shall be placed at the center of the run or the most visible location. Label may be omitted from one side of pipe if view is obstructed from that side.
 - 3. When the flow in a pipe is in one direction at all times, flow direction arrows shall be placed in front of each label on the pipe.
 - 4. The width of each letter shall be 80% of the height of each letter. The height of each letter shall be as follows:
 - a. For pipes $\frac{3}{4}$ " to $1\frac{1}{2}$ " in diameter: $\frac{1}{2}$ " in height.
 - b. For pipes 2" in diameter: $\frac{3}{4}$ " in height.
 - c. For pipes $2\frac{1}{2}$ " to 6" in diameter: $1\frac{1}{4}$ " in height.
 - d. For pipes 6" to 10" in diameter: $2\frac{1}{2}$ " in height.
 - e. For pipes greater than 10" in diameter: $3\frac{1}{2}$ " in height.
 - 5. For pipes smaller than $\frac{3}{4}$ " in outside diameter, use a laminated plastic or aluminum tag with the lettering etched or stamped and filled in with black or contrasting enamel.
 - 6. Labels shall be black or white in color such that it is contrasting with the primary pipe color.
- D. Equipment Labels
 - 1. Where specified or directed by the Engineer, the Contractor shall label, in the same manner as the pipe, the individual units of equipment such as blowers, pumps, collector drives, compressors, silencers, etc. All push buttons, starters, switches, etc., when remote from the equipment, shall have labels of the engraved plastic type affixed to or adjacent to the remote switch, push button, starter, etc.

3.22 COLOR SCHEDULE

A. Piping

Service	Pipe Color	Band Color
Raw Wastewater	Gray	None
Mixed Liquor Suspended Solids	Brown	None
Return Activated Sludge	Brown	Black
Waste Activated Sludge	Brown	Orange
Sludge Re-circulation (Discharge)	Brown	None
Reuse Water	Purple	None
Potable Water	Blue	None
Compressed Air	Green	None

B. OSHA Safety Colors

Service	Color
Fire Protection Equipment, Fire Boxes, Fire Extinguishers, Exit Signs, Fire Sprinkler Piping, Portable Containers of Flammable Liquid, Emergency Stop Bars.	Safety Red
Exposed Box Housings, Exposed Edges of Pulleys, Gears, Etc., Safety Starting Buttons.	Safety Orange
Unguarded Edges of Platforms, Elevated Door Edges, Bollards, Pulley Blocks, Material Handling Equipment.	Safety Yellow
First Aid Kits, First Aid Signs, First Aid Dispensaries, Drinking Water Stations	Safety Green

** END OF SECTION **

SECTION 11245
SUBMERSIBLE
PUMPS

1 GENERAL

1.1 SCOPE OF WORK

- A. The work covered by this section includes furnishing all labor, materials, and equipment required to install, test, and place into satisfactory operation submersible pumps and appurtenances as specified herein and as shown on the drawings.

1.2 SUBMITTALS

- A. The Contractor shall submit shop drawings and product data to the Engineer in accordance with the requirements of the section titled "Submittals" of these specifications.
- B. At a minimum, the submittals shall contain, but not be limited to, the following information to establish compliance with these specifications.
1. Drawings showing plan, elevation, and appropriate cross sections of the equipment being provided.
 2. Complete engineering data including, but not limited to, descriptive data, material specifications, pump performance curves, mass moment of inertia calculations for the impeller, motor performance data, piping diagrams, and wiring diagrams, as appropriate, to support the design of the equipment being provided.
 3. Recommended locations of pump guide rail supports.
 4. Submit control panel schematics and layout drawings and submit manufacturer's catalog information for all components used.
 5. Pump performance curves shall, at a minimum, depict the following.
 - a. Head vs. Capacity
 - b. RPM
 - c. Combined weight of pump and motor
 - d. Impeller diameter
 - e. Largest spherical solid that can be passed
 - f. Clearly marked operation points
 - g. Horsepower
 - h. NPSHR
 - i. Shut-off head
 - j. Kilowatt usage at design conditions
 - k. Efficiency at design conditions
 6. Printed warranty

1.3 OPERATION AND MAINTENANCE DATA

- A. The Contractor shall provide operation and maintenance data in accordance with the requirements of the section titled "Operating and Maintenance Data" of these specifications.

1.4 STORAGE AND PROTECTION

- A. Equipment shall be stored and protected in accordance with the requirements of the manufacturer and the section titled "Storage and Protection" of these specifications.

1.5 WARRANTIES AND BONDS

- A. The Contractor shall provide a warranty against defective or deficient materials and workmanship in accordance with the requirements of the section titled "Warranties and Bonds" of these specifications.
- B. The equipment manufacturer shall provide a warranty against defective or deficient equipment, workmanship and materials under normal use, operation and service. The warranty shall be for five (5) years from the date of Engineer's acceptance of the work. The warranty shall be in printed form and apply to all similar units.

2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved manufacturers include:
 1. Scott Creek Pump Station -Xylem (NP 3202 SH-3 230mm)
 2. Honey Creek Pump Station - Xylem (NP 3202 SH-3 230mm)
- B. The electrical design is based on the minimum motor horsepower shown in the Design Criteria table below. If a pump is selected that requires motors with higher horsepower, the Contractor shall be responsible for adjusting the size of all electrical equipment, including the standby generator, if included in the project. Contractor shall also be responsible for engineering costs to modify the electrical drawings and specifications, if required.

2.2 DESIGN CRITERIA

- A. Provide submersible pumps for each pump station that meet the following design criteria:

Parameter	Scott Creek Pump Station
Primary Duty Point	560 GPM @ 258' TDH
Number of Units	2
Variable Frequency	No
Min. Discharge Diameter, Inches	4
Minimum Motor HP	72
Motor Phase	3-phase
Voltage	460

Parameter	Honey Creek Pump Station
Primary Duty Point	1330 GPM @ 236' TDH
Number of Units	3- 2 duty, 1 standby
Variable Frequency	yes
Min. Discharge Diameter, Inches	4
Minimum Motor HP	72
Motor Phase	3-phase
Voltage	460

- B. It shall be the responsibility of the Contractor and pump manufacturer to closely inspect the Drawings and coordinate the exact location of the pump guide rails, base elbow, and all other appurtenances related to the proper installation of the pumping system being provided. Any changes from the Drawings shall be submitted to the Engineer for approval.

2.3 CONSTRUCTION

A. General

1. Pumps shall be heavy-duty, electric submersible, centrifugal non-clog units capable of handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use.
2. Pumps shall be designed for easy removal and reinstallation without the need for the removal of bolts, nuts, or other fasteners. The pumps shall automatically and firmly connect to the discharge connection, guided by no less than two parallel, non-load bearing, guide rails extending from the top of the pump station to the wet well mounted discharge connection. There shall be no need for personnel to enter the wet well.
3. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal-to-metal watertight contact.
4. The entire weight of the pump/motor unit shall be borne by the pump discharge elbow. No portion of the pump/motor unit shall bear on the sump floor directly or on a sump floor mounted stand.
5. Power and pilot cable supports shall be provided and consist of a stainless-steel wire braid sleeve with attachment loops or tails to connect to cable holders on the underside of the access frame.

B. Pump

1. Major pump components (pump casing, impeller, intermediate housing, motor housing) shall be minimum ASTM A-48, Class 30, cast iron with smooth surfaces devoid of blow holes or other casting irregularities.
2. All exposed nuts or bolts shall be Type 304 stainless steel.
3. All metal surfaces coming into contact with the pumped media, other than stainless steel, shall be protected by manufacturers standard factory applied spray coating which shall be guaranteed to protect the pump from the pumped media.
4. Pump/motor unit mating surfaces where watertight sealing is required shall be machined and fitted with Viton rubber O-rings. Joint sealing will be the result of controlled compression of rubber O-rings in two planes and O-ring contact on four sides without the requirement of a specific bolt torque limit. Rectangular cross-sectioned rubber, paper or synthetic gaskets that require specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.
5. Pumps shall pass spheres 3" and smaller in diameter.

C. Motor Cooling System (if Required)

1. The motor cooling jacket shall encircle the stator housing and shall provide heat dissipation for the motor regardless of whether the motor unit is submerged in the pumped media or surrounded by air.
2. An impeller that is integral to the cooling system and driven by the pump shaft shall provide the necessary circulation of the cooling liquid through the jacket.
3. The cooling jacket shall have one fill port and one drain port.
4. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures up to 40 °C (104 °F). Restrictions below this temperature are not acceptable.

D. Cable and Cable Entry Seal

1. The power cable shall be suitable for the submersible pump applications and sized according to NEC and ICEA standards.
2. The power cable shall be of sufficient length to reach from the pump to the control panel terminal block without splicing. The cable shall have enough slack such that it can be routed and secured out of the way of any equipment in the wet well. It shall be the Contractors responsibility to coordinate the cable length.
3. The outer jacket of the power cable shall be oil resistant.
4. The cable seal design shall preclude specific torque requirements to insure a watertight and submersible seal.

E. Motor

1. The motor shall be 60 Hz with phase, voltage and minimum horsepower as specified above in Design Criteria.
2. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings and stator leads shall be insulated with moisture resistant minimum Class F insulation rated for 155 °C (311 °F). The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be specifically designed for submersible pump usage and designed for continuous duty pumping media of up to 40 °C (104 °F) with an even 80 °C temperature rise and capable of 15 starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber shall be sealed off from the stator housing for connection of power and pilot sensor cables. The use of wire nuts or crimping type connectors is not acceptable. The motor and pump shall be provided by the pump manufacturer.
3. Motor shall have a minimum service factor of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. A performance chart shall be provided in the submittal showing curves for torque, current, power factor, input/output kW and efficiency and data on starting and no-load characteristics.
4. The motor shall be suitable for Class 1, Division 1 environments.
5. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.
6. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

F. Bearings

1. Motor bearings shall be sealed and permanently grease lubricated with high temperature grease.
2. The minimum L10 bearing life shall be 50,000 hours at any point along the usable portion of the pump curve at maximum product speed.

G. Mechanical Seals

1. Pumps shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies.
2. Each seal shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide or silicon-carbide ring.
3. Seals shall operate in an oil lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate.

4. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counterclockwise direction of rotation without damage or loss of seal.
 5. Should both seals fail and allow fluid to enter the stator housing, a port shall be provided to direct that fluid immediately to the stator float switch to shut down the pump and activate an alarm. Any intrusion of fluid shall not come in contact with the lower bearings.
 6. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The seal lubricant chamber shall have drain and inspection plugs that are both accessible from the outside of the pump unit. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate continuously while non-submerged without damage while pumping under load.
 7. Seal lubricant shall be FDA Approved, nontoxic.
- H. Pump Shaft
1. The pump shaft shall be made of 400 series stainless steel and shall be completely isolated from the pumped liquid.
 2. Pump and motor shaft shall be a solid and continuous shaft. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable.
- I. Impeller
1. Impellers shall be minimum ASTM A-48, Class 30 cast iron, dynamically balanced, multiple vaned, enclosed or semi-open, non-clogging design having long through lets without acute turns.
 2. Impellers shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater.
 3. Impellers shall be keyed to the shaft, retained with an expansion ring and shall be capable of passing the minimum diameter solid indicated in the design criteria.
- J. Wear Rings/Suction Covers
1. Enclosed Impellers
 - a. A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be fitted with a Nitrile coated steel or brass ring insert that is drive fitted to the volute inlet.
 - b. This pump shall also have a stainless-steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller.
 2. Semi Open Impellers
 - a. A replaceable cast iron suction cover shall be used to provide efficient sealing between the volute and suction inlet of the impeller.
 - b. The suction cover shall be designed such that it may be adjusted to maintain working clearances and hydraulic efficiencies.
- K. Volute
1. Volutes shall be made of minimum ASTM A-48, Class 30 cast iron, non-concentric design with smooth passages large enough to pass any size solid that may enter the impeller.
 2. Minimum discharge size shall be as specified in the design criteria.
- L. Protection
1. All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. Should high temperature occur, the thermal switches shall open, stop the motor and activate an alarm.

2. A float switch shall be installed in the seal leakage chamber. When the float switch is activated, the motor shall stop, and an alarm shall be activated.
3. The thermal switches and seal leakage float switches shall be monitored from the pump control panel.

M. Hazard Classification

1. Provide motors, control switches, and devices that meet the NEC requirements for Class I, Division 1 hazardous classification for the equipment in the pump station.

2.4 INSTRUMENTATION AND CONTROLS

A. General Requirements for Control Panels

1. Control panels shall contain all of the necessary components for system operation including, but not limited to, the following. The Control Panel specifications shown on the electrical drawings are intended to complement these specifications.
 - a. Control Panel Enclosure
 - 1) The enclosure shall be NEMA-4X stainless steel.
 - 2) The control panel shall be lockable with a keyed lockable handle. A minimum of three (3) keys shall be provided. All pump control panels on this project shall be keyed alike.
 - b. Main Disconnect Switch
 - 1) The main disconnect switch shall be interlocked with the panel door opening mechanism.
 - 2) The disconnect switch shall be metallic and shall be lockable.
 - c. Safety Interlocks
 - 1) Provide safety interlocks to stop the pumps or prevent them from starting upon motor fail or low-level alarm conditions.
 - 2) Provide circuitry required to interface with the thermal protection and leakage protection systems specified in this section.
 - 3) Provide intrinsically safe barriers in the control panel as required for the sensor circuits.
 - d. Alarms
 - 1) Provide a horn and light for alarm conditions.
 - 2) Provide a silence push button to silence the alarm while leaving the alarm light on until the alarm condition is reset.
 - e. Indicator Lights
 - 1) Provide local indicator lights for each pump that indicate pump ON, OFF, or FAIL status.
 - 2) Provide local indicator lights for Low and High level alarms.
 - 3) Provide an indicator light that indicates power is supplied to the control panel.
 - f. Alternator
 - 1) Alternate pumps after each pumpdown cycle. This may be provided as part of the pump controller.
 - g. Run Time Meter
 - 1) Provide a run time meter for each pump.
 - h. Duplex Receptacle
 - 1) Provide one 120V duplex receptacle in the control panel.
 - i. Light

- 1) Provide one 60-watt light bulb with ON/OFF switch inside the control panel.
- j. Terminal Block
 - 1) Provide 25-percent spare terminals.
- k. Ground Bus
 - 1) Provide an internal copper ground bus for grounding connections.
- l. Panel Nameplate
 - 1) Provide nameplates for all items on the control panel.
- m. Control Power Transformer
 - 1) Provide a control power transformer for control voltage as required.
- n. Space Heater
 - 1) Provide a space heater to maintain temperature above dew point. The space heater shall be thermostatically controlled.
- o. Current Monitor
 - 1) Provide a current monitor for overload protection for each pump. This may be provided as part of the pump controller.
- p. Surge Suppression Unit
 - 1) Provide surge suppression in the control panel to protect against lightning.
- B. Control Panel
 - 1. Panel shall be a duplex control panel, with provision for third future pump.
 - 2. Pump Controls
 - a. Provide a HAND/OFF/AUTO (H/O/A) switch for each pump.
 - 1) In the HAND position, the pump shall start and run.
 - 2) In the OFF position, the pump shall stop.
 - 3) In the AUTO position, the pump shall start and stop based on wet well level.
 - 3. The High Wet Well Level alarm shall activate when the wet well level reaches the elevation shown on the plans.
 - 4. The Low Wet Well Level alarm shall activate when the wet well level reaches the elevation shown on the plans.
 - 5. Output Contacts for Remote Indication
 - a. Provide dry output contacts for remote indication of pump ON/OFF status and a common alarm.
 - 6. Motor Starters
 - a. Refer to electrical drawings and specifications.
 - b. Provide all the circuit breakers per the single line diagrams. The circuit breakers shall have minimum 14,000 A RMS symmetrical capacity.
- C. Pump Controller - refer to electrical drawings and specifications.

2.5 ACCESSORIES

- A. Guide Rails
 - 1. Guide rails shall be Type 316 stainless steel provided by the Contractor. Diameter shall be as specified by the pump manufacturer.
- B. Guide Rail Supports

1. Upper and intermediate guide rail supports shall be Type 316 stainless steel provided by the pump manufacturer. The pump manufacturer shall submit the recommended locations of the guide rail supports to the Engineer.

C. Cable Holder

1. Cable holder shall be Type 316 stainless steel provided by the pump manufacturer.
2. Provide five (5) cable holders.

D. Pump Lifting System

1. Jib Cranes as indicated as indicated on the drawings.
2. Each submersible pump shall be supplied with one (1) complete Grip-Eye system, or equal.
3. System shall consist of 35 feet of nylon line, a short length of high tensile strength proof-tested chain and forged steel Grip-Eye for use with mechanical lifting devices.
4. The system shall be appropriately sized for the weight of the pump to be lifted.

2.6 SPARE PARTS

A. Provide the following spare parts.

1. Provide one (1) basic repair kit consisting of mechanical seals, O-rings, internal sensors and bearings for each pump. A total of four (4) repair kits are required, one for each pump provided.
2. Provide one (1) set of all special tools (including tool box) required for working on the pumps.

B. Spare parts shall be boxed and clearly labeled as to what equipment it is provided for.

C. Spare parts shall be new and of the same type and quality as the parts provided in the original equipment package.

2.7 PAINTING

A. Pump(s) shall be shop painted and field painted in accordance with the Manufacturer's standard.

2.8 SHOP TESTING

- A. Certification tests shall be performed on the actual assembled pumps to be supplied. Pumps shall be tested in the Manufacturer's facility and in accordance with the latest test code of the Hydraulic Institute Level A to determine head vs. capacity and kilowatt draw required. Tests shall cover a range from shut-off to a minimum of 20% beyond the specified design performance capacity. Certification tests shall be conducted on each pump being supplied. A pump curve shall be generated showing actual flow, head, BHP, and hydraulic efficiency for each pump being supplied. A registered Professional Engineer shall certify each pump curve. Certified pump curves shall be submitted to the Engineer and approved by the Engineer prior to shipping the pump(s).

3 EXECUTION

3.1 INSTALLATION

- A. Pump(s) shall be installed in accordance with the Manufacturer's requirements to produce a finished product that is clean and demonstrates true craftsmanship.

- B. Manufacturer shall allow for a minimum of two (2) trips to the project site to assist the contractor with the installation of the equipment. If additional trips are required, they shall be the responsibility of the Contractor and there shall be no additional cost to the Owner.

3.2 STARTUP AND TESTING

- A. Pump(s) shall be field tested after installation to demonstrate operation without excessive noise, vibration, cavitation or overheating to the satisfaction of the Engineer. Field tests shall be conducted by the Manufacturer or his Authorized Representative. Field test shall include, but not be limited to, checking for correct rotation, correct operation at design point(s), maximum motor amperage draws within the nameplate specifications, balanced voltages on each power leg with the pump operating to within Manufacturer's tolerances, ability of the pump to be raised from the wet well and lowered back into the seated position, and demonstrated compatibility of the pump/motor with the controls supplied. All tests shall be performed in the presence of the Engineer. Test results shall be in printed form and signed by the Manufacturer or his Representative and supplied to the Owner.
- B. Manufacturer shall allow for a minimum of one (1) trip to the project site for startup and testing of the equipment for each pump station. If additional trips are required, they shall be the responsibility of the Contractor and there shall be no additional cost to the Owner.

3.3 CERTIFICATION

- A. A manufacturer's representative that is qualified in the particular equipment requirements shall fully inspect and certify the equipment installation. Written certifications shall be provided that state the equipment is installed properly, is operating within the design parameters, and will be warranted as required by the specifications.

3.4 TRAINING

- A. The manufacturer shall conduct one (1) training class for the Owner's personnel. The training class shall be conducted in one day.
- B. Training classes shall not be conducted concurrently with startup and testing; therefore, manufacturer shall allow for one (1) additional trip to the project site.
- C. Training classes shall not be conducted until the manufacturer has certified that the equipment is properly installed and operational.
- D. Training classes shall be scheduled with the Owner a minimum of one (1) week prior to conducting the class.

3.5 ACCEPTANCE

- A. Acceptance of equipment will not be made until all equipment has been installed and tested, the manufacturer has certified the installation, the manufacturer has conducted the required training classes, final operation and maintenance manuals have been submitted to the engineer, and all spare parts have been turned over to the Owner.

**** END OF SECTION ****

SECTION 11450

JIB CRANE

GENERAL

1.1 Scope of Work

- A. The work covered by this section includes furnishing all labor, materials, and equipment required to install, test, and place into satisfactory operation freestanding manually operated jib crane with rotating boom assembly, electric hoist, manual trolley and appurtenances as specified herein and as shown on the drawings. The primary use of the Jib Crane is to remove the pumps from the wetwell. Each pump weighs approximately 1,500 lbs.

1.2 References

- A. American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts
- B. American National Standards Institute (ANSI): ANSI B30.11 – Monorails and Underhung Cranes
- C. American Society for Testing and Materials (ASTM) A36: Carbon Structural Steel
- D. American Society for Testing and Materials (ASTM) A325: Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength
- E. American Society for Testing and Materials (ASTM) A490: Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
- F. American Society for Testing and Materials (ASTM) B221: Aluminum- Alloy Extruded Bar, Rod, Wire, Shape, and Tube
- G. American Welding Society (AWS) D1.1: Structural Welding Code
- H. American Welding Society (AWS) D1.1: Certified Shop I.
- I. Occupational Safety and Health Administration (OSHA) – Specification 1910.179: Overhead and Gantry Cranes

1.3 Submittals

- A. Product Data: For each type of product
- B. Shop Drawings:

- a. Include layout, spacing, sizes, thicknesses, and types of fabrication; fastening and anchorage details, including mechanical fasteners.
- b. Indicate reinforcing channels, strapping bracing, bridging, splices, connection details, etc.
- C. Manufacturer's Warranty.
- D. Manufacturer's Installation Instructions.
- E. Manufacturer's Operation and Maintenance Manual.
- F. Delegated-Design Submittal: For Jib crane. Include all load calculations for design

Part 2 – Products

2.1 Manufacturers

- A. Subject to compliance with requirements, provide products by one of the following or equivalent:
 - 1. Abell-Howe
 - 2. Gorbelt Inc.
 - 3. Mustang
 - 4. LK Goodwin

2.2 Performance Requirements

- 1. Regulatory Requirements: Comply with specifications of the American National Standard Institute (ANSI) / American Society of Mechanical Engineers (ASME) Safety Code for Overhead and Gantry Cranes, ANSI B30.2.0-1967 reference specified in 29 CFR 1910.6(e)(19); testing by a qualified testing agency.
- 2. Structural Performance: Provide Jib Crane capable of withstanding design loads within limits and under the conditions indicated.
 - a. The manufacturers design for maximum lateral deflection is L/400 and L/450 for maximum vertical deflection, with "L" being the span of the crane.
 - b. Crane shall be designed to manually move load with maximum force of 1/100 load weight.
 - c. A maximum deflection at boom end of 1/150 span based on capacity with a 15% for weight of both the trolley and hoist.
- 3. Crane shall be consisting of a free standing mast, supported only by a concrete footer allowing for a rotating boom.
 - a. Coverage: The crane shall provide coverage of an area indicated on the drawings with 360 degrees of rotation.
- 4. Daily Inspection Requirements: Operator must conduct frequent inspections daily to monthly, and periodic inspections.
- 5. Load-Bearing Characteristics:
 - a. Must have rated load capacity of 1 ton which includes the weight of both the trolley and hoist.
 - b. Trolley and hoist will have the same load requirements of 1 ton as well.

2.3 Jib Crane Details

- 1. Type: Free standing, base plate mounted steel jib crane with manually rotating steel boom.
- 2. Span: Crane must allow steel to be lifted off the rack and placed onto a welding table. A span of 14' is necessary.
- 3. Height under boom: A height under boom equal to 12 feet is required.

4. Construction: Fabricate crane sections using ASTM A36 steel.

1. Mast: Vertical steel pipe, perpendicular to the ground and to boom. Head assembly sits atop the mast.
2. Boom: Wide flange steel beam which sits atop the mast via the head assembly. The trolley rolls along the bottom flange of the boom.
3. Head assembly: Steel assembly that allows the transfer of the load from the boom to the mast. Assembly also allows for the rotation of the boom.

2.4 Manual Trolley

1. Heavy-Duty Manual Trolley: 1-ton load capacity manual trolley, installed to either H- beam, or I- beam of a beam flange width of 3 - 8 inches.
 1. Subject to compliance with requirements, provide products by one of the following or equivalent:
 - JET
 - Global Industrial
 - Wesco

2.5 Electric Hoist

1. Electric Chain Hoist: 1-ton load capacity, 30' Lift, 460 V, 3-Phase.
 - a. This electric chain hoist to be 2,000 lb load capacity.
 - b. The overall head room for this hoist is about 21 inches.
 - c. Provide products by one of the following or equivalent:
 - JET
 - Milwaukee
 - Gorbel

2.5 Foundation Details:

- A. Install foundation in accordance with the Jib Crane Manufacturer and according to plans.
- B. Refer to manufacturers installation instructions; recommended concrete for a jib crane foundation is 3,500 psi and 2,500 /b/sf soil bearing capacity.
- C. Base-plate mounting: A hexagonal steel base plate provided by the bidder and installed will be anchored to the concrete foundation cast after welded to the mast.
 - a. Full-web gusset plates will be triangularly welded to both the mast and baseplate to provide for stability and reinforcement. Warping is not acceptable for both open gussets and base plates made from rings.
 - b. The baseplates are to be installed onto the foundation with anchor bolts of number, size, and pattern as indicated on shop drawings.

2.6 Materials and Finishing

- A. Steel Beam: raw material used to construct the crane is composed out of high- strength low-alloy (HSLA) steels with relatively low levels of carbon.
- B. Shop Finishing:
 - a. Steam wash steel crane components with iron phosphate solution and apply yellow baked enamel finish.
 - b. Provide spray can of matching color, air-drying paint for field touch-up.

Part 3 - Quality Assurance

- A. Designs, fabrication and installation for standard cranes shall meet in accordance with ANSI B30.11, MH27.2, OSHA 1910.179, and IBC.
 - a. As per the International Building Code, cranes operating in potentially hazardous or explosive environment, used in essential facilities such as, but not limited to fire departments, military buildings, or communication buildings require special consideration.

- B. Crane modifications may be required to conform to specifications other than IBC and ANSI if different specifications are required.