



**ROANE COUNTY PURCHASING
DEPARTMENT
LEACHATE PRE-TREATMENT UPGRADES**

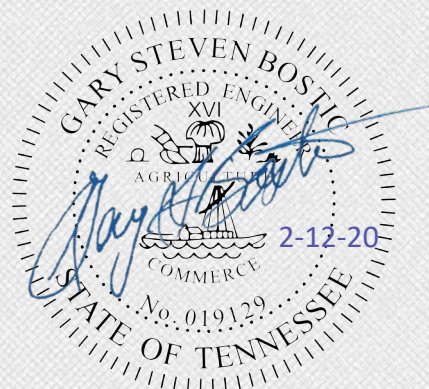
PROJECT MANUAL

FEBRUARY 2020



LDA ENGINEERING

LDAENGINEERING.COM



NOTICE TO BIDDERS

You are invited to bid on the construction of Leachate Pre-Treatment Upgrades at the Roane County Landfill, 215 White Pine Road, Harriman, Tennessee 37748.

Sealed bids will be received by the Roane County Purchasing Department at 200 East Race Street, Suite #3 in Kingston, Tennessee 37763, until **2:00 PM, EDT, 28th day, of May, 2020**, at which time they will be publicly opened and read aloud and the Contract. Any bids received after 2:00 PM will be returned unopened.

A PRE-BID MEETING WILL BE HELD ON SITE ON TUESDAY, MAY 19, 2020 AT 10:00 A.M, EDT.

Plans, Specifications and Contract Documents may be obtained by contacting the Roane County Purchasing Agent at lynn.farnham@roanecountytn.gov or on the County's website www.roanecountytn.gov – Purchasing Department.

All Bidders must be licensed Contractors as required by the "CONTRACTOR'S LICENSING ACT OF 1976", and as passed by the 89th General Assembly of the State of Tennessee. The Bidder's name, license number, expiration date, and that part of the classification which applies to the Bidder must be placed on the sealed envelope containing the executed Bid Form, otherwise, the Bid will not be considered.

Each Bid must be accompanied by a 5% Bid Bond executed by the Bidder and a surety company licensed to do business in Tennessee. The successful Bidder will be required to execute an acceptable performance and payment bond in the amount 100% of the Contract price.

Roane County reserves the right to waive any informalities in or to reject any or all bids.

Roane County Government

ROANE COUNTY PUBLIC UTILITY LEACHATE PRE-TREATMENT UPGRADES

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ROANE COUNTY PURCHASING DEPARTMENT INVITATION TO BID

Roane County is inviting sealed bids for the service(s) listed below, subject to the terms and conditions of the Invitation to Bid, the accompanying specifications, and the Roane County Purchasing Manual.

At the appointed time bids will be publicly opened in the office of the Roane County Purchasing Agent at the above address. Bids arriving in the Purchasing Department past the appointed date and time will be considered late and will not be opened.

Deliver Bids To:

ROANE COUNTY PURCHASING DEPARTMENT
200 EAST RACE STREET, SUITE #3
KINGSTON, TENNESSEE 37763

Bid Number: 2020-12-128
LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE

Open Date & Time: Thursday, May 28, 2020 at 2:00 p.m. (EDT)

Pre-Bid Conference: Tuesday, May 19, 2020 at 10:00 a.m. (EDT)

The Bid Envelope must show the Bid Number, Name & Opening Date.

PURCHASING CONTACT INFORMATION

Lynn Farnham, CPPO, CPPB
Purchasing Agent
Phone: 865-376-4317
Fax: 865-376-4318
Email: lynn.farnham@roanecountytn.gov

GENERAL TERMS & CONDITIONS

Attached are instructions and conditions for submitting a bid for Roane County Government. The objective of this bid is to select suppliers in such a manner as to provide for open and free competition and comparability.

BID PREPARATION & SUBMISSION

1. Bidders are expected to examine specifications, terms and conditions, general or special conditions, schedules and all instructions for the purpose of this bid. Failure to do so will be at the bidder's risk.
2. All bids shall be in accordance with the instructions to bidders and specifications included in this ITB. Specifications are intended to be open and non-restrictive.

3. All pricing submitted in the bid document must be completed in ink or typewritten. The bottom line total must also be printed in ink or typewritten on the proposal form. No erasures shall be permitted. Errors may be crossed out and corrections printed in ink or typewritten and must be initialed in ink by the person signing the bid.
4. All bids must meet or exceed the enclosed specifications.
5. It shall be the sole responsibility of the bidder to make certain that all bids in proper form are submitted to the Purchasing Department as described below.
6. All original forms must be signed by a person with authority to bind the bid. The bid must be sealed in an envelope that is labeled according to the directions stated below.
7. The vendor's name & address, bid/proposal number, and bid/proposal date and time is to be on the outside of the envelope. If bidding over \$25,000 the contractor's licensing information is to be on the outside of the bid envelope in accordance with T.C.A. § 62-6-119.
8. The bid must then be in a sealed envelope/package mailed or delivered to the following address:

Roane County Purchasing Department
200 East Race Street, Suite #3
Kingston, Tennessee 37763

Please note that Roane County does not receive a guaranteed delivery time for express mail and/or packages. Please mail accordingly.

9. Sealed written bids will be received at the time and place specified on the Invitation to Bid. Postmark on the Bid by this date will not suffice. Bid must be received on or before the date and time stated. Faxed bid documents will not be accepted.

LATE RECEIPT OF THE BID

1. The bid and modifications or withdrawals thereof received after the time set for opening will not be considered, unless they are received before the award is made and it is determined by Roane County that failure to arrive on time was due solely to a delay in delivery for which the bidder has no responsibility. Roane County does not receive a guaranteed delivery time for express mail and/or packages. Please mail accordingly.
2. Bids must be in the Purchasing Department prior to or at 2:00 p.m. sharp on the appointed date. No bids will be accepted past 2:00 p.m. (02:00:01 is considered late) Time will be determined by the official NIST US time.

RESTRICTIVE OR AMBIGUOUS SPECIFICATIONS

1. It is the responsibility of the bidder to review the entire Invitation to Bid document and to notify the Purchasing Agent if the Invitation to Bid is formulated in a manner that would unnecessarily restrict competition or if it is ambiguous in what is being requested.
2. Pursuant to TCA §12-4-126, questions regarding the specifications or bid procedures must be received by the Purchasing Agent and/or designer no less than ninety-six (96) hours before the bid opening date. No addenda will be issued within less than forty-eight (48) hours of the bid opening day, excluding weekends and legal holidays designated in §15-1-101 unless the bid opening is extended for a reasonable time as determined by the purchasing agent, which shall not be less than forty-eight (48) hours excluding weekends and legal holidays designated in §15-1-101, to allow for any necessary changes to the Invitation to Bid documents and to allow responders to resubmit their responses accordingly.
3. Any questions concerning this Invitation to Bid are to be faxed to the Purchasing Department. Questions will be answered via addenda. Information obtained from any office other than the Purchasing Office is not to be considered binding.

BID OPENING & AWARD

1. Only the bottom-line figure will be read at the bid opening. Bids will also be examined for compliance with specification and conditions outlined in the bid document.
2. Consideration will be given to all bids properly submitted. Bids will receive appropriate confidentiality before awarding. Upon award, bid documents and tabulations will be available for review. Errors discovered after public opening may not be corrected, and the bidder may be bound to honor bid as submitted. After investigation of the nature of the mistake, the Purchasing Agent may allow the bid to be withdrawn.
3. The contract will be awarded in writing to the most responsive bidder whose bid conforms best to the Invitation to Bid will be most advantageous to Roane County. It is the intent of Roane County to involve and utilize the best product/services at the best prices and provide small and minority firms, women's business enterprises and labor surplus area firms with increased opportunity to do business with the county. However, currently there are no set asides for small or minority firms.
4. Roane County reserves the right to accept or reject any or all bids and to waive informalities and minor irregularities in the bids received.
5. Roane County reserves the right to award the bid in its entirety or to divide the award in any way that will be more advantageous to the county.
6. Bid results will be posted on the County's website along with the bid tabulation.

PROTEST PROCEDURE

1. If a prospective vendor does not agree with the bid award, they have the right to protest. Disputes arising from the award of this bid must be submitted in writing to the Roane County Purchasing Department no later than seven (7) days from date of bid award. The steps for dispute resolution may include:
 - A meeting with the Purchasing Agent, the requisitioning department's manager and representatives from the disputing party to discuss and resolve the complaint.
 - Information from the aforementioned meeting will be forwarded to the County Attorney for review.
 - A written decision letter stating the reasons for the decision will be prepared by the Purchasing Agent and submitted in writing to the protestor and all parties involved.
 - Purchases will not be allowed under this procurement until a final decision is rendered.
 - In the event that purchases must be made before a final decision is rendered, the emergency purchase procedures will be used.

APPROPRIATION

1. In the event that funds are not appropriated by Roane County for the goods or services in any fiscal year or insufficient funds exist to purchase the goods or services, then the contract shall expire upon the expenditure of previously appropriated funds or the end of the current fiscal year, whichever occurs first, with no further obligations owed to or by either party.

INSURANCE

1. The contractor will maintain, at their expense adequate insurance coverage to protect them from claims arising under the Worker's Compensation Act, from claims for damages resulting from bodily injuries and damage to their property, for Bodily Injury and Property Damage Liability in the amount of no less than \$1,000,000, for Products and Completed Operations Liability of no less than \$1,000,000 and from claims for damage to any Roane County property. Additional insurance requirements may be listed any Special Terms & Conditions or in the Bid Specifications. This insurance company shall have a Best's rating of A or better. Any deviations from the above requirements must be disclosed in the bid submission.

2. The successful bidder shall furnish a Certificate of Insurance issued by their insurance company showing that Roane County as an additional insured. Carrier will assume full common liability of all shipments.

COMPLIANCE WITH ALL LAWS

1. Contractor is assumed to be familiar with and agrees to observe and comply with all federal, state, and local laws, statutes, ordinances, and regulations in any manner affecting the provision of goods and/or services, and all instructions and prohibitive orders issued regarding this work and shall obtain all necessary permits.

GOVERNING LAW

1. This contract shall be governed by the laws of the State of Tennessee, and all obligations of the parties are performable in Roane County, Tennessee. The Courts in Roane County shall have exclusive and concurrent jurisdiction of any disputes which arise hereunder.

BUSINESS LICENSES

1. Bidders located in Tennessee are required to have a current business license issued by the State of Tennessee at the time the bids are submitted. Vendors located outside Tennessee are required to obtain a business license issued by the State of Tennessee and in Roane County if the project cost is over \$50,000.

INDEMNIFICATION/HOLD HARMLESS

1. Contractor shall indemnify, defend, save and hold harmless all departments of Roane County Government and/or the Roane County Board of Education, its officers, agents and employees from all suits, claims, actions or damages of any nature brought because of, arising out of, or due to breach of the agreement by Contractor, its subcontractors, supplier, agents or employees or due to any negligent act or occurrence or any omission or commission of the contractor, its subcontractors, suppliers, agents or employees until the contract terminates.

VENDOR PERFORMANCE

1. If the contractor fails in full or part to perform or comply with any provision of this Contract or the terms or conditions of any documents referenced and made a part hereof, Roane County may terminate this contract, in whole or in part, and may consider such failure or noncompliance a Breach of Contract. Contractors with poor performance will be notified at the time of such performance and be given opportunity to correct the problems. Documentation will be kept on file. Any contractor with continued poor performance will be removed from the potential vendor list for one year.
2. Roane County expressly retains all its rights and remedies provided by law in case of such breach, and no action by Roane County shall constitute a waiver of any such rights or remedies. In the event of termination for default, Roane County reserves the right to purchase its requirements elsewhere, with or without competitive bid.
3. Failure to deliver within the time specified or within a reasonable amount of time, or failure to make replacements of a rejected item immediately will constitute authority to purchase on the open market so as to replace the item(s) rejected and/or not received. On all such purchases, the Vendor agrees to promptly reimburse the county for excess costs incurred by such a purchase.

BREACH OF CONTRACT

1. A party shall be deemed to have breached the contract if any of the following occurs:
 - Failure to provide the services that conform to contract requirements.
 - Failure to maintain/submit any report required hereunder.
 - Failure to perform in full or in part any of the other conditions of the contract.

CONTRACT TERMINATION FOR CAUSE

1. If the contractor fails to properly perform its obligations under this contract in a timely or proper manner, or if the contractor violates any terms of this contract, the county shall have the right to terminate the contract and withhold payments in excess of fair compensation for completed services.
2. In the event the contract is terminated for due cause by the county, the county shall have the option of awarding the contract to the next lowest bidder or bidding again.

CONTRACT TERMINATION FOR CONVENIENCE

1. The county may, by written notice to the contractor, terminate this contract without cause for any reason. Said termination shall not be deemed a Breach of Contract by the county. The county must give notice of termination to the vendor at least thirty (30) days prior to the effective date of termination. The contractor shall be entitled to receive compensation for satisfactory, authorized service completed as of the termination date, but in no event shall the county be liable to the contractor for compensation for any service which has not been rendered. Upon such termination, the vendor shall have no right to any actual general, special, incidental, consequential, or any other damages whatsoever of any description or amount.

BOOKS AND RECORDS

1. The contractor shall maintain all books, documents, accounting records and other evidence pertaining to the goods and services provided under this contract and make such materials available at its offices at all reasonable times during the contract period and for three (3) years from the date of the final payment under this agreement for inspection by county or by any other governmental entity or agency participating in the funding of this agreement, or any authorized agents thereof; copies of said records to be furnished if requested.

INVOICES AND PAYMENTS

1. Payment will be made within 30 days after receipt of invoice and/or delivery of items included in this Invitation to Bid, whichever is later.
2. Roane County Government is not subject to taxation. A tax exemption certificate will be provided upon request.

IRAN DIVESTMENT ACT

1. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to Tennessee Code Annotated § 12-12-106.

NONDISCRIMINATION AND NON-CONFLICT STATEMENT

1. Contractor agrees that no person on the grounds of handicap, age, race, color, religion, sex or national origin, shall be excluded from participation in, or be denied benefits of, or be otherwise subjected to discrimination in the performance of this agreement, or in the employment practices of vendor. Contractor shall upon request show proof of such nondiscrimination and shall post in conspicuous places available to all employees and applicants notices of non-discrimination. Contractor covenants that it complies with the Fair Wage and Hour Laws, the National Labor Relations Act, and other federal and state employment laws as applicable. Contractor covenants that it does not engage in any illegal employment practices.
2. Contractor covenants that it has no public or private interest and shall not acquire directly or indirectly any interest; that would conflict in any manner with the provision of its goods or performance of its services. The contractor warrants that no part of the total contract amount provided herein shall be paid directly or indirectly to any officer or employee of Roane County as wages, compensation, or gifts in exchange for acting as officer, agent, employee, subcontractor or consultant to contractor in connection with any goods provided or work contemplated or performed relative to the agreement.

3. No employee or member of the Roane County's governing bodies shall participate in the selection or award of a contract if a conflict of interest, real or apparent, would be involved.
4. Officers, employees or officials of the Roane County Government shall neither solicit nor accept gratuities, favors or anything of more than nominal monetary value from vendors or parties to subcontractor.

**2020-12-128 – LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE
VENDOR INFORMATION SHEET**

(Please fill out completely)

By completing and signing this form you certify that you are an authorized representative of the company for which you are submitting a bid/proposal and that you have the authority to legally bind your company. Further, by completing and signing this form you certify that you agree to all the terms and conditions of this bid/proposal.

1. Vendor Name _____

2. Address _____

City _____ State _____ Zip Code _____

3. Contact Person (Please Print) _____

4. Telephone Number _____ Fax Number _____

5. Vendor's e-mail address _____

6. Authorizing Signature _____

7. Title of Person Signing Bid _____

8. If addenda were issued, please acknowledge the receipt of: (please write "yes" if you received one)
Addendum 1 _____ Addendum 2 _____ Addendum 3 _____ Addendum 4 _____

9. If applicable, please indicate below if discounts will be allowed for prompt payment or if there is not discount offered:
_____ % Net 10 Days; _____ % Net 20 Days; _____ % Net 30 Days; _____ No Discount

SCHOOL CONTRACTS ONLY

CRIMINAL HISTORY RECORDS CHECK – Do you agree to comply with Public Chapter 587 of 2007 which requires all contractors to facilitate a criminal history check, including fingerprinting, conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation for each employee or subcontractor personnel before permitting the employee or subcontractor personnel to have contact with students or enter school grounds?

____ Yes ____ No

THIS FORM MUST BE COMPLETELY FILLED OUT, SIGNED, & RETURNED IN YOUR BID.

**2020-12-128 – LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE
NON –COLLUSION, INDEPENDENT PRICE DETERMINATION,
NON-DISCRIMINATION, NON-DEBARMENT & LOBBYING AFFIDAVIT**

I do hereby certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment, and is in all respects fair and without collusion or fraud.

I understand that collusive pricing is a violation of State and Federal law and can result in fines, prison sentences, and civil damage awards and that no collusion with another firm was used in preparation of this bid.

I also certify that this firm does not discriminate against any employee or applicant for employment on the grounds of race, color, national origin or sex; and does not and will not maintain or provide for his employees any segregated facilities at any of its establishments, and further, that the firm does not and will not permit their employees to perform their services at any location under this contract where segregated facilities are maintained.

By submission of this bid, the bidder certifies that neither it or its principals is presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal or State department or agency.

I further certify that during the Invitation to Bid solicitation and/or during the performance of this contract that neither it nor its principals will participate in lobbying activities in conjunction with this project.

I agree to abide by all terms and conditions of this Invitation to Bid and certify that I am authorized to sign this affidavit for the vendor.

Please indicate which of the following apply to your company. This information is requested for information purposes only. Roane County currently has no policy that allows for set asides or preferences for woman owned or minority owned businesses.

_____ African American Owned
_____ Caucasian Owned
_____ Native American Owned
_____ Other Owned

_____ Asian Owned
_____ Hispanic Owned
_____ Woman Owned

Signature

Title

THIS FORM MUST BE COMPLETELY FILLED OUT, SIGNED, & RETURNED IN YOUR BID.

**2020-12-128 – LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE
DRUG-FREE WORKPLACE AFFIDAVIT**

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with Roane County Government to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____ (hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the *Tennessee Code Annotated*.
3. The Company is in compliance with T.C.A. § 50-9-113.

Further affiant saith not.

Principal Officer

STATE OF _____

COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____ day of _____, 20____.

Notary Public

My commission expires _____.

THIS FORM MUST BE COMPLETELY FILLED OUT, SIGNED & NOTARIZED, & RETURNED IN YOUR BID.

**2020-12-128 – LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE
 STATEMENT OF COMPLIANCE CERTIFICATE
 ILLEGAL IMMIGRANTS**

EACH CONTRACTOR BIDDING SHALL FILL IN AND SIGN THE FOLLOWING

This is to certify that _____ have fully complied with all the requirements of Chapter No. 878 (House Bill No. 111 and Senate Bill No. 411) which serves to amend Tennessee Code Annotated Title 12, Chapter 4, Part I, attached herein for reference.

- All Bidders for construction services on this project shall be required to submit an affidavit (by executing this compliance document) as part of their bid that attests that such Bidder shall comply with requirements of Chapter no. 878.

Signed: _____

State of _____)
) ss
 County of _____)

Personally appeared before me, _____ the undersigned Notary Public, _____, the within named bargain or, with whom I am personally acquainted, and known to me to be the President / Owner / Partner (as applicable) of the _____, Corporation, Partnership, Sole Proprietorship (as applicable) and acknowledged to me that he executed the foregoing document for the purposes recited therein.

Witness my hand, at office, this _____ day of _____, 20__.

 Notary Public

My commission expires _____

THIS FORM MUST BE COMPLETELY FILLED OUT, SIGNED & NOTARIZED, & RETURNED IN YOUR BID.

**2020-12-128 – LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE
IRAN DIVESTMENT ACT COMPLIANCE**

The Iran Divestment Act of 2016, effective on July 1, 2016, is codified in Tennessee Code Annotated §12-12-101 *et seq.* The Iran Divestment Act, with certain exceptions, prohibits local governments from entering into contracts with persons or entities engaged in investment activities in the energy sector of Iran. Pursuant to the terms set forth in Tennessee Code Annotated §12-12-105, a person engages in investment activities in the energy sector of Iran if:

- 1) The person provides goods or services of twenty million dollars (\$20,000,000) or more in the energy sector of Iran, including a person that provides oil or liquified natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran; or
- 2) The person is a financial institution that extends twenty million dollars (\$20,000,000) or more in credit to another person, for forty-five (45) days or more, if that person will use the credit to provide goods or services in the energy sector in Iran and is identified on a list, created pursuant to §12-12-106, as a person engaging in investment activities in Iran as described in this section.

This Act requires the State of Tennessee’s chief procurement officer to publish on the State’s website a list of persons it determines engaged in investments activities in Iran (the “Prohibited Entities List”).

Any BIDDER that is on the Prohibited Entities List will be ineligible to contract with the COUNTY.

Pursuant to the Act, any BIDDER that attempts to contract with the COUNTY must certify, at the time the bid is submitted, that the BIDDER is not identified on the Prohibited Entities List. A bid shall not be considered for award, nor shall any award be made where the BIDDER fails to submit a signed and verified compliance certification form.

**CERTIFICATION OF COMPLIANCE
IRAN DIVESTMENT ACT**

The undersigned states that he/she has legal authority to swear this on behalf of _____

(Vendor); and that the Vendor is not in any manner in violation of *Tennessee Code Annotated §12-12-101 to §12-12-106.*

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury that to the best of its knowledge and belief that each bidder is not on the list created pursuant to the Iran Divestment Act, Tennessee Code Annotated §12-12-106.

By: _____

Title: _____

Sworn to and subscribed before me, a Notary Public, this _____ day of _____ 20____.

Notary _____ My Commission Expires _____

THIS FORM MUST BE COMPLETELY FILLED OUT, SIGNED & NOTARIZED, & RETURNED IN YOUR BID.

BID ENVELOPE COVER SHEET

Project: LEACHATE PRE-TREATMENT & COLLECTION SYSTEM UPGRADE

ROANE COUNTY LANDFILL
215 WHITE PINE ROAD
HARRIMAN, TN 38849

Bid Date & Time: Thursday, May 28, 2020 at
2:00 p.m. (Eastern Time Zone)

Bids must be delivered prior to the aforementioned date and time to:

Roane County Purchasing
200 East Race Street
Suite #3
Kingston, Tennessee 37763

Bidder Name & Address: _____	

TN License Number: _____	Limit: _____
Expiration Date: _____	Classification: _____

SECTION 00300
BID PROPOSAL

Proposal of _____ (hereinafter called BIDDER), organized and existing under the laws of the State of _____ doing business as _____* to the Roane County Government, (hereinafter called OWNER).

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all work for the **Leachate Collection and Storage Upgrades**, in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below:

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party there to certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence work under this contract on or before a date to be specified in the NOTICE TO PROCEED and to substantially complete the project within **100** consecutive calendar days thereafter, and fully complete and ready for final payment within thirty (30) days thereafter. BIDDER further agrees to pay as liquidated damages, the amount of \$500.00 per consecutive calendar day after the specified time for substantial completion until the work is substantially complete.

BIDDER acknowledges receipt of the following ADDENDA:

BIDDER understands that the Owner reserves the right to reject any or all bids and to waive any information in the bidding.

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

BIDDER agrees that this bid shall be good and may not be withdrawn for a period of ninety (90)

calendar days after the scheduled closing time for receiving bids.

Upon receipt of written NOTICE OF AWARD of this Bid, BIDDER will execute formal contract attached within ten (10) days and deliver Bonds as required by the General Conditions.

The Bid Security attached at five (5%) percent of the Bid Price contained herein or in the sum of _____ (\$_____) is to become the property of the OWNER in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the OWNER caused thereby.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following Lump Sum Price:

TOTAL BID AMOUNT: (_____
_____ & _____/100 Dollars) (\$_____).

Construction Contingency: 3% of Total Bid amount: (_____
_____ & _____/100 Dollars)
(\$_____).

BASE BID PLUS CONSTRUCTION CONTINGENCY: (_____
_____ & _____/100 Dollars)
(\$_____).

Respectfully Submitted:

BY: _____
(Signature)

(Title)

(Business Address and Zip Code)

(License Number)

(Tax ID Number)

(Telephone Number)

(Fax Number)

(Date)

(SEAL - if bid is by a Corporation)

BID BOND

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

BID

BID DUE DATE: _____

PROJECT (Brief Description Including Location):

BOND

BOND NUMBER: _____

DATE: (Not later than Bid Due Date): _____

PENAL SUM: _____

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized office, agent, or representative.

BIDDER

SURETY

_____(Seal)
Bidder's Name and Corporate Seal

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

Note: (1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents and Contract Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents and Contract Documents, or
 - 3.2 All bids are rejected by Owner, or
 - 3.3 Owner fails to issue a notice of award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by Owner and Bidder, provided that the time for issuing notice of award including extensions shall not in the aggregate exceed 120 days from Bid Due Date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety, and in no case later than one year after Bid Due Date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notice required hereunder shall be in writing and sent to bidder and surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of the Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "bid" as used herein includes a bid, offer, or proposal as applicable.

**EJCDC
STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE**

THIS AGREEMENT is by and between Roane County (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR). OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 - WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: **Construction of Leachate Collection and Storage Improvements.**

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: **Roane County Government – Leachate Collection and Storage Improvements.**

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by **LDA Engineering** who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Substantial Completion and Final Payment*

A. The Work will be substantially completed within **100** days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within **130** days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not complete on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER \$1,000.00 for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER \$1,000.00 for each day that expires after the time specified in paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01.A and 5.01.B below:

- A. For all Work other than Unit Price Work, a Lump Sum of: _____.
- B. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

ARTICLE - 6 PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the 10th day of each month during performance of the Work as provided in paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of the Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

- 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine, or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:
 - a. 95% of the Work completed (with the balance being retainage).
 - b. 95% of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 97% of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions and less 100% of ENGINEER's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 7 – INTEREST – NOT APPLICABLE

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all Federal, State, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Condition as provided in paragraph 4.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and program incident thereto.

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, report, studies, and data with the Contract Documents.

I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents which consists of the following:
1. This Agreement (pages 1 to 6, inclusive);
 2. Performance Bond (pages 1 to 2, inclusive);
 3. Payment Bond (pages 1 to 2, inclusive);
 4. Other Bonds (pages ___ to ____, inclusive);
 - a. _____ (pages ___ to ____, inclusive);
 - b. _____ (pages ___ to ____, inclusive);
 - c. _____ (pages ___ to ____, inclusive);
 5. General Conditions (pages 1 to 41, inclusive);
 6. Supplementary Conditions (pages 1 to 4, inclusive);
 7. Supplemental Special Conditions (pages 1 to 3 inclusive);
 8. Specifications as listed in the table of contents of the Project Manual;
 9. Drawing consisting of a cover sheet and sheets numbered 1 through 5 inclusive, with each sheet bearing the following general title: **Roane County Government- Leachate Collection & Storage Improvements**
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Notice to Proceed (pages 1 to 2, inclusive);
 - b. CONTRACTOR's Bid (pages 1 to 3, inclusive);
 - c. Documentation submitted by CONTRACTOR prior to Notice of Award (pages -- to ---, inclusive);
 - d. Drug Free Work Place Affidavit
 11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Written Amendments;

- b. Work Change Directive;
- c. Change Order(s).

B. The documents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraphs 3.05 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interest in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successor and Assigns

A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

10.04 Severability

A. Any provisions or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Other Provisions – NONE USED

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed four (4) copies of this Agreement. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on _____, 2020 (which is the Effective Date of the Agreement).

OWNER:

CONTRACTOR:

By _____

By _____

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest _____

Attest _____

Address for giving notices

Address for giving notices

(If OWNER is a corporation, attach evidence of authority to sign. If OWNER is a public body, attached evidence of authority to sign and resolution or other documents authorizing execution of OWNER-CONTRACTOR Agreement.)

License No. _____ .

Agent for service of process _____

Designated Representative:

Designated Representative:

Name: _____

Name: _____

Title: _____

Title: _____

Address: _____

Address: _____

Phone: _____

Phone: _____

Facsimile: _____

Facsimile: _____

CONSTRUCTION PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location)

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: _____
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: _____
Name and Title:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: _____
Name and Title:

SURETY

Company: (Corp. Seal)

Signature: _____
Name and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1
3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
 - 3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and
 - 3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or
 - 4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or
 - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or
 - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
 2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this bond, but subject to commitment by the Owner of the Balance of the Contract price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:
 - 6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
 - 6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction contract, and the Balance of the Contract price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or with two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
 - 12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3 Contractor Default: Failure of the Contractor which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
 - 12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY – Name, Address and Telephone)
 AGENT or BROKER: OWNER'S REPRESENTATIVE (Architect, Engineer or other party):

CONSTRUCTION PAYMENT BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location)

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

SURETY

Company: (Corp. Seal)

Signature: _____
Name and Title:

Signature: _____
Name and Title:

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

SURETY

Company: (Corp. Seal)

Signature: _____
Name and Title:

Signature: _____
Name and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.

2. With respect to the Owner, this obligation shall be null and void if the Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is not Owner Default.

3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Contractor:

1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any

Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date 91) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2 (iii), or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Upon request by any person or entity appearing to be a potential beneficiary of this bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY – Name, Address and Telephone)

AGENT or BROKER: OWNER'S REPRESENTATIVE (Architect, Engineer or other party):

NOTICE OF AWARD

Dated _____, **2020**

TO: _____
(BIDDER)

ADDRESS: _____

Contract: Roane County Government – Leachate Collection and Storage Upgrades

You are notified that your Bid dated _____, **2020** for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a contract for _____

The Contract Price of your Contract is _____ **Dollars**
(\$00).

4 copies of each of the proposed Contract Documents (except Drawings accompany this Notice of Award

You must comply with the following conditions precedent within fifteen (15) days of the date of this Notice of Award, that is by _____.

1. Deliver to the OWNER 4 fully executed counterparts of the Contract Documents. Each of the Contract Documents must bear your signature on all required documents.
2. Deliver with the executed Contract Documents the Contract Security (Bonds) as specified in the Instructions to Bidders (Article 20), General Conditions (paragraph 5.01) Supplementary Conditions (paragraph SC-5.01).]
3. (List other conditions precedent). NOT APPLICABLE

Failure to comply with these conditions within the time specified will entitle OWNER to consider your Bid in default, to annul this Notice of Award and to declare your Bid security

EJCDC No. 1910-22 (1996 Edition)

Prepared by the Engineers Joint Contract Documents Committee and endorsed by The Associated General Contractors of America and the Construction Specifications Institute.

forfeited.

Within ten (10) days after you comply with the above conditions, OWNER will return to you one (1) fully executed counterpart of the Contract Documents.

Roane County Public Utilities

(OWNER)

BY

(AUTHORIZED SIGNATURE)

(TITLE)

Copy to ENGINEER
(Use Certified Mail,
Return Receipt Requested)

NOTICE TO PROCEED

Dated _____, 2020

TO: _____
(BIDDER)

ADDRESS: _____

Contract: **Roane County Government – Leachate Collection and Storage Upgrades**

You are notified that the Contract Times under the above contract will commence to run on _____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement the date of Substantial Completion _____ and the date of readiness for final payment is _____.

Before you may start any Work at the Site, paragraph 2.05.C of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

- Also, before you may start any Work at the Site, you must:
1. Submit shop drawings in accordance with Section 01340.
 2. Submit a Project Schedule.
 3. Submit a Schedule of Values.

ROANE COUNTY GOVERNMENT
(OWNER)

BY: _____
(AUTHORIZED SIGNATURE)

(TITLE)

Copy to ENGINEER

¹(Use Certified Mail, Return Receipt Requested)

CHANGE ORDER

No. _____

DATE OF ISSUANCE _____

EFFECTIVE DATE _____

OWNER _____

CONTRACTOR _____

Contract: _____

Project: _____

OWNER's Contract No. _____

ENGINEER's Contract No. _____

ENGINEER _____

You are directed to make the following changes in the Contract Documents.

Description:

Reason for Change Order:

Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE:
Original Contract Price \$ _____
Net Increase (Decrease) from previous Change Orders No. __ to No. _____ \$ _____
Contract Price prior to this Change Order \$ _____
Net Increase (decrease) of this Change Order \$ _____
Contract Price with all approved Change Orders \$ _____

CHANGE IN CONTRACT TIMES:
Original Contract Times: Substantial Completion: _____ Ready for final payment: _____ <p align="right">(days or dates)</p>
Net changes from previous Change Orders No. _____ to No. _____: Substantial Completion: _____ Ready for final payment: _____ <p align="right">(days)</p>
Contract Times prior to this Change Order Substantial Completion: _____ Ready for final payment: _____ <p align="right">(days or dates)</p>
Net Increase (decrease) of this Change Order Substantial Completion: _____ Ready for final payment: _____ <p align="right">(days)</p>
Contract Times prior to this Change Order Substantial Completion: _____ Ready for final payment: _____ <p align="right">(days or dates)</p>

RECOMMENDED:

BY:

ENGINEER (Authorized Signature)

DATE:

APPROVED:

BY:

OWNER (Authorized Signature)

DATE:

ACCEPTED:

BY:

CONTRACTOR (Authorized Signature)

DATE:

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By



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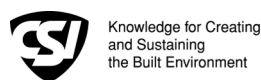
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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the

Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other

Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

- a. does not conform to the Contract Documents, or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
- c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment

to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to five printed or hard copies of the Drawings, and Project Manual on CD. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times com-

mence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance

will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any

duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which

the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities)

that Engineer has used in preparing the Contract Documents.

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. Engineer's Review: After receipt of written notice as required by Paragraph 4.03.A, Engineer will

promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

- a. reviewing and checking all such information and data,
- b. locating all Underground Facilities shown or indicated in the Contract Documents,
- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated

with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. Reports and Drawings: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefore as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of

engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees,

agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of nonconformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written

consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be

submitted to Engineer for review under the circumstances described below.

1. *“Or Equal” Items:* If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and

as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor’s achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a

substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date

prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of

Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility

owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work,

Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. Cleaning: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. Loading Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the

safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 Continuing the Work

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor's General Warranty and Guarantee

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract

Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation

acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for

the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data)

upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph

13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 Notification to Surety

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 Claims

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and

the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include,

without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. Costs Excluded: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and

other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE;
CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other

causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by

Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any

specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
2. correct such defective Work; or
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall

pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses

and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of

each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
- c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
- b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

- a. to supervise, direct, or control the Work, or
- b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

- a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after

consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of

the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefore. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

- a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
- b. consent of the surety, if any, to final payment;
- c. a list of all Claims against Owner that Contractor believes are unsettled; and
- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full

and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by

Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way

of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 Methods and Procedures

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If

the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (C-700, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

I. SC-4.02. Add the following new paragraphs immediately after Paragraph 4.02.B:

- C. Copies of reports and drawings itemized in SC-4.02.C that are not included with Bidding Documents may be examined at the office of the Owner and Engineer during regular business hours. These reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which the Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon other information and data utilized by Engineer in the preparation of the Drawings and Specifications.

II. SC-5.04 - Add the following new paragraph immediately after paragraph 5.04.B:

- C. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
 - 1. Workers' Compensation and related coverages under paragraphs 5.04.A.1 and A. 2 of the General Conditions:
 - a. State: Statutory
 - b. Applicable Federal (e.g., Longshoreman's) Statutory
 - c. Employer's Liability \$1,000,000
 - 2. Contractor's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:
 - a. General Aggregate \$2,000,000
 - b. Products - Completed Operations Aggregate \$2,000,000
 - c. Personal and Advertising Injury \$1,000,000
 - d. Each Occurrence
 - (1) (Bodily Injury and Property Damage) \$1,000,000
 - e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
 - f. Excess or Umbrella Liability
 - (1) General Aggregate \$1,000,000
 - (2) Each Occurrence \$1,000,000
 - 3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:

- a. Bodily Injury:
 - (1) Each Person \$ 500,000
 - (2) Each Accident \$ 500,000
 - b. Property Damage:
 - (1) Each Accident \$ 500,000
 - c. Combined Single Limit of: \$1,000,000
4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
- a. Bodily Injury:
 - (1) Each Accident \$1,000,000
 - (2) Annual Aggregate \$1,000,000
 - b. Property Damage:
 - (1) Each Accident \$1,000,000
 - (2) Annual Aggregate \$1,000,000
5. The Contractor shall furnish the Owner with a Certificate of Insurance naming Owner as an additional insured on all casualty policies.

III. SC-5.06.A. - Delete paragraph 5.06.A in its entirety and insert the following in its place:

- A. CONTRACTOR shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
- 1. Include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 - 2. Be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss:
 - fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 - 3. Include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 - 4. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and
 - 5. Allow for partial utilization of the Work by OWNER;
 - 6. Include testing and startup; and

7. Be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. CONTRACTOR shall be responsible for any deductible or self-insured retention.

C. The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph SC-5.06 shall comply with the requirements of paragraph 5.06.C of the General Conditions.

IV. SC-6.08 - Add the following new paragraph immediately after paragraph 6.08.A:

B. Contractor shall abide by all conditions of permits obtained including any additional insurance requirements requested by the permitting agency(s).

V. SC-10.01 Add the following new paragraph immediately after paragraph 10.01B:

C. Changes in Scope of Work:

1. The Contract Documents outline a Scope of Work that reflects the intended size of the Project based on the best information available at the time of document preparation and Advertisement for Bids.

2. The actual Scope of Work may vary once actual field conditions are encountered and addressed as the Work progresses.

3. The Owner reserves the right to increase up to ten (10%) percent or decrease up to twenty-five (25%) percent the Scope of Work without obligation to receive or to pay additional compensation from or to the Contractor beyond the contract unit prices, or to adjust the Contract Time as a penalty for the change in the Scope of Work.

4. All terms, conditions, Unit Prices and Schedule of Values in the Contract for Work within the original Scope of Work shall apply to all Work and to determine the value of all Work added to or deleted from the original Scope of Work.

5. Changes outside the stated limits for the revised Scope of Work shall be subject to applicable revisions of Article 10, 11, and 12 of Section 00700, General Conditions of the Construction Contract.

VI. T.C.A. 66-11-144, Portion of Contract Price Held in Escrow

- A. Whenever, in any contract for the improvement of real property, a certain amount or percentage of the contract price is held back by the owner or contractor, that retained amount shall be deposited in a separate escrow account with a third party giving proper security for the performance of the obligation of the owner or contractor.
- B. As of the time of the deposit of the retained funds, such funds shall become the sole and separate property of the contractor, subcontractor, materialman, or laborer to whom they are owed.
- C. Upon satisfactory completion of the contract, to be evidenced by a written release by the owner or contractor, all funds accumulated in the escrow account together with any interest thereon shall be paid immediately to the contractor, subcontractor, materialman, or laborer to whom such funds and interest are owed.
- D. In the event the owner or contractor fails or refuses to execute the release provided for in subsection (c), then the contractor, subcontractor, materialman, or laborer shall seek any remedy in a court of proper jurisdiction and the person holding the fund as escrow agent shall bear no liability for the nonpayment thereof to the contractor, subcontractor, materialman, or laborer.
- E. In contracts to which the State of Tennessee or any department, board or agency thereof, including the University of Tennessee, is a party, interest shall be paid on such retained amounts at the same rate interest is paid on the funds of local governments participating in the local government investment pool established pursuant to § 9-4-704, for the contract period.
- F. The provisions of this section shall be applicable to the State of Tennessee, any department, board or agency thereof, including the University of Tennessee, and all counties and municipalities and all departments, boards or agencies thereof, including all school and education boards, and any other subdivision of the state.
- G. The provisions of this section shall be applicable to all contracts for the contract price is five hundred thousand dollars (\$500,000.00) or greater.
- H. Compliance with this section shall be mandatory, and may not be waived by contract.

VII. Independent Contractors:

- A. The parties acknowledge that the relationship created under this Contract is that of independent contracting parties and this Contract does not create a general agency, joint venture, partnership, employment relationship, or franchise between the parties. Neither party shall represent itself to be an agent of the other, nor shall it execute any documents or make any commitments to any contractual or other obligations with third parties.

END OF SECTION

SECTION 00900

SUPPLEMENTAL SPECIAL CONDITIONS

I. PERMITS, LICENSES, EASEMENTS, AND REGULATIONS

A. GENERAL

1. Permits and licenses shall be obtained from the appropriate authorities having jurisdiction prior to beginning any Work on the project.
2. Contractor shall have copies of each specific permit and license at the job site prior to initiating construction of Work associated with the permit or license.
3. Copies of all permits and licenses obtained by the Contractor shall be supplied to the Owner prior to beginning any Work on the project.
4. Copies of permits and easements obtained by the Owner shall be supplied to the Contractor prior to beginning any Work on the project.
5. Contractor shall strictly adhere to all requirements, stipulations and conditions of each permit, license and/or easement.
6. Contractor shall comply with all permits, regulations and ordinances governing employee safety and health, hazardous materials and environmental protection.
7. Any problem noted in compliance with the permits, license and/or easement, or any proposed amendments by the Contractor shall be reported to the Engineer in writing before initiating or continuing with the Work.

B. REGULATIONS AND ORDINANCES

1. Contractor shall strictly adhere to all regulations and ordinances governing Work included in the construction of this Project, employee safety and health, hazardous materials and environmental protection for all activities associated with the project.
2. The enclosed list of applicable regulations and ordinances is included for general reference, and should not be considered complete until verified by the Contractor to assure strict compliance.
3. The regulations and ordinances governing this Project shall include, but not necessarily be limited to:
 - a. Tennessee Department of Environment and Conservation, Division of Water Supply;
 - b. Tennessee Department of Environment and Conservation, Division of Water Pollution Control, Wastewater and Stormwater Regulations;
 - c. Tennessee Department of Environment and Conservation, Division of Air Pollution Control, all Air Quality Regulations, with specific reference to all Sections dealing with lead based coatings removal, painting operations and to Chapter 1200-3/Section 1-26, with general attention to Section 8 - "Fugitive Dust";
 - d. Tennessee Department of Environment and Conservation, Division of

Solid Waste Management, all solid waste and hazardous materials regulations;

- e. The Tennessee Valley Authority;
- f. Tennessee Occupational Safety and Health Act, (TOSHA), Regulations;
- g. The U.S. Corps of Engineers; and
- h. The Resident County, City and/or Utility District for the Project, regulations and ordinances governing Air Quality, Wastewater, Stormwater and Solid Waste, Employee Safety and Health, Hazardous Materials and Environmental Protection.

C. PERMITS AND EASEMENTS SECURED BY THE OWNER (Only permits specifically applicable to the project will be supplied)

- 1. Tennessee Department of Environment and Conservation - Water System Construction Permit;
- 2. Tennessee Department of Environment and Conservation - Wastewater System Construction Permit;
- 3. Tennessee Department of Environment and Conservation - Stormwater Construction Permit;
- 4. U.S. Army Corps of Engineers - 404 Permit;
- 5. Tennessee Valley Authority, 26A Permit;
- 6. Resident County, City and/or Utility District Permits governing Air Pollution, Potable Water, Wastewater, Stormwater and Erosion Control, Solid Waste, and Roadway - Encroachment and Crossings;
- 7. Tennessee Department of Transportation - Roadway Encroachment and Crossings;
- 8. Rail Road Right-of-way Encroachments and Crossings;
- 9. Boiler and Machinery Insurance and other such coverage as may be required to be maintained by the Owner.
- 10. Easements for Encroachments on Private Property; and
- 11. Other Permits and Easements specifically required and listed for this Project.

D. PERMITS AND LICENSES TO BE SECURED AND PAID FOR BY THE CONTRACTOR (Only Permits specifically applicable to the Project are required)

- 1. Tennessee Department of Commerce and Insurance Licenses for working as a Contractor in the State with applicable classification(s) for the specific work task(s) associated with this Project;
- 2. Resident County, City and/or Utility District, Business and/or Contractors Licenses;
- 3. U.S. Government; State of Tennessee; Resident County, City and/or Utility District Permit to transport or dispose of solid waste;
- 4. State of Tennessee; Resident County, City and/or Utility District Permits and Licenses for Contractor's job site office, yard and utilities;
- 5. Easements and other Agreements between the Contractor and other parties for use of property or utilities for the job site office, yard and other materials

- or equipment lay down or storage areas;
- 6. Labor Unions, all applicable agreements;
- 7. Tennessee Department of Transportation Permits and Licenses to transport materials and equipment to and from the job site(s); and
- 8. Any and all other permits and/or licenses required of the Contractor for the complete and successful construction of the Project.

E. **DRUG FREE WORK PLACE REQUIREMENTS**

- 1. Pursuant to Tennessee Code Annotated § 50-9-113, an employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services is required to submit an affidavit stating that such employer has a drug-free workplace program in place that complies with Title 50, Chapter 9 of the Tennessee Code. The affidavit form is included in this bid packet and must be returned with the bid proposal. Failure to return the affidavit, failure to complete the affidavit, or failure to comply with the drug-free workplace program requirements of Title 50, Chapter 9 of the Tennessee Code will result in the bidder being disqualified from consideration as State law prohibits a local government from entering into any contract for construction services with any employer who does not comply with the above.

F. **ANTI-DISCRIMINATION:**

- 1. The Contractor, in performing the work or furnishing the services covered by this contract shall not discriminate against any person seeking employment with or by the Contractor because of race, creed, color, national origin, age, sex, sexual orientation, disability, religion, or other legally protected status. The City of Morristown encourages the utilization of minority and women-owned businesses in its contracting and subcontracting projects and the Contractor is encouraged to actively solicit the participation of these businesses. The Contractor shall inform all of its subcontractors and vendors providing work or services under this Agreement of this requirement and shall ensure compliance therewith.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY DOCUMENTS

- A. The work covered comprises the construction and placement of a new leachate tank for the Roane County Government. The work includes, but is not limited to, the following major components:
1. Provide and install a 16,000-gallon polyethylene leachate storage and mixing tank at the Roane County Landfill. Include all civil, mechanical, electrical, and instrumentation required to provide a complete, functional facility.
 2. Provide and install a mag drive recirculation pump capable of pumping 30 gallons per minute at a discharge head of 30 feet.
 3. Replacement of the existing 4-inch gravity flow tank fill pipe with a new 4-inch HDPE fill pipe installed on elevated pipe supports.
 4. Provide and install a new 1-1/2" flow meter on the discharge side of the existing leachate pumping station.
 5. Provide and install a new dialer system to notify landfill personnel of alarms at the existing leachate pumping station.
 6. Maintenance of site during construction, including erosion and sediment control and stormwater control devices.
 7. All piping, manholes, vaults, valves, and other appurtenances.
 8. All other mechanical, electrical, and instrumentation as required for the project.
- B. The Bid for the contract will include all items necessary to provide a complete, functional system.
- D. Some equipment specifications include specific brand and/or model numbers. Any substitutions must be approved by the Owner and the Engineer prior to the Bid opening date.
- C. All regulations and requirements of the Tennessee Department of Environment and Conservation and the Roane County Landfill must be followed in construction of the

various components of the project.

1.02 RELATED REQUIREMENTS

- A. Section 00700: General Conditions
- B. Section 00800: Supplementary Conditions.
- C. Section 00910: Supplemental Special Conditions.
- D. Section 01150: Measurement and Payment.
- E. Section 01310: Construction Schedules.

1.03 CONTRACTS

- A. The work for this project will be performed under a single Lump Sum Contract, as shown on the Bid Form.

1.05 WORK SEQUENCE

- A. Contractors shall be responsible for notifying all individual(s) affected by the work **prior** to construction (contact Roane County for acceptable methods of notification).
- B. Prior to the beginning of any work, the contractor shall take video recordings and photographs of project work area in accordance with Section 01320.
- C. Coordinate all Work with the Owner and Engineer to ensure a successful Project. The schedule and actual construction operations must be approved by the Owner as described in, and/or referenced to Section 01310, including:
 - 1. All Contracts
 - a. Rigidly adhere to Project Schedule.
- D. Execute Construction schedules to minimize disruption to the Owner's facilities, the public convenience and safety, and to maximize Project construction efficiency.
- E. INITIAL RESTORATION
 - 1. Initial restoration for all surface disturbances shall take place **IMMEDIATELY** and shall include **ALL** of the following:
 - a. Rough grading and removal of surplus soil as specified in Section 02260.
 - b. Re-vegetation of all disturbed areas in accordance with Section 02485.
 - 2. Contractor shall be responsible for repeating steps a. and b. from Part 1 after each phase is completed, including placement of topsoil. This 'final restoration' shall be as directed by Engineer, or as soon as weather conditions permit.
- H. Contractor shall closely coordinate with Contractors of other work that may be underway in the landfill and schedule work at the sites in order to minimize conflicts in the construction process and scheduling issues. Regularly scheduled progress

meetings will be held as needed to discuss scheduling, use of project work areas, and other pertinent issues.

1.06 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit his use of the premises for Work and for storage, to areas allow for: Public Use, and other Contractors.
- B. Coordinate use of premises under direction of Owner.
- C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.
- D. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate Contractor.
- E. Obtain and pay for the use of additional storage or work areas needed for operations.
- F. Coordinate closely with the Owner's personnel and other Contractors.
- G. Maintain the operation of the Owner's facilities at all times during construction. Contractor shall be fully responsible for any spillage or bypass.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

(Not used)

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall be responsible for all cutting, fitting, and patching, including attendant excavation and backfill required to complete the Work or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the Work to provide for installation and ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of Contract Documents.
 - 5. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

1.02 RELATED DOCUMENTS

- A. Section 01010: Summary of Work

1.03 SUBMITTALS

- A. Submit a written request to Engineer well in advance of executing any cutting or alteration which affects:
 - 1. Work of the Owner or any separate contractor.
 - 2. Structural value or integrity of any element of the Project.
 - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. Efficiency, operational life, maintenance, or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.
- B. Request shall include:
 - 1. Identification of the Project.
 - 2. Description of affected work.
 - 3. Necessity of cutting, alteration, or excavation.
 - 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.
 - 5. Description of proposed work.
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades who will execute the work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 - 6. Alternatives to cutting and patching.
 - 7. Cost proposal, when applicable.
 - 8. Written permission of any separate contractor whose work will be affected.

- C. Should conditions of Work or the schedule indicate a change of products from original installation, Contractor shall submit request for substitution.
- D. Submit written notice to Engineer designating the date and the time the work will be uncovered.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Comply with specifications and standards for each specific product involved.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Engineer in writing; do not proceed with work until Engineer has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of Project from damage.
- C. Provide protection from elements for the portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.
- B. Execute cutting and backfilling by methods which will prevent settlement or damage to other work.
- C. Employ original Installer or Fabricator, to perform cutting and patching for:
 - 1. Weather-exposed or moisture-resistant elements.
 - 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. Restore work which has been cut or removed; install new products to provide complete Work in accord with requirements of Contract Documents.

- F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and pay for field engineering services required for the Project.
 - 1. Survey work required in execution of Project.
 - 2. Civil, structural, or other professional engineering services specified, or required to execute contractor's construction methods.
- B. Owner's Representative will identify existing control points and property line corner stakes indicated on the drawings, as required.

1.02 RELATED REQUIREMENTS

- A. Section 00700: General Conditions
- B. Section 00800: Supplementary Conditions
- C. Section 01010: Summary of Work
- D. Section 01720: Project Record Documents
- E. Permit and Easement Documentation

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. Qualified engineer or registered land surveyor, acceptable to Contractor and Owner.
- B. Registered Professional Engineer of the discipline required for the specific service on the Project, if required, licensed in the State in which the project is located.

1.04 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are those designated on drawings.
- B. Locate and protect control points prior to starting site work, and reserve all permanent reference points during construction.
 - 1. Make no changes or relocations without proper written notice to Engineer.
 - 2. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to replace project control points which may be lost or destroyed.
 - a. Establish replacements based on original survey control.

1.05 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of two (2) permanent benchmarks on site, when not present, referenced to data established by survey control points.
 1. Record locations with horizontal and vertical data, on Project Record Documents.
- B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:
 1. Site improvements;
 - a. Stakes for grading, fill and topsoil placement.
 - b. Utility slopes and invert elevations.
 2. Batter boards for structures.
- C. Clearly delineate stream buffers, TVA boundaries, and permanent and temporary easements on the ground as indicated on the drawings
- C. From time to time, verify layouts and replace delineation markers by same methods.
- D. Replace property corners and other monuments disturbed during construction operations.

1.06 RECORDS

- A. Maintain a complete, accurate log of all control and survey work, if required, as it progresses.

1.07 SUBMITTALS

- A. Submit name and address of Surveyor and Professional Engineer to Engineer.
- B. On request of Engineer, submit documentation to verify accuracy of field engineer work.
- C. Submit certificate signed by Registered Engineer or Surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Abbreviations and acronyms used in Contract Documents to identify reference standards.

1.02 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
- B. Publication Date: The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OF ORGANIZATIONS

- A. Obtain copies of referenced standard direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.

AASHTO
American Association of State Highway and
Transportation Officials
444 North Capital Street, Northwest
Washington, DC 20001

ACI
American Concrete Institute
Post Office Box 19150
Detroit, MI 48219
(313) 523-2600

ANSI, APS
American National Standards Institute, Inc.
10E 40th Street
New York, NY 10018

AREA
American Railroad Engineering Association
200 "L" Street, Northwest
Washington, DC 20036

ASCE
American Society of Civil Engineers
345 East 47th Street
New York, NY 10017

ASME
American Society of Mechanical Engineers
385 E. 47th Street
New York, NY 10017

ASTM
American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

AWWA
American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

CRSI
Concrete Reinforcing Steel Institute
933 No. Plumb Grove Road
Schaumburg, IL 60173-4758

FHWA
Federal Highway Administration
Federal Building, U.S. Courthouses
Nashville, TN 37202

FS
Federal Specification
Superintendent of Documents
Government Printing Office
Washington, DC 20234

FSS
Federal Specification and Standards
General Services Administration
Specifications and Consumer Information Distribution
Section (WFSIS)
Washington Navy Yard, Building 197
Washington, DC 20407

TDOT
Tennessee Department of Transportation
James K Polk Building
505 Deaderick Street
Nashville, TN 37219

TDEC
Tennessee Department of Environment and Conservation
312 Rosa L. Parks Avenue
Tennessee Tower, 2nd Floor
Nashville, TN 37243

WEF
Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994

TVA
Tennessee Valley Authority
Morristown Regional Office
3726 East Morris Blvd
Morristown, TN 37813

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 GENERAL

- A. For the information and guidance of bidders, the following explanation of the Bid Form items is made. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Form or relieve the Contractor of the necessity of furnishing such as part of the Contract(s). The quantities set forth in the Bid Form are approximate and are given to establish a uniform basis for the comparison of Bids. The Owner reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accordance with the terms of the Contract. Lump Sum prices are used as a means of computing the final figures for Bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else as is reasonable.
- B. Payment will be made on the basis of Work actually performed completing each item in the Contract, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, and all other appurtenances to complete the construction, installation, testing and start-up of the work to the configuration and extent as shown on the Project Plans and as described in the Specifications.
- C. Notwithstanding any other Sections, paragraphs, sentences, or words in the Contract Documents, payments shall not be made for work not performed, materials not supplied and/or any other item/items for which the Owner does not receive the benefit described or intended.
- D. **CLEANUP AND SEEDING**
 - 1. Contractor shall cleanup all areas of the Work and fine grade and seed all appropriate disturbed areas with seeding types as listed in the Specifications for the areas and seasons as appropriate as the Work progresses. All areas where poor vegetation cover has been noted by April 1st of the year following the initial seeding shall be fine graded and re-seeded.
 - 2. This work is considered incidental to the construction of the Project and no separate payment will be made for the initial or any necessary follow up, clean up, fine grading or seeding required to properly restore all disturbed areas of this Project.

1.02 MEASUREMENT AND BASIS OF PAYMENT

- A. The general construction of the leachate storage and recirculation system shall be measured as a constructed unit, tested and accepted, including all work specified herein and as shown on the Plans to be within the limits of this Contract. The general construction work, as above stipulated, shall be for all labor, materials, and equipment required for the work, and shall be paid for at the Contract Lump Sum price for complete and functional installations. The work covered comprises the construction and placement of a new leachate tank for the Roane County Government. The work includes, but is not limited to, the following major components:
1. Provide and install a 16,000-gallon polyethylene leachate storage and mixing tank at the Roane County Landfill. Include all civil, mechanical, electrical, and instrumentation required to provide a complete, functional facility.
 2. Provide and install a mag drive recirculation pump capable of pumping 30 gallons per minute at a discharge head of 30 feet.
 3. Replacement of the existing 4-inch gravity flow tank fill pipe with a new 4-inch HDPE fill pipe installed on elevated pipe supports.
 4. Provide and install a new 1-1/2" flow meter on the discharge side of the existing leachate pumping station.
 5. Provide and install a new dialer system to notify landfill personnel of alarms at the existing leachate pumping station.
 6. Maintenance of site during construction, including erosion and sediment control and stormwater control devices.
 7. All piping, manholes, vaults, valves, and other appurtenances.
 8. All other mechanical, electrical, and instrumentation as required for the project.
- E. Some equipment specifications include specific brand and/or model numbers. Any substitutions must be approved by the Owner and the Engineer prior to the Bid opening date.
- G. A construction contingency is included in the Bid for project budgeting purposes only. Payment to the Contractor shall be for the work actually performed based on the lump

sum base bid price and any approved change orders.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to Engineer in accordance with the schedule established by Conditions of the Contract and Agreement Between Owner and Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 00500: Agreement
- B. Section 00700: General Conditions
- C. Section 01370: Schedule of Values
- D. Section 01700: Contract Closeout

1.03 FORMAT AND DATA REQUIRED

- A. Submit applications typed on the Application for Payment Form included herein, with itemized data typed on 8-1/2" x 11" white paper continuation sheets.
- B. Provide itemized data on continuation sheet:
 - 1. Format, schedules, line items, and values: Those of the Schedule of Values accepted by Engineer.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of contract firm.
- B. Continuation Sheets:
 - 1. Fill in total list of all scheduled component items of Work, with item number and schedule dollar value for each item.
 - 2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
 - a. List by Change Order Number, and description, as for an original component item of work.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:
 1. Project
 2. Application number and date
 3. Detailed list of enclosures
 4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.
- B. Submit one (1) copy of data and cover letter for each copy of application.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application Form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 - Contract Closeout.

1.07 SUBMITTAL PROCEDURE

- A. Submit Application for Payment to Engineer at the times stipulated in the Agreement.
- B. Number: Three (3) copies of each Application.
- C. When Engineer finds Application properly completed and correct, he will transmit certificate for payment to Owner, with copy to Contractor.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01153

CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Promptly implement change order procedures:
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records of work done on a time-and-material/force account basis.
 - 3. Provide full documentation at Engineer's request.
- B. Designate in writing the member of Contractor's organization:
 - 1. Who is authorized to accept changes in the Work.
 - 2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the Work.
- C. Owner will designate in writing the person who is authorized to execute Change Orders.

1.02 RELATED REQUIREMENTS

- A. Agreement: The amounts of established unit prices.
- B. Conditions of the Contract:
 - 1. Methods of determining cost or credit to Owner resulting from changes in Work made on a time and materials basis.
 - 2. Contractor's claims for additional costs.
- C. Section 01152: Applications for Payment
- D. Section 01720: Project Record Documents

1.03 DEFINITIONS

- A. Change Order: See General Conditions
- B. Engineer's Supplemental Instructions: A written order, instructions, or interpretations, signed by Engineer making minor changes in the Work not involving a change in Contract Sum or Contract Time.

1.04 PRELIMINARY PROCEDURES

- A. Owner or Engineer may initiate changes by submitting a Proposal Request to Contractor. Request will include:
 - 1. Detailed description of the Change, Products, and location of the change in the Project.
 - 2. Supplementary or revised Drawings and Specifications.

3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not authorized.
 4. A specific period of time during which the requested price will be considered valid.
 5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.
- B. Contractor may initiate changes by submitting a written notice to Engineer containing:
1. Description of the proposed changes.
 2. Statement of the reason for making the changes.
 3. Statement of the effect on the Contract Sum and the Contract Time.
 4. Statement of the effect on work of separate contractors.
 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.
- B. On request, provide additional data to support time and cost computations:
1. Labor required.
 2. Equipment required.
 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 4. Taxes, insurance, and bonds.
 5. Credit for work deleted from contract, similarly documented.
 6. Overhead and profit.
 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:
1. Name of the Owner's authorized agent who ordered the work, and date of the order.
 2. Dates and times work was performed, and by whom.
 3. Time record, summary of hours worked, and hourly rates paid.
 4. Receipts and invoices for:
 - a. Equipment used, listing dates, and times of use.
 - b. Products used, listing of quantities.
 - c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

- A. Engineer will prepare each Change Order.
- B. Form: Contract Change Order Form included herein.
- C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- D. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.07 LUMP-SUM/FIXED PRICE CHANGE ORDER

- A. Content of Change Orders will be based on, either:
 - 1. Engineer's Proposal Request and Contractor's responsive Proposal as mutually agreed between Owner and Contractor.
 - 2. Contractor's Proposal for a change, as recommended by Engineer.
- B. Owner and Engineer will sign and date the Change Order as authorization for the contractor to proceed with the changes.
- C. Contractor may sign and date the Change Order to indicate agreement with the terms therein.

1.08 UNIT PRICE CHANGE ORDER

- A. Content of Change Orders will be based on, either:
 - 1. Engineer's definition of the scope of the required changes.
 - 2. Contractor's Proposal for a change, as recommended by Engineer.
 - 3. Survey of completed work.
- B. The amounts of the unit prices to be:
 - 1. Those stated in the Agreement.
 - 2. Those mutually agreed upon between Owner and Contractor.
- C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
 - 1. Owner and Engineer will sign and date the Change Order as authorization for Contractor to proceed with the changes.
 - 2. Contractor may sign and date the Change Order to indicate agreement with the terms therein.

- D. When quantities of the items cannot be determined prior to start of the work:
 - 1. Engineer or Owner will issue a construction change authorization directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit price.
 - 2. At completion of the change, Engineer will determine the cost of such work based on the unit prices and quantities used:
 - a. Contractor shall submit documentation to establish the number of units of each time and any claims for a change in Contract Time.
 - 3. Engineer will sign and date the Change Order to indicate his agreement with the terms therein.
 - 4. Order to indicate their agreement with the terms therein.

1.09 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Request for Payment forms to record each change as a separate item of Work and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Within twenty (20) days after the delivery of the executed Agreement and prior to commencing work on the project, the Contractor shall meet with the Engineer and the Owner for a Pre-construction Conference. The Engineer shall designate the time and place.
- B. As he sees fit, the Engineer may periodically request that the Contractor meet with the Owner and the Engineer to discuss the progress of the Work. The Contractor shall attend such meetings.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract
- B. Section 00620: Notice of Award
- C. Section 01310: Construction Schedules

1.03 RECORD OF DISCUSSION

- A. The Engineer shall prepare a written record of the discussions conducted during such meetings and shall distribute a copy to each party in attendance or affected by the discussions.
- B. Any party whose understanding of a discussion or action differs from that presented by the Engineer in the written record shall promptly notify the Engineer of the difference.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Within ten (10) days after delivery of the Notice to Proceed, prepare and submit to Engineer estimated construction progress schedules for the Work, with sub-schedules of related activities which are essential to its progress.
- B. Submit revised progress schedules periodically.

1.02 RELATED REQUIREMENTS

- A. Section 00700: General Conditions
- B. Section 01010: Summary of Work
- C. Section 01200: Project Meetings
- D. Section 01340: Shop Drawings, Product Data, and Samples

1.03 FORM OF SCHEDULES

- A. Prepare schedules in the form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation.
 - 2. Horizontal time scale: identify the first work day of each week.
 - 3. Scale and spacing: to allow space for notations and future revision.
 - 4. Minimum sheet size: 8-1/2" x 11".
- B. Format of listings: the chronological order of the start of each item of work.
- C. Identification of listings: by major specification section numbers.

1.04 CONTENT OF SCHEDULES

- A. Construction Progress Schedule:
 - 1. Show the complete sequence of construction by activity.
 - 2. Show the dates for the beginning and completion of each major element of construction.
 - 3. Show projected percentage of completion for each item, as of the first day of each month.

- B. Submittals Schedule for Shop Drawings, Product Data Samples. Show:
 - 1. the dates for Contractor's submittals, and
 - 2. the dates approved submittals will be required from the Engineer. Allow a minimum of three (3) weeks.
- C. Prepare and submit subschedules for each separate stage of work specified in Section 01010.
- D. Provide subschedules to define critical portions of prime schedules.

1.05 PROGRESS REVISIONS

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the impact on the schedule.
 - 2. Corrective action recommended, and its effect.
 - 3. The effect of changes on schedules of other prime contractors.

1.06 SUBMISSIONS

- A. Submit initial schedules within ten (10) days after Notice to Proceed.
 - 1. Engineer will review schedules and return review copy within fourteen (14) days after receipt.
 - 2. If required, resubmit within seven (7) days after return of review copy.
- B. Submit revised progress schedules with each application for payment.
- C. Submit the number of opaque reproductions which the contractor requires, plus three (3) copies which the Engineer will retain.

1.07 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:
 - 1. Job site files.
 - 2. Subcontractors
 - 3. Other concerned parties.
- B. Instruct recipients to report promptly to the contractor, in writing, any problems anticipated by the projections shown in the schedules.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01320

PRE AND POST CONSTRUCTION VIDEO AND PHOTOGRAPHIC RECORDS

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all equipment, labor, and materials required to provide the Owner with construction videos and photographs of the Project.
- B. Original documents and negatives respectively shall become the property of the Owner and none of the videos and photographs herein shall be published without express permission of the Owner.

1.02 PRE AND POST CONSTRUCTION PHOTOGRAPHS

- A. Prior to the beginning of any work, the Contractor shall take video recordings of the entire project work area and project photographs of any existing conditions that appear to be of special interest, including but not limited to land scraping, walkways, driveways, and structure foundations.
- B. Following completion of the work, another recording shall be made showing the same areas and features as in the pre-construction videos and photographs.
- C. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.
- D. The pre-construction videos and photographs shall be submitted to the Engineer within twenty-five (25) calendar days after the date of receipt by the Contractor of Notice to Proceed. Post-construction videos and photographs shall be provided prior to final acceptance of the project.

1.03 SUBMITTALS

- A. Photographs shall be submitted in digital format (.jpeg) on compact discs.
- B. Video recordings shall be DVD format.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

(Not used)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Shop Drawings, Product Data, and Samples required by Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Section 00300: Bid Proposal
- B. Section 00700: General Conditions
- C. Section 01310: Construction Schedules
- D. Section 01720: Project Record Documents
- E. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Product Data, and Samples will be needed.

1.03 SHOP DRAWINGS

- A. Drawings shall be presented in a clear and thorough manner.
 - 1. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
- B. Minimum Sheet size: 8-1/2" x 11" for paper submittals.
- C. Digital (color .pdf) format preferred.

1.04 PRODUCT DATA

- A. Preparation:
 - 1. Clearly mark each copy to identify pertinent products or models.
 - 2. Show performance characteristics and capacities.
 - 3. Show dimensions and clearances required.
 - 4. Show wiring or piping diagrams and controls.
- B. Manufacturer's standard schematic drawings and diagrams:
 - 1. Modify drawings and diagrams to delete information that is not applicable to the work.

2. Supplement standard information to provide information specifically applicable to the Work.

1.05 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 2. Full range of color, texture, and pattern.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Review Shop Drawings, Product Data, and Samples prior to submission.
- B. Determine and verify:
 1. Field measurements,
 2. Field construction criteria,
 3. Catalog numbers and similar data, and
 4. Conformance with specifications.
- C. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- D. Notify the Engineer in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- E. Begin no fabrication or work which requires submittals until return of submittals with Engineer approval.

1.07 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work, or in the work of any other contractor.
- B. Number of submittals required:
 1. Shop Drawings: Submit the number of opaque reproductions which the contractor requires, plus four (4) copies which will be retained by the Engineer.
 2. Product Data: Submit the number of copies which the Contractor requires, plus four (4) which will be retained by the Engineer.
 3. Samples: Submit the number stated in each specification section.
 4. **The preference is for shop drawings to be submitted in electronic (color .pdf format) either by electronic mail or on cd. The engineer will create a project site using Newforma for all submittals to be routed through.**

- C. Submittals shall contain:
 - 1. The date of submission and the dates of any previous submissions.
 - 2. The project title and number.
 - 3. Contract identification.
 - 4. The names of:
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
 - 5. Identification of the project, with the specification section number.
 - 6. Field dimensions, clearly identified as such.
 - 7. Relation to adjacent or critical features of Work or materials.
 - 8. Applicable standards, such as ASTM or Federal Specification numbers.
 - 9. Identification of deviations from Contract Documents.
 - 10. Identification of revisions on resubmittals.
 - 11. An 8" x 3" blank space for Contractor and Engineer stamps.
 - 12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work.

1.08 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by the Engineer and resubmit until approved.
- B. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
 - 2. Indicate any changes which have been made other than those requested by the Engineer.
- C. Samples: Submit new samples as required for initial submittal.

1.09 DISTRIBUTION

- A. Distribute reproductions of Shop Drawings and copies of Product Data which carry the Engineer stamp of approval to:
 - 1. Job site file
 - 2. Record documents file
 - 3. Other affected contractors
 - 4. Subcontractors
 - 5. Supplier or fabricator
- B. Distribute samples which carry the Engineer stamp of approval as directed by Engineer.

1.10 ENGINEER DUTIES

- A. Review submittals with reasonable promptness and in accordance with schedule.
- B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or approval of submittal.
- C. Return submittals to Contractor for distribution, or for resubmission.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within ten (10) days after award of contract, for lump sum contracts only.
- B. Upon request of Engineer, support the values with data which will substantiate their correctness.
- C. The Schedule of Values, unless objected to by the Engineer, shall be used only as the basis for the Contractor's Applications for Payment for lump sum contracts only.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract
- B. Section 01152: Applications for Payment

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on 8-1/2" x 11" white paper; Contractor's standard forms and automated printout will be considered for approval by Engineer upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location
 - 2. Engineer and project number
 - 3. Name and address of Contractor
 - 4. Contract designation
 - 5. Date of submission
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents of this Project Manual as the format for listing component items.
 - 1. Identify each line item with the number and title of the respective major section of the specification.
- D. For each major line item, list sub-values of major products or operations under the item.
- E. For the various portions of the Work:
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested for stored material, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid.

b. The total installed value.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a subschedule of unit costs and quantities for:
 - 1. Products on which progress payment will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in Schedule of Values.
- C. The unit quantity of bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Installation costs, including Contractor's overhead and profit.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01520

CONSTRUCTION AIDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install, and maintain required construction aids, remove on completion of Work.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required by personnel and to facilitate execution of the Work; scaffolds, staging, ladders, stairs, ramps, runway, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Consult with Engineer, review site conditions and factors which affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by execution of Work.

3.02 GENERAL

- A. Comply with applicable requirements specified in sections of Divisions 2-16.
- B. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment, and services:
 - 1. When construction needs can be met by use of permanent construction.
 - 2. At completion of Project.

- B. Clean and repair damage caused by installation or by use of temporary facilities.
 - 1. Remove foundations and underground installations for construction aids.
 - 2. Grade areas of site affected by temporary installations to required elevations and slopes, and clean the area.

- C. Restore existing facilities used for temporary purposes to specified or to original condition.

- D. Restore permanent facilities, if any, used for temporary purposes to specified condition.

END OF SECTION

SECTION 01530

BARRIERS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install, and maintain suitable barriers as required to prevent public entry, and to protect the Work, existing facilities, trees, and plants from construction operations; remove when no longer needed, or at completion of the Work.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work
- B. Section 01520: Construction Aids

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 FENCING

- A. Materials to Contractor's option, minimum fence height six (6') feet.
- B. Install chain link fencing to protect existing County facilities.

2.03 BARRIERS

- A. Materials to Contractor's option, as appropriate to serve required purpose.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install facilities of a neat and reasonably uniform appearance, structurally adequate for required purposes.
- B. Maintain barriers during entire construction period.
- C. Relocate barriers as required by progress of construction.

3.02 FENCES

- A. Prior to start of work at the Project site, install enclosure fence with suitably locked entrance gates.
 - 1. Locate as shown on drawings.

3.03 TREE AND PLANT PROTECTION

- A. Preserve and protect existing trees and plants at site which are designated to remain, and those adjacent to site.
- B. Consult with Engineer and remove agreed-on roots and branches which interfere with construction.
 - 1. Employ qualified tree surgeon to remove, and to treat cuts.
- C. Provide temporary barriers to a height of six (6') feet, around each, or around each group of trees and plants.
- D. Protect root zones of trees and plants:
 - 1. Do not allow vehicular traffic or parking.
 - 2. Do not store materials or products.
 - 3. Prevent dumping refuse or chemically injurious materials or liquids.
 - 4. Prevent puddling or continuous running water.
- E. Carefully supervise excavating, grading, filling, and subsequent construction operations to prevent damage.
- F. Replace, or suitably repair, trees, and plants designated to remain which are damaged or destroyed due to construction operations.

3.04 REMOVAL

- A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed and when approved by the Engineer.
- B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide a Project security program, to:
 - 1. Protect Work stored products and construction equipment from theft and vandalism.
 - 2. Protect premises from entry by unauthorized persons.
- B. Comply with local security requirements.

1.02 RELATED REQUIREMENTS

- A. Section 01530: Barriers

1.03 MAINTENANCE OF SECURITY

- A. Initiate security program in compliance with Owner's system, prior to job mobilization.
- B. Maintain security program throughout construction period, until Owner occupancy or Owner acceptance precludes the need for Contractor security.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of work.

1.02 RELATED REQUIREMENTS

- A. Section 01570: Traffic Regulations
- B. Section 01710: Cleaning

1.03 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operation, and provide positive means to prevent airborne dust from dispersing into the atmosphere.

1.04 WATER CONTROL

- A. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
 - 1. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.
- B. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and groundwater.
- C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site, or to adjoining areas.

1.05 DEBRIS CONTROL

- A. Maintain all areas under contractor's control free of extraneous debris.
- B. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
 - 1. Provide containers for deposit of debris as specified in Section 01710 - Cleaning.
 - 2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
 - a. Provide periodic inspection of traffic areas to enforce requirements.

- C. Schedule periodic collection and disposal of debris as specified in Section 01710 - Cleaning.

1.06 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by discharge of noxious substances from construction operations.
- B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
 - 1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters.
 - 1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.
 - 2. Prevent harmful dispersal of pollutants into the atmosphere.

1.07 EROSION CONTROL

- A. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Hold the areas of bare soil exposed at one time to a minimum.
 - 2. Provide temporary control measures such as berms, dikes, and drains.
- B. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
- C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01570

TRAFFIC REGULATIONS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 RELATED REQUIREMENTS

- A. Section 01530: Barriers
- B. Section 01560: Temporary Controls

1.03 TRAFFIC SIGNALS AND SIGNS

- A. Provide and operate traffic control and directional signals required to direct and maintain an orderly flow of traffic in all areas under Contractor's control, or affected by Contractor's operations in accordance with Owner requirements and the Manual of Uniform Traffic Control Devices.
- B. Provide traffic control, directional signs, and warning signs mounted on barricades or standard posts:
 - 1. At each change of direction of a roadway and at each crossroads.
 - 2. At detours.
 - 3. At parking areas.
 - 4. Well in advance of the work area toward oncoming traffic.

1.04 FLAGMEN

- A. Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic.

1.05 FLARES AND LIGHTS

- A. Provide flares and lights during periods of low visibility:
 - 1. To clearly delineate traffic lanes and to guide traffic.
 - 2. For use by flagmen in directing traffic.
- B. Provide illumination of critical traffic and parking areas.

1.06 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.
- B. Monitor parking of construction personnel's private vehicles.
 - 1. Maintain free vehicular access to and through parking areas.
 - 2. Prohibit parking on or adjacent to access roads, or in non-designated areas.

1.07 HAUL ROUTES

- A. Consult with governing authorities and establish public thoroughfares which will be used as haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to expedite traffic flow to minimize interference with normal public traffic.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Material and equipment incorporated into Work:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the Engineer.
 - 3. Manufactured and Fabricated Products:
 - a. Design, fabricate, and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two (2) or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 - 4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract
- B. Section 00300: Bid Proposal
- C. Section 01010: Summary of Work
- D. Section 01340: Shop Drawings, Product Data, and Samples
- E. Section 01710: Cleaning

1.03 REUSE OF EXISTING MATERIAL

- A. Except as specifically indicated or specified, materials and equipment removed from the existing structure, if any, shall not be used in the completed work.
- B. For material and equipment specifically indicated or specified to be used in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation, to assure

- proper function in the completed Work.
2. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation. Pay all costs for such work.

1.04 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two (2) copies to Engineer.
 1. Maintain one (1) set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition, and adjust products in strict accordance with such instructions and in conformity with specified requirements.
 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.
 2. Do not proceed with work without clear instructions.
- C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of Product in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.
 1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.
- B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.06 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions with seals and labels intact and legible.
 1. Store Products subject to damage by the elements in weathertight enclosures.
 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

- B. Exterior Storage:
 - 1. Store fabricated Products above the ground, on blocking or skids, prevent soiling or staining. Cover Products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specified conditions, and free from damage or deterioration.
- D. Protection after Installation:
 - 1. Provide substantial coverings as necessary to protect installed Products from damage from traffic and subsequent construction operations. Remove when no longer needed.

1.07 SUBSTITUTIONS AND PRODUCT OPTIONS

- A. Products List:
 - 1. Within ten (10) days after contract Date, submit to Engineer a complete list of major Products proposed to be used, with the name of the manufacturer and the installing subcontractor.
- B. Contractor's Options:
 - 1. For Products specified only by reference standard, select any Product meeting that standard.
 - 2. For Products specified by naming several Products or manufacturers, select any one (1) of the Products or manufacturers named, which complies with the specifications.
 - 3. For Products specified by naming one (1) or more Products or manufacturers and stating "or equal," Contractor must submit a request for substitutions for any Product or manufacturer not specifically named.
 - 4. For Products specified by naming only one (1) Product and manufacturer, there is no option.
- C. Substitutions:
 - 1. Major Equipment Items
 - a. For a period of fourteen (14) days after the Bid opening, Engineer will consider written requests from Contractor for substitutions identified in the major equipment Schedule of the Bid Form.
 - 2. Other Products
 - a. For a period of thirty (30) days after Contract Date, Engineer will consider written requests from Contractor for substitutions on Products.

3. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the Product specified.
 - e. Any required license fees or royalties.
 - f. Availability of maintenance service, and source of replacement materials.
 4. Engineer shall be the judge of the acceptability of the proposed substitution.
- D. Contractor's Representation:
1. The request for a substitution constitutes a representation that contractor:
 - a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the Product specified.
 - c. Will coordinate the installation of an accepted substitution into the work, and make such other changes as may be required to make the work complete in all respects.
 - d. Waives all claims for additional costs, under this responsibility, which may subsequently become apparent.
- E. Engineer will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 RELATED REQUIREMENTS

- A. Conditions of the contract: Fiscal provisions, legal submittals and additional administrative requirements:
- B. Section 01710: Cleaning
- C. Section 01720: Project Record Documents
- D. The respective sections of Specifications: Closeout Submittals Required of Trades.

1.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, he shall submit to Engineer:
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, Engineer will make an inspection to determine the status of completion.
- C. Should Engineer determine that the Work is not substantially complete:
 - 1. Engineer will promptly notify the Contractor in writing, giving the reasons for Work not being substantially complete.
 - 2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer.
 - 3. Engineer will reinspect the Work.
- D. When the Engineer finds that the Work is substantially complete, he will:
 - 1. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with a tentative list of items to be completed or corrected before final payment.

2. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.04 FINAL INSPECTION

- A. When Contractor considers the Work is complete, he shall submit written certification that:
 1. Contract Documents have been reviewed.
 2. Work has been inspected for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 5. Work is complete and ready for final inspection.
- B. Engineer will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Engineer consider that Work is incomplete or defective:
 1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective Work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies in the Work and send a second written certification to the Engineer that the Work is complete.
 3. Engineer will reinspect the Work.
- D. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Evidence of compliance with requirements of governing authorities.
- B. Project Record Documents: to requirements of Section 01720
- C. Evidence of Payment and Release of Liens: to requirements of General and Supplementary Conditions.
- D. Certificate of Insurance for Products and Completed Operations, as applicable.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Engineer.

- B. Statement shall reflect all adjustments to the Contract Sum:
1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices
 - d. Deductions for uncorrected work
 - e. Penalties and Bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for reinspection payments
 - h. Other adjustments
 3. Total Contract Sum, as adjusted
 4. Previous payments
 5. Sum remaining due
- C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the conditions of the Contract.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract
- B. Section 01560: Temporary Controls
- C. Each Specification Section: Cleaning for specific Products or Work.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the Work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris, and rubbish.

- C. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- C. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- D. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed surfaces, and all work areas, to verify that the entire Work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain at the site for the Owner one (1) record copy of:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other Modifications to the Contract
 - 5. Engineer Field Orders or written instructions
 - 6. Approved Shop Drawings, Product Data and Samples
 - 7. Field test records

1.02 RELATED REQUIREMENTS

- A. Section 01340: Shop Drawings, Product Data, and Samples

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with CSI/CSC format.
- C. Maintain documents in a clean, dry legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by Engineer.

1.04 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by Engineer.

1.05 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.
 - 1. Do not conceal any Work until required information is recorded.

1.06 SUBMITTAL

- A. At Contract closeout, deliver Record Documents to Engineer for the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each Record Document
 - 5. Signature of Contractor or his authorized representative

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds.
- B. Submit to Owner for review.

1.02 RELATED REQUIREMENTS

- A. Invitation to Bid- General Terms & Conditions
- B. Section 00700: General Conditions
- C. Section 00800: Supplementary General Conditions
- D. Section 01700: Contract Closeout.

1.03 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two (2) each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or Work item.
 - 2. Firm, with name of principal, address, and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond, or service and maintenance contract.
 - 5. Duration of warranty, bond, or service maintenance contract.
 - 6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name of responsible principal, address, and telephone number.

1.04 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.

- B. Format:
 - 1. Size 8-1/2 in. x 11 in., punch sheets for standard 3-ring binder.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.05 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service, and maintenance contracts as specified in respective sections of Specifications.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 02100

EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 01050: Field Engineering
- B. Section 02210: Site Grading and Filling
- C. Section 02221: Trenching, Backfilling, and Compacting
- D. Section 02485: Seeding
- E. Section 15060: Pipe, Valves, and Appurtenances

1.02 JOB CONDITIONS

- A. Excavation, trenching, backfilling, and grading operations to elevations as needed to meet the requirements shown on the Contract Documents, shall be done in such a manner as to cause the least amount of soil erosion and siltation.
- B. Appropriate management practices and control structures shall be in place prior to clearing of vegetation for necessary construction activities near streams, rivers, and lakes.
- C. Provisions required to maintain uninterrupted surface water flow shall be maintained during the work. Storm water flow in existing gutters, surface drains, and swales shall not be interrupted.
- D. The Engineer shall be notified of any unexpected subsurface or other unforeseen conditions. Work shall be discontinued until the Engineer provides notification to resume work.

1.03 PERMITS

- A. All conditions set forth in the Corps of Engineers 404 Permit , Tennessee Valley Authority 26A Permit (if applicable), and the Tennessee Department of Environment and Conservation Notice of Coverage (and Storm Water Pollution Prevention Plan (SWPPP)) shall be strictly adhered to. The Owner shall obtain the appropriate permit.

- B. The Contractor and his/her subcontractors will be required to sign the SWPPP and the Notice of Intent (NOI), thus binding them to the conditions outlined in the SWPPP and the Notice of Cover (NOC). The contractor shall be responsible for all fines and penalties arising from failure to adhere to the SWPPP, NOC, or proper erosion control practices.

PART 2 - PRODUCTS

2.01 PROTECTIVE MATERIALS

- A. Straw Bale Barriers
- B. Silt Fence and Stakes
- C. Sand Bags
- D. Stone Rip Rap
- E. Floating Boom
- F. Burlap

PART 3 - EXECUTION

3.01 PREPARATION

- A. Erosion and sediment control shall be in accordance with the Tennessee Water Quality Control Act of 1977, as amended, and the Federal Act PI 92-59.
- B. The Tennessee Department of Conservation Publication, Tennessee Erosion & Sediment Control Handbook, latest revision, shall be used as a guide for construction of projects that require erosion and sediment controls to protect adjoining property and waters of the state.

3.02 PERFORMANCE

- A. Whenever possible, a buffer strip of vegetation cover shall be kept adjacent to grading operations.
- B. Control measures shall be in place and functional before earth moving operations begin, and must be properly constructed and maintained during the construction period.
- C. Staked and entrenched straw bales or silt fence shall be installed along the base of all sloped cuts and fills, on the down hill sides of stockpiled soil, and along stream banks.

- D. All surface water flowing toward the construction area shall be diverted around the area as much as possible to reduce erosion potential by using beams, channels, and/or sediment traps as necessary.
- E. Maintenance of erosion and sediment control methods shall be performed on a regular basis throughout the construction period and until a good vegetative cover is established over the entire disturbed area.
- F. A vegetation buffer strip shall be maintained between any stream and pipe trenching. Excavated material from the trench shall not be placed between the trench and stream.
- G. Trenches or pits shall be backfilled as soon as practicable to reduce erosion potential.
- H. Erosion control measures shall be removed when they have served their useful purpose. The disturbed soil shall be fine graded, top soiled, and planted with permanent vegetation as soon as the construction sequence allows to prevent further potential erosion and sedimentation. Any seeded areas which are eroded shall be reworked as soon as possible.

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 01050: Field Engineering
- B. Section 01090: Reference Standards
- C. Section 01720: Project Records Documents
- D. Section 02210: Site Grading and Filling

1.02 JOB CONDITIONS

- A. Clear, grub, remove, and dispose of vegetation, rocks, and debris within the limits of the work except items to remain as designated on the drawings.
- B. Excavate, backfill, compact, and grade the site to the elevations shown on the drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- C. Existing utilities, poles, services lines, fences, structures, trees, shrubs, or other improvements encountered during the construction, whether above or below ground, shall be protected by the Contractor. Any item damaged or removed by the Contractor shall be repaired or replaced at the Contractor's expense to at least its original condition and to the satisfaction of the Owner. It shall be the Contractor's responsibility to locate any existing utilities in the path of construction.
- D. Notify the Engineer of any unexpected subsurface conditions. Discontinue work in area until the Engineer provides notification to resume work.

1.04 PROTECTION

- A. Protect living trees not marked for removal and outside the construction area. Treat cut or scarred surfaces of trees or shrubs with a paint prepared especially for tree surgery.
- B. Protect benchmarks and existing structures, roads, sidewalks, paving, and curbs against damage from vehicular or foot traffic.
- C. Maintain designated temporary roadways, walkways, and detours for vehicular and

pedestrian traffic.

- D. It is mandatory that the contractor employ construction methods and techniques that will not cause unnecessary environmental impact. The contractor will enforce ecologically sound construction practices to ensure acceptance by the Owner and the public and minimal environmental impact and, comply with environmental laws and regulations.
- E. Any unreasonable environmental impacts or potential noncompliance issue as determined by the appropriate regulatory agency, shall be noted and rectified at the contractor's expense, to the satisfaction of the Owner and the appropriate regulatory agency.
- F. Care shall be taken to avoid oil or chemical spills while working in or near bodies of water. Oil and fuels near bodies of water where, they can reasonably be expected to discharge to watercourses, shall be diked so that the spill can be retained until cleaned up. Any spills will be reported immediately to the Owner and Engineer.
- G. Maintenance of equipment shall not cause damage to the area being cleared and grubbed. Equipment fluids shall not drip or be drained onto any surface area. If a release occurs, notify the Owner and Engineer, and the contractor shall remediate the affected area to the satisfaction of the Owner and appropriate regulatory agency.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - PRODUCTS

3.01 PREPARATION

- A. Maintain benchmarks, monuments, and other reference points. Re-establish if disturbed or destroyed at no cost to Owner.
- B. Provide a minimum of seventy-two (72) hour notice to property owners whose property will potentially be disturbed.

3.02 CLEARING AND GRUBBING

- A. Clear rights-of-way, easements, borrow pit, and other stockpile areas of objectionable material to the ground surface except for trees and stumps.
- B. Cut trees and stumps outside the construction area marked for removal by the Engineer to within six (6") inches of the ground surface.

- C. Remove low hanging, unsound, or unsightly branches on trees or shrubs designated to remain. All branches shall be cut at the appropriate branch collars.
- D. Grub construction area of protruding obstructions except sound undisturbed stumps and roots six (6") inches or less above the ground which will be a minimum of five (5') feet below subgrade or embankment slope provided undercutting, topsoil stripping, or other corrective measures are not stipulated.
- E. Areas required for embankment construction, all stumps, roots, etc., shall be removed to a depth of minimum of five (5) feet below the existing ground surface.
- F. Herbicide use shall only be Environmental Protection Agency (EPA) approved materials and shall be applied in accordance with manufacturer recommendations. Use of herbicides must be approved by the Owner.
- G. Rights-of-way and easements will be completely clear within their total width.
- H. Grub borrow pit and stockpile areas of all objectionable material. Strip overburden over the material to be obtained in stockpile areas.
- I. Perform clearing and grubbing well in advance of construction or material removal activities.
- J. Fences are to be maintained at all times. Under no circumstances is a fence to be let down or cut without prior arrangement with the property owner. If fences are damaged, the contractor shall repair and put the fence in first class condition entirely acceptable to the property owner. Repair work is to be accomplished at time of damage, or as soon thereafter as possible at the sole expense of the Contractor
- K. Wherever feasible, access to right-of-way and/or easement shall be through an existing gate (with agreement of the property owner). The gate shall be closed immediately after each passage. Any agreements with property owners shall be obtained in writing. Copies of agreements shall be provided to the Owner and Engineer prior to proceeding.

3.03 USE OF CHEMICALS AND SPRAYS

- A. All Right-of-Way/Easement spraying shall be performed by a certified and licensed applicator. Contractor shall be responsible for purchasing, storing, and furnishing chemicals to its crews. Engineer and Owner shall be consulted prior to any use of chemicals or sprays by Contractor.

- B. Spraying of right of way/easements may be done at various locations using suitable herbicides to control vegetation particular to that location. Detailed records of the applicator's name, property owner permission, date, location, amount and type of herbicide used shall be kept and copies furnished to the Owner and Engineer on a routine basis or upon completion of the job. Prior to commencement of any Work involving the application of chemicals, the Contractor shall thoroughly familiarize and inform himself of all local conditions and other factors which could or might affect chemical spraying.
- C. Unless otherwise specified by the Owner or Engineer, the Contractor shall mix and apply the chemicals in accordance with the recommendations of the manufacturer, and the following general specifications:
 - 1. For Foliage Application: This method shall be used only on brush over three (3) feet in average height during the active plant growth period, generally between May 1 and September 1. Chemical mixture shall be applied to completely wet the entire leaf, stem and trunk surface of each plant.
 - 2. For Basal Application: This method shall be used on brush of any size at any season of the year. Chemical mixture shall be applied to completely wet the entire surface of the stem or trunk from the root crown up the stem eighteen (18) inches, with emphasis on completely wetting the root crown.
 - 3. For Stump Application: This method shall be used on all new stumps at any season of the year. Stumps shall be sprayed as soon as practical, but always on the same day that the cutting is performed. Chemical mixture shall be applied in sufficient volume to completely wet the sapwood, bark area, root crown and any exposed roots.
- D. No spraying shall be done within thirty (30) minutes after fog, dew, or rain events sufficiently heavy to cause runoff.
- E. Contractor shall not spray any portion of a Right-of-Way or Easement where damages to crops, orchards, or ornamental plants may result from chemical drift.
- F. Owner or Engineer will have the right to specify when and where chemical application and/or chemical spraying will be used in rural areas or otherwise.

- G. Contractor's use of chemicals in connection with the Work shall be in strict compliance with all federal and state laws, rules and regulations which from time to time govern the use of chemicals, including but not limited to the Tennessee Hazardous Chemical Right to Know How (T.C.A. Section 5032001, et seq.), the Tennessee Hazardous Substance Act (T.C.A. Section 6827101, et seq.), the Tennessee Application of Pesticides Act of 1978 (T.C.A. Section 6221101, et seq.), the Federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. Section 136, et seq.), and the Federal Hazard Communications Standard (29 CFR 1910.1200). By undertaking to perform any part of the Work in which chemicals are used, the Contractor certifies that Contractor is familiar with, has complied with, and at all times will comply with all requirements (including but not limited to those relating to training and the giving and posting of all required notices) under all of the foregoing laws, rules and regulations and further, the Contractor shall indemnify and hold harmless the Owner and Engineer against any liability, claim, demand, cause of action of every kind and description, damage, losses and expenses, including attorney's fees through appeals, arising or resulting from the Contractor's noncompliance with or violation of any of the foregoing laws, rules or regulations.
- H. Contractor shall be solely responsible for the accurate recording and submission of all forms required by the applicable regulatory agencies and other governing authorities in connection with the use of chemicals.
- I. Chemical spills shall be immediately cleaned up in a manner consistent with label restrictions, Federal and State regulations, and acceptable environmental procedures mandated by law, as well as, notify the Owner and Engineer. Any and all notifications to proper authorities in connection with such spills shall be made by the Contractor. Each crew responsible for chemical applications shall be supplied with a suitable spill response kit for cleaning up and neutralizing spills of chemicals, all at the sole expense of the Contractor. Contractor shall insure that its employees are trained in the proper techniques for spill response, and are supplied with the necessary personal protective equipment required to perform spill mitigation duties.
- J. Contractor shall at all times be solely responsible for the continuous safeguarding of its workforce, including compliance with all applicable Federal, State, and local laws, together with its responsibilities for training its employees in the proper methods and use of personal protective equipment required for handling chemicals used in connection with this Work.

3.04 BACKFILLING AND SURFACE PREPARATION

- A. Backfill and compact all depressions resulting from clearing and grubbing with suitable materials in accordance with Section 02210.
 - 1. Backfill embankment areas to natural ground elevation.
 - 2. Backfill excavation areas below finished subgrade to finish subgrade.

- B. Perform backfilling a satisfactory distance ahead of construction operations.
- C. Prepare areas designated on the drawings to receive erosion control matting to smooth surfaces that have been shaped, fertilized, and seeded.
- D. All depressions/holes remaining after clearing and grubbing shall be backfilled and tamped as directed by the Engineer. In areas to be immediately excavated, the Engineer may direct that the holes may not be backfilled.
- E. The entire area will be repaired to prevent ponding of water and to provide drainage.
- F. All disturbed areas shall be restored in accordance with Section 02260 Finish Grading and Section 02485 Seeding

3.05 DEBRIS REMOVAL

- A. Promptly remove cleared debris from site.
- B. Obtain permission from applicable regulatory authority for disposal of debris to waste disposal site.
- C. Under no circumstances are brush, trees, and debris to be buried within the property, right-of-way, easements, borrow pit, and other stockpile areas.

3.06 CLEAN-UP

- A. Upon acceptance of the Work, the Contractor shall reinstate the Project areas affected by the operations.
- B. Removal and replacement of fences, damage repair to yards, lawns, sidewalks, driveways, roads, other utilities, etc. due to movement of excavating or other equipment and/or erection of equipment and/or any other activities associated with the Work shall be the sole responsibility and at the sole expense of the Contractor unless specifically designated for payment under the Contract Unit Price Schedule.

3.07 MEASUREMENT AND PAYMENT

- A. Measurement of clearing and grubbing area will not be made unless it is identified as a Unit Price Item on the Bid Form.
- B. Payment for clearing and grubbing shown on the drawings or specified herein shall be included in the work with which they are associated.

- C. Clearing and grubbing will be considered subsidiary to the subsequent bid item unless a specific bid item is provided in the proposal. All work performed in clearing and grubbing areas not so designated on the Plans or in the Special Provisions, will not be paid for directly but shall be considered subsidiary work pertaining to the various bid items.
- D. Payment will not be made for unauthorized work.
- E. If a specific bid item is included in the bid proposal, all work performed will be paid for at the unit price bid for clearing and grubbing or as a lump sum price according to the bid proposal. Price shall include full compensation for furnishing all labor, materials, equipment, tools, supplies, and incidentals necessary to complete the work.

END OF SECTION

SECTION 02210

SITE GRADING AND FILLING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 01150: Measurement and Payment
- B. Section 01710: Cleaning
- C. Section 01720: Project Record Documents
- D. Section 02100: Erosion Control
- E. Section 02221: Trenching, Backfilling, and Compacting
- F. Project Drawings

1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. Comply with requirements of the authority having jurisdiction for work done on controlled property.
 - 2. Obtain permits and notices, as required, for removal of walks and drives on controlled property.

1.03 PROTECTION

- A. Protect excavations and grounds from water ponding and water damage. Construct and maintain temporary drainage. Pump, if required, to keep excavations free of water. Maintain site in well drained condition at all times.
- B. Protect, maintain, and restore benchmarks, monuments, and other reference points affected by this work. If benchmarks, monuments, or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed surveyor who shall furnish Engineer with certification of his work.
- C. Protect Utilities and other construction designated to remain in place.
- D. Protect trees to remain in place.

1.04 LINES AND GRADES

- A. It is imperative that lines and grades established on drawings, except for allowance for installation of fill aggregate, concrete, and topsoil established below, be met when this work is completed.

1.05 SUBMITTALS TO ENGINEER

- A. Submit one (1) copy of permits and notices obtained from authority having jurisdiction before commencing work.
- B. If benchmarks and other permanent reference points are displaced, obtain and submit certification, signed and sealed by a licensed surveyor, of proper re-establishment of benchmarks and reference points.

PART 2 - PRODUCTS

2.01 GRANULAR FILL

- A. Crushed or natural stone conforming to ASTM D448, Size 67, or well graded, dense mineral aggregated meeting Tennessee D.O.T. Specification 303 Class A, Grading E.

2.02 EARTH FILL

- A. Clean earth (free from organic material, cinders, ice and rocks over two (2") inches in their longest dimension) consisting of low plasticity clay having a plasticity index of less than thirty-five (35). Material should exhibit a standard proctor dry density of at least 90 p.c.f.
- B. On-site earth removed during cutting operations may be used if it meets the above requirements.

2.03 OFF-SITE BORROW

- A. Off-site borrow may be utilized provided the Geotechnical Engineer approves its use.

PART 3 - EXECUTION

3.01 REMOVAL OF OBSTRUCTIONS

- A. Clean out cellars, wells, cisterns, septic tanks and drain fields, cesspools, catch basins, manholes, and similar items to solid subgrade and break up masonry and/or concrete bottoms so that no pieces remain which are over twelve (12") inches in their largest dimension. Break out masonry and concrete sides of such construction to a depth of at least two (2') feet below bottoms of footings to be installed as part of this project or subgrade, as applicable.
- B. Fill basements, cellars, walls, and other items enumerated above with specified granular fill and compact to 100 percent Standard Proctor Density.

3.02 DISPOSITION OF ABANDONED UTILITIES

- A. If abandoned underground utility lines and electric conduit are uncovered in the course of grading, then that part uncovered shall be removed and capped off at points of removal as well as at property lines.

3.03 REMOVAL AND STORAGE OF TOPSOIL

- A. Remove topsoil to its entire depth from areas within building lines and for a distance of ten (10') feet beyond, under pavements, or other areas to be excavated, filled, or

graded.

- B. Mow grass, weeds and other annual-type growth, and brush close to ground.
- C. Scrape or rake area to remove brush, roots, loose grass, weeds, and rocks before stripping topsoil.
- D. Topsoil to be stored for reuse shall meet requirements established above.
- E. Store topsoil in area designated by Architect. Store so as to prevent erosion and mixture with debris and other materials.

3.04 GRADING

- A. Grade to uniform levels and slopes, without abrupt changes. Make transitions from levels to slopes smooth and with large radius cuts.
- B. Finish areas to a reasonably true and even plane at required elevations, less allowances for items specified above.
- C. Along the lines indicating the limits of work, taper finish grade to the existing grade at a slope matching the natural contour. Perform all of this work within the limit lines.

3.05 PLACING OF TOPSOIL

- A. Place topsoil in areas disturbed by construction and not covered by paving, buildings and other hard-surfaced materials.
- B. Scarify sub-grade to a depth of three (3") inches and spread topsoil uniformly to bring finished grade to elevations indicated after topsoil has been lightly compacted with roller. Topsoil shall be four (4") to six (6") inches thick.
- C. Level and slope topsoil as indicated so that finished grades are +/- 0.1' elevations indicated.

3.06 CLEAN-UP

- A. After all other work of this section is completed, leave area clean and free of any debris.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 01050: Field Engineering
- B. Section 01150: Measurement and Payment
- C. Section 01530: Barriers
- D. Section 01570: Traffic Regulations
- E. Section 01720: Project Record Documents
- F. Section 02100: Erosion Control
- G. Section 02260: Finish Grading
- H. Section 02485: Seeding
- I. Section 15060: Pipes, Valves, and Appurtenances

1.02 JOB CONDITIONS

- A. Provide for uninterrupted surface water flow during the work. Provide means whereby storm water can be uninterrupted in existing gutters and surface drains, or temporary drains.
- B. All pipe shall be installed in a dry trench. No extra compensation shall be allowed for trench dewatering.
- C. Immediately notify the Engineer of any unexpected subsurface or other unforeseen conditions. Discontinue work in area until Engineer provides notification to resume work.
- D. Existing utilities, poles, service lines, fences, structures, trees, shrubs, or other improvements encountered during the construction, whether above or below ground, shall be protected by the Contractor. Any item damaged or removed by the Contractor shall be repaired or replaced at the Contractor's expense to at least its original condition and to the satisfaction of the Owner. It shall be the Contractor's responsibility to locate any existing utilities in the path of construction.
- E. Adjacent structures which may be damaged by excavation work shall be underpinned or supported by other means.

- F. Excavations shall be protected by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave in or loose dirt from falling into excavation.

1.03 PERMITS

- A. Permits shall be obtained from authorities having jurisdiction prior to any explosives being brought to the site. The Contractor shall be responsible for providing such insurance that is required to hold the Owner harmless from any claims that may arise due to blasting operations at the site. The minimum insurance requirement will be that which is outlined in the General Conditions.
- B. All conditions set forth in the Corps of Engineers 404 Permit and Tennessee Valley Authority 26A Permit (if applicable), and the SWPPP, shall be strictly adhered to. The Owner shall obtain the appropriate permit.

1.04 QUALITY ASSURANCE

- A. Adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for the proper performance of the work in this section shall be used.
- B. Equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner shall be used.

PART 2 - PRODUCTS

2.01 SANITARY SEWERS

A. BEDDING MATERIAL

- 1. Angular gravel, crushed gravel, or crushed limestone meeting the following gradation requirements set forth in ASTM 33 shall be used:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
1"	100
3/4"	90 - 100
1/2"	20 - 55
3/8"	0 - 15
#4	0 - 5

- 2. Shall be used for bedding, haunching, and initial backfill of PVC pipe.
- 3. Shall be used for bedding and haunching of Ductile Iron Pipe.
- 4. Frozen materials shall not be used.
- 5. In areas where rock excavation is required, undercut the trench six (6") inches and place flowable fill prior to placing backfill material.

B. BACKFILL MATERIALS

- 1. Material excavated from the trench, free from large stones, clods, debris, or frozen lumps shall be used:

- a. For final backfill of PVC pipe.
 - b. For initial and final backfill of Ductile Iron Pipe.
- C. CRUSHED STONE BACKFILL MATERIAL: UNDER ROADS OR AREAS TO BE PAVED
- 1. Shall be used for final backfill for all pipe under roads and in areas indicated as future roads on the drawings.
 - 2. Material shall be approved by the Engineer.

2.02 WATER LINES AND FORCE MAINS

A. BEDDING MATERIALS

- 1. Angular gravel, crushed gravel, or crushed limestone, meeting the following gradation requirements set forth in ASTM 33:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
1"	100
3/4"	90 - 100
1/2"	20 - 55
3/8"	0 - 15
#4	0 - 5

- 2. Material excavated from the trench, free from large stones (any dimension greater than two (2") inches), clods, debris, or frozen lumps shall be used.
- 3. Borrow materials previously approved by the Engineer may be used for backfill material if suitable material is not available from trench.
- 4. Frozen materials shall not be used.
- 5. In areas where rock excavation is required, undercut the trench six (6") inches and place flowable fill prior to placing bedding material.

B. CRUSHED STONE MATERIAL SHALL BE USED AS FOLLOWS:

- 1. On road crossings where open cut crossings are made, crushed stone shall be used for bedding, haunching, and backfill. (See Typical Details at back of Project Manual).
- 2. In areas where rock excavation is required for installation of pipe, crushed stone shall be used for bedding, haunching, and initial backfill.
- 3. In other areas as directed by the Owner or Engineer and not otherwise required by the Contract Documents, crushed stone shall be replaced at a cost per ton previously agreed by the Owner and Contractor. The quantity of excavation work anticipated to be placed with crushed stone shall be mutually agreed to by the Contractor and the Engineer before excavation.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Line and grade for trench shall be established.

- B. Location of all underground utilities, existing and proposed shall be located.
- C. Location of existing sewer laterals, manholes and service connections shall be located prior to commencement of trenching.
- D. Location of existing water services, meters, and appurtenances shall be located prior to commencement of trenching.

3.02 PERFORMANCE

- A. All earthwork and trenching operations shall comply with the requirements of OSHA Construction Standards for the construction industry (29 CFR part 1926).
- B. Unless otherwise shown on the drawings or required by the specifications or authorized by the Engineer, all work shall be done in open, vertical trenches. Any sheeting driven below the level of the top of the pipe shall not be disturbed or removed. The responsibility for assessing the need for sheeting and analyzing the stresses induced shall be the total responsibility of the Contractor.
 - 1. Trench sheeting left in place shall be backfilled to a level of twelve (12") inches above the top of the pipe. It shall then be cut off and the upper portion removed.
 - 2. Sheeting for structures shall be left in place until backfill has been brought to a level of twelve (12") inches above the top of the bottom footing. It shall then be cut off and removed.
- C. Clearing, including removal of surfacing and pavement, shall be done as necessary to carry on the construction in the proper manner. Material shall be removed only to minimum width necessary to allow adequate construction area. Concrete and asphalt shall be saw cut.
- D. Trenches shall be excavated to such depth as required by the drawings. Trenches for water lines shall be excavated to such depth as required to provide a minimum of thirty (30") inches cover in all directions from the pipe wall, unless otherwise indicated. Maximum width of the trench at and below the top of the pipe shall not exceed the following widths.

PIPE SIZE	MAXIMUM WIDTH
6"	2' 6"
8"	2' 6"
10"	2' 6"
12"	2' 8"
15"	2' 10"
18"	3' 0"
21"	3' 3"
24"	3' 6"

- E. If rock is encountered in the trench, it shall be excavated in a manner approved by the Owner and as specified below:

1. No separate payment for trench rock excavation will be made. Trench excavation shall be considered unclassified.
 2. Trench shall be undercut one (1') foot where rock is in the trench and backfilled with crushed stone.
 3. Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws, and regulations governing blasting and the use of explosives. Rock excavation near existing pipelines or other structures shall be conducted with the utmost of care to avoid damage.
 4. All drilling, blasting, and use of explosives shall be in strict accordance with OSHA standards for the construction industry (29 CFR part 1926).
- F. Excavated material suitable for backfilling shall be stockpiled no closer than two (2') feet from the edge of the trench and shall not obstruct crosswalks, sidewalks, or street intersections, and shall not cause unreasonable interference with travel on the streets by occupants of adjacent property. Gutters and other drainage facilities shall not be obstructed. Free access shall also be maintained to fire hydrants, mailboxes, sewer and water manholes, gas meters, or other municipal facilities.

3.03 BEDDING, HAUNCHING, AND BACKFILLING

- A. Pipe shall be installed as shown on the drawings.
- B. Bedding shall be shaped and compacted to 60 percent relative density, ASTM D2049, to provide uniform bearing of the pipe. Bell holes shall be excavated to allow for unobstructed assembly of the joint. Bell holes shall be made as small as practical. After the joint has been made, bell holes shall be filled with bedding material.
- C. After pipe is jointed and aligned, haunching material shall be installed and compacted to 60 percent relative density, ASTM D2049. Ensure material is worked under the haunch of the pipe to provide adequate side support. Precautions shall be taken to prevent movement of the pipe during placement and compaction of haunching material.
- D. Initial backfill shall be hand placed and compacted to provide cover over the pipe as detailed. Pipe shall be protected from large particles of backfill material.
- E. Balance of backfill shall be placed by a method which will not damage or displace the pipe, nor cause bridging action in the trench. Backfill material shall be compacted with earthmoving equipment as material is placed so that excessive settlement of the trench material will not occur. Material shall be neatly mounded over the trench. Trench and settled areas shall be maintained as they occur. Finish grade shall be completed to eliminate uneven areas.

- F. Where pavement is to be placed over the backfilled trench as indicated on the drawings, the backfill shall be crushed stone under the full trench depth. Under future roads, compaction will be required up to within one (1') foot of existing grade with remaining one (1') foot backfill as per paragraph 3.03. E above.

3.04 CREEK AND DITCH CROSSINGS

- A. Construct pipe encasement as shown on typical details. Concrete shall be placed in the dry. Concrete: ASTM C94, 2500 psi, at twenty-eight (28) days.
- B. Construction methods that will minimize siltation and erosion shall be utilized.
- C. All backfill shall be granular material as specified for embedment material or crusher run stone.
- D. Clean up, grading, seeding, and other restoration work shall begin immediately and exposed areas shall not remain unprotected for more than seven (7) days.

3.05 TEST FOR DISPLACEMENT OF SEWERS

- A. A check of sewer pipe shall be made to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.
- B. A light shall be flashed between manholes or between locations of manholes with a flash light or sun reflecting mirror.
- C. If the pipe line shows poor alignment, displaced pipes, or any other defects, defects shall be corrected to the specified conditions at no additional cost to the Owner.

3.06 TESTING OF BACKFILL

- A. A testing laboratory or the Owner shall verify compaction of the bedding and haunching material after placement and compaction.

END OF SECTION

SECTION 02260

FINISH GRADING

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 02210: Site Grading and Filling
- B. Section 02221: Trenching, Backfilling, and Compacting

1.02 PROTECTION

- A. Prevent damage to existing fencing, trees, landscaping, natural features, benchmarks, pavement, utility lines, and structures. Correct damage at no cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of four (4%) percent and a maximum of twenty-five (25%) percent organic matter. Use topsoil stockpiled on site if conforming to these requirements.

PART 3 - EXECUTION

3.01 SUB-SOIL PREPARATION

- A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, and etc., in excess of three (3") inches in size. Remove sub-soil which has been contaminated with petroleum products.
- B. Cut out areas, to sub-grade elevation, which has been contaminated with petroleum products.
- C. Bring sub-soil to required levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- D. Slope grade away from building minimum two (2") inches in ten (10') feet unless indicated otherwise on drawings.
- E. Cultivate sub-grade to a depth of three (3") inches where topsoil is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted sub-soil.
- F. Compact sub-soil to the following:
 - 1. Under Topsoil: 85 percent modified Proctor, ASTM D1557.
 - 2. Under Streets, Drives, and Parking Areas: 95 percent standard Proctor ASTM D1557.
 - 3. Under Walks: 85 percent modified Proctor, ASTM D1557.

3.02 PLACING TOPSOIL

- A. Place topsoil in areas where seeding and planting is to be performed. Place to the following minimum depths, up to finished grade elevations.
 - 1. Six (6") inches for seeded areas.
 - 2. Twenty-four (24") inches for shrub beds.
- B. Use topsoil in relatively dry state. Place during dry weather.

- C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of sub-grades.
- D. Remove stone, roots, grass, weeds, debris, and other foreign material while spreading.
- E. Manually spread topsoil around trees, plants, and buildings to prevent damage which may be caused by grading equipment.
- F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

- A. Remove surplus sub-soil and topsoil from site.
- B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE

- A. This section includes all materials, labor, equipment, and services required for the installation of all plain and reinforced cast-in-place concrete (including formwork, reinforcement, reinforcement supports, embedded items detailed on the concrete drawings, joint fillers, joint sealers, and waterstops), and all related activities in accordance with the drawings, construction specifications, General Conditions, and other contract documents.

1.02 PUBLICATIONS REFERENCED HEREIN

- A. American Concrete Institute (ACI) as listed:
1. ACI 116R - Cement and Concrete Terminology.
 2. ACI 301 - Specifications for Structural Concrete for Buildings.
 3. ACI 305R - Hot Weather Concreting.
 4. ACI 306R - Cold Weather Concreting.
 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
 6. ACI 350R - Environmental Engineering Concrete Structures.
- B. American Society for Test and Materials (ASTM) standards:
1. CRD-C 48 - Method of Test for Water Permeability of Concrete.
 2. Concrete Reinforcing Steel Institute, Manual of Standard Practice.
 3. Federal Specifications, TT-S-00227E (COM-NBS)-70, Sealing Compound, Elastomeric Type, Multi-Component.
 4. American Association of State Highway and Transportation Officials (AASHTO), Standard Specifications - Part II, T 260 Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials.
 5. American Welding Society, Structural Welding Code - Reinforcing Steel (AWS D 1.4).

1.03 DEFINITIONS

- A. Embedded Items: All bolts, inserts, sleeves, conduit, fixtures, and other material placed so as to become anchored in cast-in-place concrete, as indicated and specified elsewhere in the contract documents.
- B. Testing Laboratory: An independent engineering testing laboratory engaged by the Owner (or as otherwise specified in the contract documents) to perform testing services required in this section not otherwise assigned.
- C. Concrete Design Mix: A concrete design mix in the quantities of specific ingredients which, when mixed, will yield one (1) cubic yard of concrete of a given strength, slump, and air content. Any variation in admixtures, cement or water content, or of any other ingredient, shall constitute a different design mix.
- D. Hydraulic Structures: Cast-in-place structures which have as their primary purpose the containment, conveyance or processing of liquids without other materials to provide water

SECTION 02485

SEEDING

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 01310: Construction Schedules
- B. Section 01560: Temporary Controls
- C. Section 01700: Contract Closeout
- D. Section 02100: Erosion Control
- E. Section 02260: Finish Grading

1.02 QUALITY ASSURANCE

- A. Seeds shall meet the requirements of the Official Seed Analysis of North America.
- B. Contractor shall provide sod where applicable for exotic grasses such as, Zoysia, Bermuda etc. The contractor and field representative shall meet with the property owner to discuss re-establishing the disturbed areas.
- C. Sod shall meet the requirements of the local producer members of Turfgrass Producers International, (TPI). TPI should be consulted on all sodding projects to gain information related to “micro-climates” and other localized conditions that could affect selection, installation and overall satisfaction with a newly sodded area.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage or purse seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Every shipment of sod shall be accompanied by an invoice or sales slip indicating whether the material is of a single variety, a blend or a mixture, species, and the quality grade of the shipment.

PART 2 - PRODUCTS

2.01 FERTILIZER

- A. Commercial type, 10-20-10 grade, granular type.
- B. Sod type, 16-16-16 grade, granular type.

- C. All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment. Fertilizers shall be delivered to the site fully labeled, according to applicable fertilizer laws and shall bear the name, trade name or trademark, and warranty of the producer or manufacturer.

2.02 SEEDS

- A. Vegetation and re-vegetation of lawn type areas where scheduled maintenance and up keep are desired and will be necessary to preserve the quality and appearance of the mature ground cover.
 - 1. Type "A" mixtures of the following:
 - (a) Type "A-1" mixture as required to match existing vegetation
 - (b) Type "A-2" Mixture of turf type tall fescue and rye consisting of: 60% turf type tall fescue -(30% certified Rebel II)(30% certified Titan) 40% turf type perennial -Rye (Palmer)
 - 2. Purity: 98 percent
 - 3. Germination: 90 percent
 - 4. Weed Seed: Less than 0.5 percent
- B. General vegetation and re-vegetation of pipeline trenches, tank and pump station sites, pastures, and roadway slopes where minimum maintenance and up keep are required.
 - 1. Type "B" mixtures of the following:
 - (a) Type B-1, non-seasonal, mixture-KY-31 tall fescue - 50%, annual rye - 50%
 - (b) Type B-2, seasonal, shall consist of the following;

TIME OF YEAR	TYPE	% (BY WEIGHT)
February-May	KY-31 Tall Fescue	85
	English Rye	15
June-September	KY-31 Tall Fescue	65
	English Rye	25
October-January	German Millet	10
	KY-31 Tall Fescue	70
	English Rye	20
	White Clover	10
	Purity	90
	Germination	90
	Weed Seed	less than 1
Phyter Tall Fescue (Fungus free) shall be used in all pasture applications, with Ky-31 Tall Fescue used in other applications		

- C. Vegetation and re-vegetation of slopes greater than 3:1 or as may be otherwise specified elsewhere in the contract documents where superior soil protection, erosion prevention, and minimum maintenance and upkeep are required.
 - 1. Type "C": Mixture of the following mixture:
 - (a) Type C-1, same as Type "B"
 - (b) Type C-2, preferred for slopes of 2:1 and greater, shall consist of the following:
 - Crown Vetch: 25%
 - Ky-31 Tall Fescue: 70%
 - English Rye: 5%
 - 2. Purity: 90%
 - 3. Germination: 90%
 - 4. Weed Seed: Less than 1.0 percent
 - 5. Type C-2 shall be applied with use of a TDOT approved soil inoculant to stimulate reproduction at the rate specified by the manufacturer of the produce selected.
 - 6. Phyter Tall Fescue (Fungus Free) shall be used in all pasture applications, with KY-31 tall Fescue used in other applications.

2.03 MULCH

- A. Non-toxic to vegetation and to the germination of seed, free from noxious seeds and weed seeds, and fresh.
 - 1. Hand or machine placement - Wheat, rye, or oat straw, air dried.
 - 2. Hydro-placement - wheat, rye or oat straw; shredded newspaper or peanut hulls, or other as approved by the Engineer.
- B. Asphalt Emulsion: SS-1.

2.04 SOD

- A. Sod shall be of good quality, free of weeds, disease, and insects and of good color and density
- B. Thickness of Cut: Sod shall be machine cut at a uniform soil thickness of 0.60 inch, plus or minus 0.25 inch, at the time of cutting. Measurement for thickness shall exclude top growth and thatch.
- C. Pad Size: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 0.5 inch (15 mm) on width and plus or minus five percent on length. Broken pads and torn or uneven ends will not be acceptable.
- D. Strength of Turf Sod Sections: Standard size sections of sod shall be strong enough that it can be picked up and handled without damage.
- E. Moisture Content: Sod shall not be harvested or transplanted when its moisture content (excessively dry or wet) may adversely affect its survival.

- F. Time Limitations: Sod shall be harvested, delivered and installed/transplanted within a period of 24 hours, unless a suitable preservation method is approved prior to delivery. Sod not transplanted within this period shall be inspected and approved by the field representative prior to its installation.
- G. Delivery and Off-Loading: Sod shall be delivered to the site specified in this contract and off-loaded using equipment furnished by the sod supply contractor. Palletized or large-roll sod shall be off-loaded at the location(s) designated for this purpose at the installation site.

2.04 LIME

- A. Agricultural ground limestone, minimum eighty (80%) percent passing No. 8 sieve, with a minimum 80 percent calcium carbonate equivalent.
- B. One (1) or both percentages greater than eighty (80) so that multiplication of the percent passing No. 8 sieve by the percent of calcium carbonate equivalent will be at least 0.72.

2.05 APPLICATION RATES

- A. Fertilizer: Ten (10 lb.) pounds per 1,000 sq. ft.
- B. Seeds:
 - 1. Type A 5.0 lbs/1000 sq. ft.
 - 2. Type B 5.5 lbs/1000 sq. ft.
 - 3. Type C 6.0 lbs/1000 sq. ft.
- C. Mulch: Two (2") inch thickness, loose measure.
- D. Asphalt Emulsion: 100 gallons per ton mulch.
- E. Lime: 75 lbs/1,000 sq. ft.

PART 3 - EXECUTION

3.01 PREPARATION

- A. When soil is in a tillable condition, cultivate to a depth of four (4") inches, reducing soil particles to a size no larger than two (2") inches for Type "B" and "C" seeding and one (1") inch for type "A" seeding.
- B. Assure seed bed is level and free of weeds, clods, stones, root, sticks, rivulets, gullies, crusting, and caking.
- C. Slopes greater than twenty (20%) percent shall be "raked" or "tracked" to produce horizontal grades following the surface contours to assist establishment of vegetation cover and reduce wash-off before germination.
- D. Preparation of areas designated for type "C" grassing. Disturbed area shall be:
 - 1. Brought to general contours three (3") inches below finished grades and prepared in accordance with 3.01, A and B.

2. The surface shall be tightened by "tracking" using a single pass of a D-6 class track machine with a minimum of eighty (80%) percent pad depth, on earth tracks traveling vertically up and down the slope.
 3. Top soil shall be placed to a uniform depth at four (4") inches over the area to bring the site up to finished grade elevations.
 4. Should seeding methods other than hydro-seeding be approved by the Engineer, lime and fertilizer shall be placed at this time.
 5. The surface shall be tightened by "tracking" using a final single pass of a D-6 class track machine with a minimum of eighty (80%) percent pad depth, on earth tracks traveling vertically up and down the slope. Care should be taken to establish and protect a uniform "tracking" pattern over the entire surface to assist the establishment of vegetation cover and reduce wash-off before germination.
 6. Areas that cannot be "tracked" as outlined in 3.01 - C-5 above shall be hand raked to establish horizontal lines following the surface contours.
- E. Preparation for disturbed areas for sod replacement shall be:
1. Brought to general contours to a point equivalent to the thickness of the cut below finished grades and prepared in accordance with 3.01, A and B.
 2. Moistening the Soil: During periods of higher than optimal temperature for the species being specified, and after all unevenness in the soil surface has been corrected, the soil shall be lightly moistened immediately prior to installation of the sod.
 3. Starter Strip: The first row of sod shall be laid in a straight line, with subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered to promote more uniform growth and strength. Care shall be exercised to insure that the pieces are not stretched or overlapped and that all joints are butted tightly to prevent voids that would cause air drying of the roots.
 4. Sloping Surfaces: On 3:1 or greater slopes, traditional size (1 sq yd / 1 sq m) sod shall be laid across the angle of the slope (perpendicular), with staggered joints and secured by tamping, pegging, stapling or other approved methods of temporarily securing each piece. Large-roll sod shall be laid in the direction of the slope, with temporary securing being at the discretion of the field representative.
 5. Swales and Intermittent Waterways: The installation of sod within drainage ways or intermittent waterways shall be determined after considering maximum channel velocities for storms of a designated intensity. Traditional size sod shall be laid perpendicular to the direction of flow and pegged to resist washout during the establishment period, while large-roll pieces shall be laid in the direction of the flow, with temporary securing being at the discretion of the field representative.

6. Watering and Rolling: The installation contractor shall water the sod immediately after transplanting to prevent drying. As sodding is completed in any one section, the entire area shall be lightly rolled. It shall then be thoroughly watered to a depth sufficient to ensure the underside of the new sod pad and soil immediately below the pad are thoroughly wet. The general contractor shall be responsible for having adequate water available at the site prior to and during installation.

3.02 FERTILIZING AND LIMING

- A. Fertilizer and lime placed mechanically shall be applied separately and mixed into the top two (2") inches of soil. Apply within forty-eight (48) hours of seeding.

3.03 MULCHING AND SEEDING

- A. Seed: Apply over the prepared area using methods that will produce a uniform application to the entire area.
- B. Mulch:
 1. Apply mulch uniformly over the area after seeding.
 2. Application shall be undertaken in a manner as to minimize bald and tightly clumped spots in the mulch that will adversely effect the seed germination and growth.
 3. Mulch shall be tacked with SS-1 or other methods as approved by the Engineer to hold mulch in place until development of the vegetation cover.
- C. Hydroseeding: Apply complete mix of fertilizer, lime, seed, and mulch uniformly over the entire area to produce a final application free of bald or weak spots and of the rates specified herein.

3.04 MAINTENANCE PERIOD

- A. Maintenance Period: Until final acceptance.

3.05 MAINTENANCE

- A. Maintain surfaces; supply additional topsoil and re-seed/sod where necessary, including areas affected by erosion.
- B. Water the entire area to ensure uniform seed germination, establish sod root system and re-water regularly to keep surface of soil damp and promote proper growth.
- C. Apply water slowly so that surface of soil will not puddle and crust.
- D. The contractor shall supply adequate water to the site. The single-most important factor in the successful rooting of newly installed sod/seeding is adequate, regular watering. Watering should begin immediately after installation. The amount of water required will vary depending upon season, weather, temperature, wind, slope, and sod/seed variety. The contractor shall ensure adequate water supply and application.

1. First Week: The contractor shall provide all labor and arrange for all watering necessary for rooting of the sod/seed. Soil on sod pads shall be kept moist at all times. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least four (4) inches. Watering should be done during the heat of the day to prevent wilting.
2. Second and Subsequent Weeks: The contractor shall water the sod/seed as required by the manufacturer to maintain adequate moisture in the upper four (4) inches of soil, necessary for the promotion of deep root growth.

3.06 ACCEPTANCE

- A. Seeded/Sodded areas will be accepted at end of maintenance period when seeded/sodded areas are properly established and otherwise acceptable.

END OF SECTION

tightness and are designed in accordance with ACI 350.

- E. Definitions of other terms used in this specification, not defined where used or elsewhere in the contract documents, shall be as given in ACI 116R.

1.04 SUBMITTALS

- A. General: All submittals required by this specification shall be to the persons or parties identified in the contract documents.
- B. Concrete Design Mix Reports: Design mix reports for each proposed concrete design mix shall be submitted. These submittals shall include the results of all tests performed to qualify the materials (including determination of chloride ion concentration) and to establish each design mix. No concrete shall be placed until the design mix for that concrete is accepted and approved by the Engineer.
- C. Concrete Permeability: Certified test results, showing that the water permeability of concrete proposed for use in any hydraulic structure designed to contain liquids satisfies the requirements of Paragraph 3.16, shall be submitted prior to the placement of any such concrete.
- D. Mill Test Reports: Certified test reports, showing compliance with the required standards, shall be submitted for any or all materials proposed for use on the project, as required by the Engineer. When so required, such test reports shall certify that the material tested is of the same quality as that proposed for use on this project.
- E. Reinforcing Steel Shop Drawings: Reinforcing steel shop drawings shall be submitted for review prior to fabrication. They shall conform to the requirements of ACI 315 and shall include placement plans, bar details, and bills of materials. Fabrication shall not be started until the submitted shop drawings have been reviewed and marked "Released for Production" by the Engineer.
- F. Formwork Shoring: The Contractor shall specify the type of forms that are to be used for the job and provide detailed drawings of formwork to insure compliance with ACI 301, Section 2. No concrete pours will be made prior to approval of the proposed formwork and rebar placement.
- G. Production Concrete Testing
 - 1. The Contractor and the Testing Laboratory shall report the results of all tests and inspections immediately after they are performed. Reports on strength tests shall include, in addition to the information required by ASTM C 39, the following:
 - a. Project name and project number.
 - b. Air temperature and temperature of concrete at time of sampling.
 - c. Slump of sample.
 - d. Air content of sample, percent.
 - e. Location where the concrete represented by the sample was deposited.
 - f. Name of person who molded the test cylinders.
 - g. Description of storage and curing conditions prior to testing.
 - h. Batching information (amount of concrete, time loaded or mixed, concrete design mix designation, type and brand of cement and any admixtures, total mixing water, maximum aggregate size, weights of ingredients, and

amount of added water).

PART 2 - PRODUCTS

2.01 QUALITY OF MATERIALS

- A. When selecting materials, the contractor shall confirm the availability of certified test reports showing compliance with all required standards. See Submittals, Paragraph D.1.

2.02 CEMENT

- A. All cement shall be Portland Cement conforming to ASTM C 150, Type I or Type II (normal or moderately sulfate resistant, respectively), and shall all be of one brand produced at a single cement manufacturing plant.

2.03 ADMIXTURES

- A. All admixtures shall be compatible with all other concrete mix ingredients and reinforcing steel, and with the intended use of the concrete. No admixtures shall be used without the consent of the Owner's representative.
- B. Admixtures to be used in concrete, when permitted, shall conform to the following specifications:
 - 1. Air entraining admixtures, ASTM C 260.
 - 2. Water-reducing, retarding, and accelerating admixtures, ASTM C 494.
 - 3. Pozzolanic admixtures (including fly ash), ASTM C 618, including the supplementary optional physical requirements.

2.04 WATER

- A. Mixing water shall meet the requirements of ASTM C 94 (subject to chloride limitations in Paragraph 2.06).

2.05 AGGREGATES

- A. Aggregates shall conform to the requirements of Section 4.2 of ACI 301.

2.06 CHLORIDE ION CONCENTRATION

- A. Unless otherwise specified, the maximum water soluble chloride ion concentration in hardened concrete at ages twenty-eight (28) to forty-two (42) days contributed from the ingredients of the concrete including water, aggregates, cement, and admixtures shall not exceed 0.10% by weight of the cement. The water soluble chloride ion concentration in each proposed concrete design mix shall be determined by testing in accordance with AASHTO T260.

2.07 STORAGE OF MATERIALS

- A. The storage of cement, aggregates, and admixture materials shall conform with Section 4.1 of ACI 301. Reinforcing shall be stored clear of the ground and protected from formation of rust and other damage.

2.08 FORMWORK

- A. All formwork shall conform to the requirements of Section 2 of ACI 301.

2.09 REINFORCEMENT

- A. Reinforcement material shall conform to the requirements of Section 3 of ACI 301 (all reinforcing bars shall be Grade 60 unless noted otherwise on the drawings). No coated bars shall be accepted unless otherwise noted or approved in writing by the Engineer.

2.10 WIRE BAR SUPPORTS

- A. Wire bar supports shall be plastic coated when in contact with forms for concrete that is to be left exposed. Such bar supports shall be in accordance with Class 1, maximum protection, in Chapter 3 of Manual of Standard Practice by the Concrete Reinforcing Steel Institute. All other wire bar supports shall conform to Class 2, moderate protection (or to Class 1).

2.11 PRE-MOLDED EXPANSION JOINT FILLER

- A. Pre-molded expansion joint filler material shall conform to ASTM D 1752, Type I or II, or to ASTM D 1751.

NOTE: If ASTM D 1751 joint filler material is used, backer material compatible with the joint sealer shall be used between the joint sealer and the joint filler material. Such backer material must provide a complete permanent separation of the joint filler and the joint sealer.

2.12 JOINT SEALER

- A. Joint sealer shall be a self-leveling two (2) component polysulfide material conforming to Federal Specification TT-S-00227E, Type 1, Class A.

2.13 WATERSTOPS

- A. Waterstops shall be "Waterstop RX" as manufactured by American Colloid Company or approved equal.
- B. Products proposed as an equal to those specified shall be submitted to the Engineer for review. Submittals shall include sample, specifications, and list of various installations of similar applications.

2.14 CURING MATERIALS

- A. Waterproof sheet material (such as polyethylene film) shall conform to ASTM C 171.
- B. Membrane curing compound material shall conform to ASTM C 309, Type I-D with fugitive dye. Materials containing wax, silicones, or other ingredients detrimental to subsequent floor finishes, are not acceptable.
- C. Other suitable materials, which when saturated over a period of time will not stain the concrete or otherwise be detrimental to the work may be used if approved by the Owner's representative.

2.15 GROUT

- A. All grout shall be one (1) of the following non-shrink grouts and shall be in accordance with ASTM C827, ASTM C191 and ASTM C109: Crystex (L & M Construction Chemicals), Five Star (US Grout Corporation), or Masterflow 713 (Master Builders). The installation and curing of all grout shall be in accordance with the manufacturer's recommendations. All grout shall be submitted to the Engineer for approval prior to placement.

PART 3 - EXECUTION

3.01 GENERAL

- A. All concrete shall be of the specified quality and capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by these specifications and the contract documents.

3.02 STRENGTH

- A. The specified compressive strength of the concrete, f_c , shall be 4000 psi unless otherwise specified. Strength requirements shall be based on a twenty-eight (28) day compressive strength unless a different test age is specified.

3.03 WEIGHT

- A. Unless otherwise specified, the concrete shall be regular weight. When lightweight concrete is specified, the concrete proportions shall be selected to meet the specified limit on maximum air-dry unit weight as measured in accordance with ASTM C 567.

3.04 DURABILITY

- A. Air-entrainment and air content measurement for all concrete shall conform with ACI 301 (Section 4.2.2.4) requirements for concrete subject to potentially destructive exposure as follows:

Aggregate Size	Percent Air Content by Volume
#7 (1/2" max.)	5 to 9
#67 (3/4" max.)	4 to 8
#57 (1" max.)	3.5 to 6.5

- B. Measurement of air content shall conform to ASTM C 138, C 173, or C 231. Unless otherwise specified, ASTM C231 shall be used.

3.05 WATER-CEMENT RATIO

- A. Unless otherwise specified, all concrete for structures designated as hydraulic structures and or designed to contain liquids (such as chests), shall have a water-cementing material (cement plus any accepted pozzolans) ratio not to exceed 0.45 by weight. All other concrete shall have a water-cementing material ratio not to exceed 0.50 by weight.

3.06 MINIMUM CEMENT

- A. Unless otherwise specified, the minimum cementing material (cement plus accepted pozzolans) content per cubic yard for all concrete shall be as follows (from ACI 301, Table 4.2.2.1):

Nominal Maximum Aggregate Size	Minimum Cement*
1" (#57 stone)	520 pounds/cubic yard (5.5 Bags/cu.yd.)
3/4" (#67 stone)	540 pounds/cubic yard (5.7 Bags/cu.yd.)
1/2" (#7 stone)	590 pounds/cubic yard (6.3 Bags/cu.yd.)

*Maximum 20% pozzolan by weight.

3.07 MINIMUM CEMENT FOR HYDRAULIC STRUCTURES

- A. Unless noted otherwise, the minimum cementing material (cement plus any accepted pozzolans) content per cubic yard for hydraulic structures shall be as follows (from ACI 350, Section 3.5.1, and ACI 301, Table 4.2.2.1):

Nominal Maximum Aggregate Size	Minimum Cement*
1" (#57 stone)	536 pounds/cubic yard (5.7 Bags/cu.yd.)
3/4" (#67 stone)	564 pounds/cubic yard (6.0 Bags/cu.yd.)
1/2" (#7 stone)	590 pounds/cubic yard (6.3 Bags/cu.yd.)

*Maximum 20% pozzolan by weight (fly ash).

3.08 SLUMP

- A. Unless otherwise specified, all concrete, except floor slabs with specified f'c of 4000 psi or greater, shall be proportioned and produced to have a slump of four (4") inches or less. Concrete for floor slabs with specified f'c of 4000 psi or greater shall be proportioned and produced to have a slump of three (3") inches or less.
- B. A tolerance of up to one (1") inch above the maximum is allowed for one (1) batch in any five (5) consecutive batches tested. Concrete of lower than usual slump may be used only if it is properly placed and consolidated. The slump shall be determined in accordance with ASTM C 143.

3.09 MAXIMUM SIZES OF COARSE AGGREGATE

- A. Unless noted otherwise, the maximum nominal size of the coarse aggregate shall not be more than that of #57 stone (one (1") inch), 1/5 of the narrowest width of beams or walls, 1/3 of the depth of slabs, nor 3/4 of the minimum clear spacing between reinforcing bars. Additionally, the maximum nominal size of the coarse aggregate shall not be less than that of #7 stone (1/2").

3.10 ADMIXTURES

- A. Admixtures used shall conform to the requirements in Paragraph 2.03 and shall be subject to the following limitations.
- B. Admixtures containing calcium chloride shall not be used.
- C. All admixtures shall be used in accordance with the manufacturer's instructions.

3.11 SELECTION OF PROPORTIONS

- A. Each concrete design mix (see Definitions, Paragraph C.1.) shall be proportioned in accordance with ACI 301 (Section 4 on the basis of previous field experience or laboratory trial mixtures).

3.12 PROPORTIONING ON THE BASIS OF PREVIOUS FIELD EXPERIENCE OR TRIAL MIXTURES

- A. The determination of the standard deviation shall be in accordance with ACI 301 (Section 4).
- B. The determination of the required average compressive strength shall be in accordance with ACI 301 (Section 4).
- C. The documentation of the average strength shall be in accordance with ACI 301 (Section 4). See Submittals, Paragraph A.1.

3.13 PROPORTIONING BASED ON EMPIRICAL DATA

- A. Unless otherwise specified, concrete shall not be proportioned based on empirical data.

3.14 REDUCTION OF THE REQUIRED AVERAGE STRENGTH

- A. After sufficient data becomes available during construction, the amount by which the average strength must exceed the specified minimum strength f'_c may be reduced, subject to approval by the Owner's representative, in accordance with ACI 301 (Section 4.2).

3.15 LIGHTWEIGHT CONCRETE

- A. The ability of the selected proportions to meet the specified limits for air-dry weight shall be verified by tests made in accordance with ASTM C 567. The air-dry unit weight shall be correlated with the fresh unit weight of the same concrete to permit use of the latter as the basis for acceptance during construction.

3.16 HYDRAULIC STRUCTURE WATER PERMEABILITY

- A. The permeability of trial batch concrete proposed for use in any watertight structure indicated on the drawings shall not exceed ten (10) by ten (10) to the minus of twelve (12) when tested in accordance with CRD-C 48 (Method of Test for Water Permeability of Concrete).

PART 4 - PERFORMANCE OF WORK

4.01 FORMWORK

- A. The design and installation of all formwork shall be in accordance with ACI 301 (Section 2) except as otherwise specified (see Paragraph 4.13 for requirements for removal of forms).
- B. Chamfer strips, 3/4" x 45 degrees in size, shall be used at all edges of formed concrete to be left exposed, unless otherwise specified.
- C. Tolerances: Unless otherwise specified, formwork shall be constructed so that the concrete surfaces will conform to the tolerances given to ACI 301 (Section 2.3).
- D. The preparation of form surfaces shall be in accordance with ACI 301 (Section 2.2) except as otherwise specified.
- E. The portion of the forms in contact with concrete surfaces to receive joint sealer shall be free of any substance which will remain on these surfaces and cause the adhesion between the surfaces and the sealer to be weakened.

- F. Form tie assemblies for hydraulic structures shall be of such type as to leave no metal or other material within 1 1/2" of the surface. The assembly shall provide a cone-shaped depression at the surface of the concrete at least one (1") inch in diameter and 1 1/2" deep to allow filling and patching.
- G. When a portion of single rod ties are to remain in a liquid retaining structure, the portion that is to remain shall be provided with a tightly fitted washer at midpoint.

4.02 REINFORCEMENT

- A. Reinforcing shall not be welded unless otherwise specified. When welding of reinforcement is specified all such welding shall conform to AWS D 1.4.
- B. If welding is specified for zinc-coated or epoxy-coated reinforcement, zinc coatings shall be repaired afterwards with a zinc-rich formulation conforming to ASTM A 767 and epoxy coatings shall be repaired with a patching material conforming to ASTM A 775. Such repairs shall conform to the material manufacturer's recommendations. All welds, and all steel splice members used to splice reinforcing bars, shall be coated with the material used for repair of coating damage.
- C. The fabrication of reinforcing steel shall conform to the requirements of ACI 301 (all reinforcement shall be cold bent unless otherwise specified).
NOTE: Fabrication shall not be started until the reinforcing steel shop drawings have been reviewed and marked "Released for Production," by the Engineer. See Submittals, Paragraph E.1.
- D. Tolerances for the fabrication of reinforcing steel shall conform to Figures 4 and 5 of ACI 315.
- E. Tolerances for the placing of reinforcing steel shall conform to the requirements of ACI 301 (Section 3.3).
- F. The placing of reinforcing steel shall conform to the requirements of ACI 301 (Section 3.3), except as otherwise specified.
- G. Positioning of wire mesh shall be done in a manner that will allow lifting it off of the subgrade at least as indicated, but not closer to the surface of the concrete than one (1") inch or closer than 1 1/2" to the ground.

4.03 CONSTRUCTION AND CONTROL JOINTS

- A. Joints allowed, but not indicated on the contract documents, shall be located and constructed to minimize the impact on the strength of the structure. All locations shall be approved by the Owner's representative. In general, joints, when necessary, shall be located as near as possible to the middle of the spans of slabs, beams, and girders. Joints, when necessary in columns and walls, shall be at the underside of beams, and girders, and at the top of footings. Beams, girders, brackets, column capitals, haunches, and deep panels shall be placed at the same time as slabs.
- B. In floor slabs on grade, unless otherwise indicated on the drawings, provide construction or control joints continuously on maximum spacing of fifteen (15') feet, unless otherwise specified, in a grid pattern which coincides with column centerlines whenever feasible, and as approved by the Owner's representative.
- C. Unless otherwise specified, control joints shall be completed while the concrete is still in the plastic state.

4.04 EXPANSION AND ISOLATION JOINTS

- A. Reinforcement or other embedded metal items bonded to the concrete (except dowels in slabs on grade, bonded on only one (1) side of the joint) shall not be permitted to extend continuously through any expansion joint.
- B. Provide 1/2" wide expansion joints continuously at edges of slabs on grade abutting walls, columns, foundations, and other construction, unless otherwise indicated. Joint filler material shall extend full depth of joint except for space at top required for joint sealer, and shall be securely positioned.
- C. Exposed corners with rough edges shall be smoothed with an abrasive tool prior to sealer installation. Immediately prior to sealer installation, concrete surfaces to receive the sealer shall be clean and dry.

4.05 WATERSTOPS

- A. The design and location of waterstops shall be as shown on the drawings. See Paragraph 2.13 for waterstop material (unless specified otherwise).
- B. Each piece of pre-molded waterstop shall be of the maximum practical length in order to reduce the number of required splices.
- C. Waterstop material shall be butted at all joints to form a continuous barrier. Joints shall develop water tightness equal to that of continuous waterstop material.

4.06 OTHER EMBEDDED ITEMS

- A. All trades whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to set and/or furnish embedded items before the concrete is placed.

- B. Embedded Items
 - 1. All embedded items in any section or area in concrete which is scheduled to be placed, including anchor bolts (free of oil and other foreign matter), shall be set true within 1/8" of position shown on the drawings or as otherwise indicated, securely installed, and shall be thoroughly checked by the Contractor before concreting for that section or area is started. Voids in these items shall be filled temporarily with readily removable material to prevent the entry of concrete into these voids.

4.07 PRODUCTION OF CONCRETE

- A. The production of all concrete shall conform to the requirements of ACI 301 (Section 4).
- B. The control of admixtures shall conform to the requirements of ACI 301 (Section 4.3).

4.08 TEMPERING AND CONTROL OF MIXING WATER

- A. Concrete shall be mixed only in quantities for immediate use. Concrete which has started to harden shall be discarded and shall not be re-tempered.
- B. When concrete arrives at the job site with slump below that suitable for placing, as indicated by the specifications, water may be added only as follows:
 - 1. If approved by the concrete manufacturer and the Owner's representative, water may be added, but only once at the rate of one (1) gallon per cubic yard, and only if neither the design mix water-cement ratio nor the maximum slump for the concrete mix is exceeded. If allowed, an addition of water above that permitted by the water-cement ratio limitation shall be accompanied by addition of a quantity of cement sufficient to maintain the proper water-cement ratio.
 - 2. The additional water shall be incorporated into the mixture by mixing for a minimum of an additional thirty (30) drum revolutions in accordance with ASTM C 94. Immediately after such additional mixing, representative samples shall be taken for separate strength tests.

4.09 EXTREME WEATHER CONDITIONS

- A. During Hot Weather
 - 1. Whenever the job temperature is over, or likely to be over, 80° F, all mixing, placement, and finishing procedures shall be directed to keeping the concrete at a temperature not in excess of 85° F maintained reasonably uniform, and to maintain uniform moist conditions. Refer to ACI 305R Hot Weather Concreting.
- B. During Cold Weather
 - 1. When daily temperatures are generally below 40° F, the temperature of the concrete at the time of placing shall be above 50° F, but not higher than 85° F. Provisions shall be made for maintaining the placed concrete at a temperature above 50° F for a period of at least six (6) days. Refer to ACI 306R Cold Weather Concreting.

4.10 PREPARATION BEFORE PLACING CONCRETE

- A. General
 - 1. Immediately prior to concreting, the place of deposit and all mixing, transporting, conveying, and placing equipment shall be available for inspection. The Contractor shall give the Owner's representative twenty-four (24) hours notice before placing concrete. Access shall be provided by the Contractor to top and bottom of forms prior to inspection.
- B. The inner surfaces of conveying equipment shall be free of hardened concrete and foreign materials.
- C. Preparation of previously cast construction joint surfaces shall be completed. All laitance, soft mortar, dirt, form oil, or other foreign materials shall be removed. Except as otherwise specified, the preparation shall be as follows:
 - 1. The previously cast concrete shall be moistened thoroughly (damp but completely free of standing water or free moisture).
 - 2. The surfaces of all vertical construction joints cast against bulkheads shall be roughened to uniformly expose the aggregate, and then washed with clean water to remove all dust and loose particles.
 - 3. The surfaces of all horizontal construction joints in work designed to contain liquids (such as chests) shall be dampened (but not saturated) and then thoroughly covered with a two (2") inch thick (minimum) coat of cement grout of similar proportions to the mortar in the concrete. The fresh concrete shall be placed before the grout has attained its initial set.
 - 4. Surfaces specified to receive an adhesive (see Paragraph 2.16) shall be prepared and the adhesive applied in accordance with the manufacturer's recommendations.
- D. Formwork shall be completed; snow, ice, and water shall be removed; reinforcement shall be secured in place; expansion joint material, anchor bolts, and other embedded items shall be properly positioned.
- E. Reinforcement shall be free of dirt, loose scale, oil, ice, kinks, or bends not shown on the details, and free of rust which could be removed by moderate hand wiping.
- F. Preventing Cave-Ins
 - 1. Adequate means of preventing cave-ins of earth during placement of concrete shall be provided. All work shall conform to OSHA Standards.
- G. Preventing Absorption of Water
 - 1. Earth, against which concrete is placed, shall be sufficiently damp to prevent absorption of water from the concrete, without allowing water to stand.
- H. Grade under slabs shall conform to line and grade of slab bottom indicated.
- I. Concrete shall not be placed on frozen ground.
- J. The readiness of each place to receive concrete shall be approved by the Owner's representative before concreting is begun.

4.11 CONVEYING AND DEPOSITING CONCRETE

- A. General
 - 1. Conveying and depositing of concrete shall be in accordance with ACI 301 (Section 5) and the following additional requirements:
- B. Concrete shall be conveyed and deposited in such a manner as to prevent separation of ingredients and to minimize re-handling and flowing. In depositing concrete, the following requirements shall be observed:
 - 1. At free-fall heights of six (6') feet or less, concrete may be deposited without the use of a dropchute, if apparent separation of ingredients does not occur.
 - 2. For free-fall heights greater than six (6') feet, a dropchute shall be used.
 - 3. For hydraulic structures, the free-fall height shall not exceed four (4') feet.
- C. When concrete is placed against earth, care shall be taken to prevent mixing of earth and concrete during placing and consolidation.
- D. Concrete shall be properly consolidated at or near the place of deposit. Vibrators shall not be used to move the concrete to other parts of the form. Adequate reserve vibration equipment shall be on hand to ensure continuous consolidation of all freshly placed concrete.
- E. All concrete surfaces to receive grout, or an additional concrete pour, shall be roughened with a rake or coarse broom before the fresh concrete obtains final set.
- F. Unless otherwise specified, concrete shall not be deposited under water. If so specified, procedures for placing such concrete shall ensure that concrete enters the mass of previously placed concrete from within, causing water to be displaced with minimum disturbance at the surface of the concrete. Placing procedures and the concrete mix design shall be approved by the Engineer.

4.12 CURING AND PROTECTION

- A. Beginning immediately after placement, concrete shall be cured and protected in accordance with ACI 301 (Section 5) and as follows:
 - 1. Concrete surfaces to receive joint sealer shall be kept free of any substance which might cause the adhesion between these surfaces and the joint sealer to be weakened.
 - 2. After the concrete has been placed, anchor bolts shall be protected from corrosion by daubing the threads with grease, wrapping with burlap, and then covering bolts with wooden boxes or plastic protectors.
 - 3. Extra attention to water curing shall be given to concrete slabs exposed to the sun's rays throughout the curing period, especially on any day when the surface temperature reaches 80° F. Each surface shall be kept wet.
 - 4. Curing of floor hardened surfaces shall be in accordance with the recommendations of the manufacturer of the floor hardener.
 - 5. Housing, covering, or other protection used to maintain elevated temperature shall remain in place for at least twenty-four (24) hours after artificial heating is discontinued.

NOTE: ACI 301 requires that the curing of all concrete be continued for at

least seven (7) days, except for high-early-strength concrete for which the minimum period is three (3) days. Alternately, ACI 301 permits terminating proper moisture retention measures when properly field-cured cylinders reach 70% of f_c , or when laboratory-cured cylinders reach 85% of f_c .

4.13 REMOVAL OF FORMS AND RESHORING

- A. The removal of forms and reshoring shall conform to ACI 301 (Section 2) and the following additional requirements.
- B. Unless otherwise specified, forms and shoring supporting the weight of elevated slabs, beams, columns, and load bearing walls shall remain in place until the concrete attains at least seventy-five (75%) percent of the specified compressive strength, f_c , but not less than 3000 psi.
- C. Unless otherwise specified, forms and shoring supporting the weight of all other concrete shall remain in place until the concrete attains at least fifty (50%) percent of the specified compressive strength, f_c , but not less than 2000 psi.
- D. Unless otherwise specified, construction loads plus dead load on elevated slabs, beams, columns, and walls shall not exceed fifty (50%) percent of the design live load and dead load until the specified compressive strength is attained, unless shoring, designed to carry the total load is in place.
- E. For the purpose of determining when form removal is allowed, the concrete will be presumed to have reached the specified strength when either of the following conditions have been met:
 - 1. When test cylinders, field cured along with the concrete they represent, have reached the strength specified for form removal. The cylinders shall be molded and tested in accordance with Paragraph 4.22 (Testing).
 - 2. When the concrete has been cured in accordance with Paragraph 4.12 (Curing and Protection), for the same length of time as the age at test of laboratory-cured cylinders which reach the strength specified for form removal. The length of time the concrete in the structure has cured shall be taken to be the cumulative time that the concrete has been dampened or thoroughly sealed against moisture loss and the temperature has been maintained above 50° F.
- F. Forms to be reused shall be cleaned immediately after removal.
- G. **No form shall be removed prior to 48 hours after completion of a concrete pour.**

4.14 REPAIR OF SURFACE DEFECTS

- A. Surface defects, including tie holes shall be repaired immediately after form removal in accordance with ACI 301 (Section 5), except as otherwise specified.
- B. Unless otherwise specified, all tie holes shall be plugged.

4.15 FINISHING OF FORMED SURFACES

- A. In cases of exposed concrete, all formed surfaces shall be rubbed locally to remove

loosened surface particles, to reduce misalignments of forms to not over 1/16", and to provide a uniform surface texture, immediately after removal of forms and subsequent removal of any concrete fins and after completion of any patching.

- B. In liquid retaining structures, concrete shall be rubbed to one (1') foot below the minimum liquid level (as specified by the Engineer).
- C. In cases of unexposed concrete, no further work is required after the patching is completed.

4.16 FINISHING OF UNFORMED (TOP) SURFACES

- A. All unformed surfaces shown on the plans as level or sloping planes shall be finished to a Class B finishing tolerance (1/4" in ten (10') feet as determined by a ten (10') foot straightedge placed anywhere on the slab in any direction), unless otherwise indicated (see definition of each Class of Finishing Tolerances in ACI 301, Section 5).
- B. Any depressed surface shall be struck off to elevations noted on plans.
- C. Unless otherwise indicated, one (1) of the following finishes shall be provided, depending upon the use to which the surface will be subjected:
 - 1. Float Finish - Provide an even, level, dense surface by mechanical and/or hand floating to establish finished grades.
 - 2. Soft-Textured Broom Finish - The surface shall be thoroughly hand or mechanically floated as required for Float Finish. Following any trowelling required to meet the specified finishing tolerance, the surface shall be lightly brushed with a soft bristled broom to produce a uniform, slightly textured surface, with grooves at right angles to the direction of greater traffic.
 - 3. Rough-Textured Broom Finish - The surface shall be thoroughly hand or mechanically floated as required for Float Finish. Following any trowelling required to meet specified finishing tolerance, the surface shall be lightly brushed with a coarse bristled broom to produce a uniform roughly textured surface, with grooves at right angles to the direction of greater traffic.
 - 4. Trowel Finish - After thorough hand or mechanical floating, when no additional mortar or moisture can be drawn to the surface, and when the concrete is sufficiently hardened to bear a man's weight without imprint, the surface shall be steel trowelled smooth. Final trowelling by hand shall produce a ringing sound when the trowel is drawn across the surface. This requires a Class A finishing tolerance (1/8" in ten (10') feet as determined by a ten (10') foot straightedge placed anywhere on the slab in any direction).

4.17 METALLIC FLOOR HARDENER APPLICATION

- A. When application of a metallic floor hardener is specified on the drawings, the hardener material shall be applied to a float finished surface at the rate recommended by the manufacturer for the particular type of service to which the floor will be subjected, in accordance with procedure demonstrated in the preparation of a Floor Slab Test Panel. The finish shall match the texture and density of the Floor Slab Test Panel finish selected by the Owner's representative as the model for this work.

4.18 ARCHITECTURAL CONCRETE

- A. All concrete designated as architectural concrete on the drawings or elsewhere in the contract documents shall conform to the requirements of ACI 301 (Section 6) for architectural concrete.

4.19 MASSIVE CONCRETE

- A. All concrete with a least dimension greater than six (6') feet, or when designated on the drawings, shall be treated as mass concrete and the requirements of ACI 301 (Section 8) for massive concrete shall be satisfied.

4.20 PRECAST - PRESTRESSED CONCRETE

- A. Precast - Prestressed concrete shall be in accordance with Section 03413, Precast - Prestressed Concrete, of the construction specifications.

4.21 JOB-CAST, POST-TENSIONED, PRESTRESSED CONCRETE

- A. Job-cast, post-tensioned, prestressed concrete shall conform to the special provisions of Section 9 of ACI 301 in addition to all other applicable portions of the Cast-In-Place Concrete section of the specification.

4.22 TESTING

- A. Concrete testing procedures, except as otherwise provided, shall be as follows:
 - 1. Determining Air Content - ASTM C 173 (Test for Air Content of Freshly Mixed Concrete by the Volumetric Method), or other suitable method approved by the Owner's representative.
 - 2. Determining Slump - ASTM C 143 (Test for Slump of Portland Cement Concrete).
 - 3. Making, curing, and Shipment of Test Specimens - ASTM C 31 (Making and Curing Concrete Compressive and Flexural Test Specimens in the Field), with special attention to consolidation, prevention of water evaporation, temperature control and handling.
 - 4. Compression Testing of Strength Test Specimens - ASTM C 39 (Test for Compressive Strength of Cylindrical Concrete Specimens).
- B. Unused Concrete
 - 1. Concrete in samples removed from concrete trucks for testing purposes shall be wasted on the site as directed by the Owner's representative.

4.23 EVALUATION AND ACCEPTANCE OF CONCRETE STRENGTH AND STRUCTURE

A. General

1. The evaluation of test results, acceptance of concrete, core tests (if required), and acceptance of structure shall be in accordance with ACI 301 (Section 1.6 and 1.7), and the contract documents.

B. Embedded Items

1. Embedded anchor bolts shall be installed per Section 4.06 of this specification and the Contract Documents. Anchor bolts shall be secured in place at the time of inspection with markings to identify grade and size per ASTM.

END OF SECTION

SECTION 11112

VERTICAL SINGLE WALL POLYETHYLENE STORAGE TANK

PART 1 – GENERAL

1.01 Scope

- A. This specification covers upright, cylindrical, flat bottom, single wall tanks molded in a one-piece seamless construction by the rotational molding process. The tanks shall be designed for above-ground, vertical installation and be capable of containing chemicals at atmospheric pressure. Included in this specification are requirements for materials, properties, design, construction, dimensions, tolerances, workmanship, and appearance. The tank capacity shall be a minimum of 16,000 gallons.
- B. Contractor shall supply and install all materials, equipment, appurtenances, specialty items, and services required to provide an upright, single wall, flat bottom, closed top, polyethylene storage tank for storage of the Landfill Leachate. Each tank is to be molded in one-piece seamless construction according to ASTM D 1998 and will be capable of storing the leachate at atmospheric pressure.

1.02 Manufacturer

- A. Tanks shall be manufactured by Snyder Industries Inc. or approved alternate.

1.03 Applicable Documents

- A. ASTM (American Society for Testing and Materials) Standards:
 - 1. D618 Conditioning Plastics and Electrical Insulating Materials for Testing
 - 2. D638 Tensile Properties of Plastics
 - 3. D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - 4. D883 Definitions of Terms Relating to Plastics
 - 5. D1505 Density of Plastics by the Density-Gradient Technique
 - 6. D1525 Test Method for Vicat Softening Temperature of Plastics
 - 7. D1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics
 - 8. D1998 Standard Specification for Polyethylene Upright Storage Tanks
 - 9. D2765 Degree of Crosslinking in Crosslinked Ethylene Plastics as Determined by Solvent Extraction
 - 10. D2837 Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
 - 11. D3892 Practice for Packaging/Packing of Plastics
 - 12. F412 Definitions of Terms Relating to Plastic Piping Systems
- B. ARM (Association of Rotational Molders) Standards: Low Temperature Impact Resistance (Falling Dart Test Procedure)
- C. ANSI Standards: B-16.5 Pipe Flanges and Flanged Fittings

1.04 Submittals

- A. Drawings and Data: The manufacturer's shop drawings shall be approved by the engineer and contractor prior to the manufacturing of the tank(s). Data and specifications for the equipment shall include, but shall not be limited to, the following submittals.

- B. Contractor shall submit for review sufficient literature, detailed specifications, and drawings to show dimensions, materials used, design features, internal construction, weights and any other information required by the ENGINEER for review of storage tanks and accessories.
- C. Information to be included with submittals are specified below:
1. Shop drawings for the tanks shall include as a minimum the following:
 - a. Service Conditions: Chemical environment and temperature.
 - b. Statement that fabrication shall be in accordance with ASTM D 1998, where applicable.
 - c. Sizing and description of the fittings and accessories for each tank that are to be supplied by the tank manufacturer.
 - d. Layouts and assembly schedules for each tank identifying the location and elevation from the bottom of the tank for all inlet, outlet and other integrally molded connections and appurtenances supplied by the tank manufacturer.
 2. Resin - A copy of the resin data sheet from the resin manufacturer for the tank is to be supplied and the tank manufacturer is to certify that it will be the resin used in the manufacture of the tank. Verification may be required if the resin is to be FDA or NSF 61 listed.
 3. Wall thickness - Prior to the manufacture of the tank the designed wall thickness audit is to be supplied based upon ASTM D1998 @ 100 degrees F
 4. Tank restraint – If supplied, the drawings and calculations for the system are to be supplied.
 5. Supporting information on fittings and accessories to be supplied.
 6. Technical Manuals: The tank manufacturers Guideline for Use & Installation is to be submitted for review.
 7. Manufacturer's warranty
 8. Manufacturer Qualifications: The manufacturer is to have rotationally molded tanks based upon ASTM D 1998 utilizing Type I and Type II resins for the last 10 years.
 9. Installation certificate: Once installed the installer is to certify that the tank system has been installed according to the tank manufacturer's Guidelines for Use & Installation.
 10. Factory Test Report: Upon completion of the tank the manufacturer's inspection report is to be supplied for each tank.
 - a. Hydrostatic test (See 1.09 F.)
 - b. Verification of fitting placement (See 1.09 B.)
 - c. Visual inspection (See 1.09 G.)
 - d. Verification of materials

1.05 Chemical Compatibility

A. Chemical compatibility shall be according to the following chemical resistance guides:

Compass Publications -

Pruett, Kenneth M., "Chemical Resistance Guide for Plastics"

Pruett, Kenneth M., "Chemical Resistance Guide for Metals and Alloys"

Pruett, Kenneth M., "Chemical Resistance Guide for Elastomers III"

B. These references shall be considered as general guidelines only. In many cases, combinations of these chemicals are used in such a way that only the customer (by testing molded product samples) can make a determination in regards to acceptability.

Chemical	Concentration	Tank Resin	Tank Design Info	Fitting Material	Gasket Material	Bolt Material
Acetic Acid	60	HDLPE & XLPE	1.5/AST M	PP/PVC	EPDM	316SS/Hastelloy/Titan.
Acetic Acid	80	HDLPE	1.9/AST M	PP	EPDM	316SS/Hastelloy/Titan.
Acrylic Emulsions	50	XLPE	1.9/AST M	PVC	EPDM	316SS
Aluminum Sulfate	50	HDLPE & XLPE	1.5/AST M	PVC	EPDM	316SS**/Hastelloy/Titan.
Ammonium Sulfate	40	HDLPE & XLPE	1.5/AST M	PVC	EPDM	316SS**/Hastelloy/Titan.
Calcium Carbonate	Saturated	HDLPE & XLPE	1.9/AST M	PVC	EPDM	316SS
Calcium Chloride	40	HDLPE & XLPE	1.5/AST M	PVC	EPDM	316SS**/Hastelloy/Titan.
Citric Acid	Saturated	HDLPE	1.9/AST M	PVC/PP	EPDM	316SS
DEF (Diesel Exhaust Fluid)	32.5	HDLPE & XLPE	1.35/AST M	316 SS	EPDM	316SS
Deionized Water	Up to 18.3 mΩ	HDLPE & XLPE	1.5/AST M	PVC	EPDM	316SS
Ethylene Glycol	100	HDLPE & XLPE	1.9/AST M	PVC	EPDM	316SS
Ferric Chloride	50	HDLPE & XLPE	1.9/AST M	PVC	EPDM	Hastelloy/Titan.
Ferric Sulfate	60	HDLPE & XLPE	1.9/AST M	PVC	EPDM	316SS**/Hastelloy/Titan.
Ferrous Chloride	Saturated	HDLPE & XLPE	1.9/AST M	PVC	EPDM	Hastelloy/Titan.
Ferrous Sulfate	20	HDLPE & XLPE	1.5/AST M	PVC	EPDM	Hastelloy
Hydrochloric Acid	37	HDLPE	1.9/AST M	PVC	Viton	Hastelloy
Hydrofluoric Acid	48	HDLPE	1.9/AST	PP/PV	Viton	Hastelloy

			M	C		
Hydrofluosilicic Acid	26	HDLPE/XLPE*	1.9/AST M	PP/PV C	Viton	Hastelloy
Hydrogen Peroxide	50	HDLPE	1.9/AST M	PVC	Viton	316SS/Hastelloy/ Titan.
Magnesium Chloride	30	HDLPE & XLPE	1.5/AST M	PVC	EPD M	316SS**/Hastello y/Titan.
Motor Oil	100	HDLPE & XLPE	1.9/AST M	316SS	Viton	316SS
Peracetic Acid	30	HDLPE	1.9/AST M	316SS	Aflas	316SS
Phosphoric Acid	85	HDLPE	1.9/AST M	PVC	Viton	316SS
Polyaluminum Chloride		HDLPE & XLPE	1.9/AST M	PVC	EPD M	Hastelloy.
Polymers (Deposition)		XLPE	1.5/AST M	PVC	EPD M	316SS
Potable Water		HDLPE	1.5/AST M	PVC	EPD M	316SS
Potassium Carbonate	50	HDLPE & XLPE	1.9/AST M	PVC	EPD M	316SS
Potassium Hydroxide	Saturated	HDLPE & XLPE	1.9/AST M	PVC	EPD M	316SS
Propylene Glycol		HDLPE & XLPE	1.9/AST M	PP/316 SS	EPD M	316SS
Sodium Bisulfate		HDLPE	1.9/AST M	PVC/P P	EPD M	316SS
Sodium Bisulfite		HDLPE	1.9/AST M	PVC/P P	EPD M	316SS
Sodium Carbonate	30	HDLPE & XLPE	1.5/AST M	PVC	EPD M	316SS**/Hastello y/Titan.
Sodium Carbonate	Saturated	HDLPE & XLPE	1.9/AST M	PVC	EPD M	316SS**/Hastello y/Titan.
Sodium Hydroxide	50	HDLPE & XLPE	1.9/AST M	PVC	EPD M	316SS
Sodium Hypochlorite-in (Non-UV)	<16.5	HDLPE	1.9/AST M	PVC	Viton	Titanium
Sodium Hypochlorite- out (UV)	<16.5	HDLPE #880059	1.9/AST M	PVC	Viton	Titanium
Sodium Hypochlorite- out (UV)	<16.5	HDLPE Insulated	1.9/AST M	PVC	Viton	Titanium
Sodium Thiosulfate	40	HDLPE & XLPE	1.9/AST M	PVC	EPD M	316SS
Sulfuric Acid	98	HDLPE #880046*	1.9/AST M	CPVC	Viton	Hastelloy
Sulfuric Acid	93	HDLPE #880046*	1.9/AST M	CPVC	Viton	Hastelloy
Surfactants		XLPE	1.5/AST M	PVC	EPD M	316SS
Urea Solution	50	HDLPE & XLPE	1.35/AS TM	PP/PV C	EPD M	316SS

Water w/Ozone up to 10 PPM		HDLPE & XLPE	1.5/ASTM	PVC	EPD M	316SS
Zinc Orthophosphate		HDLPE	1.9/ASTM	PP/316SS	EPD M	316SS

*Chemical may cause tank material to discolor.

** 316SS may pit upon drying. Not recommended for SUMOs.

For chemicals or chemical blends not listed on the above chart, please contact Snyder Industries

1.07 Materials – Resin Classification

- A. Tanks shall be molded from Type II linear polyethylene resin (not cross-linkable resin).
- B. The material used shall be virgin polyethylene resin as compounded and certified by the manufacturer. Type II tanks shall be made from high density linear polyethylene (HDLPE) resin as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties.
- C. All polyethylene resin material shall contain a minimum of a U.V. 8 -15 stabilizer as compounded by the resin manufacturer. Pigments may be added at the purchaser's request, but shall not exceed 0.25% (dry blended) of the total weight.
- D. Mechanical Properties of Type II tank material: High density Linear (HDLPE)

<u>PROPERTY</u>	<u>ASTM</u>	<u>VALUE</u>
Density (Resin)	D1505	0.941-0.950 g/cc
Tensile (Yield Stress 2"/min)	D638	2800 - 3500 PSI
Elongation at Break (2"/min.)	D638	>1000%
ESCR (100% Igepal, Cond. A, F50)	D1693	>500 hours
ESCR (10% Igepal, Cond. A, F50)	D1693	40 - 48 hours
Flexural Modulus 1% Secant	D790B	130,000 – 145,000 PSI

1.08 Design Requirements

- A. The minimum required wall thickness of the cylindrical shell at any fluid level shall be determined by the following equation, but shall not be less than 0.187 in. thick.

$$T = P \times O.D./2 SD = 0.433 \times S.G. \times H \times O.D./2 SD$$

T = wall thickness

SD = hydrostatic design stress, PSI

P = pressure (.433 x S.G. x H), PSI

H = fluid head, ft.

S.G. = specific gravity, g/cm³

O.D. = outside diameter, in.

1. The hydrostatic design stress shall be determined by multiplying the hydrostatic design basis, determined by ASTM D2837 using rotationally molded samples, with a service

factor selected for the application. The hydrostatic design stress would be ≤ 660 PSI at 73 degrees Fahrenheit for Type I and Type II materials based the resin density. In accordance with the formula in 1.08 A., the tank shall have a stratiform (tapered wall thickness) wall. In no case shall the wall thickness be less than the minimum allowed per calculation of ASTM D1998.

2. The hydrostatic design stress shall be derated for service above 100 degrees Fahrenheit and for mechanical loading of the tank.
 3. The standard design specific gravity shall be 1.35, 1.5 or 1.9.
- B. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support.
 - C. The top head must be integrally molded with the cylinder shell. The minimum thickness of the top head shall be equal to the top of the straight wall. The top head of tanks with 2000 or more gallons of capacity shall be designed to provide a minimum of 1300 square inches of flat area for fitting locations.
 - D. Tanks with 2000 or more gallons of capacity shall have a minimum of 3 lifting lugs integrally molded into the top head. The lifting lugs shall be designed to allow erection of an empty tank.
 - E. The tank shall be designed to provide a minimum of 4 tie-down lugs integrally molded into the top head. The tie-down lugs shall be designed to allow tank retention in wind and seismic loading. Refer to section 2.02 H. for tank tie-down accessories.

Table II – Tank Schedule

Tank Reference #	
Quantity	1
Capacity - Side Wall	16,000 GAL
Diameter (maximum)	12 ft
Height max liquid level	20 ft
Type II HDLPE	X
Color	OPAQUE
Fitting Material	SST
Bolt Material	SST

1.09 Quality Assurance & Test Methods

- A. The tanks of the same material furnished under this Section shall be supplied by a manufacturer who has been regularly engaged in the design and manufacturing of rotationally molded chemical storage tanks using cross-linked and high density linear polyethylene tanks for over ten years.
- B. Dimensions and Tolerances
 1. All dimensions will be taken with the tank in the vertical position, unfilled. Tank dimensions will represent the exterior measurements.
 2. The tolerance for the outside diameter, including out of roundness, shall be per ASTM D1998.

- The tolerance for fitting placements shall be +/- 0.5 in. in elevation and 2 degrees radial at ambient temperature.

C. Ultrasonic Tank Thickness Test

- All tanks 2000 gallons or larger shall be measured for tank wall thickness at 6", 1ft., 2ft. and 3ft. on the tank sidewall height at 0° and 180° around the tank circumference with 0° being the tank manway and going counter-clockwise per ANSI standard drafting specifications. A copy of this test report shall be provided prior to tank shipment. All tanks shall meet design thickness requirements and tolerances.

D. Hydrostatic Water Test

- The hydrostatic water test shall consist of filling the tank to brim full capacity for a minimum of four hours and conducting a visual inspection for leaks.

E. Workmanship

- The finished tank wall shall be free, as commercially practicable, of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking and delaminations that will impair the serviceability of the vessel. Fine bubbles are acceptable with Type II tanks to the degree in which they do not interfere with proper fusion of the resin melt.
- All cut edges where openings are cut into the tanks shall be trimmed smooth.

Table III – Fitting and Accessory Schedule

Tank Number	
Description	Quantity / Size
Inlet /Fill	1-4"/2-2"
Outlet	2 – 3"
Drain	N/A
Overflow	4"
Vent	2 – 4"
Manway	18" Dia
Ladder FRP or Galv. Steel	N/A
Lifting Lugs	YES
Tie-down Lugs	YES
Seismic/Wind Tie-down	NO
Sight Glass Assembly	NO
Ultrasonic Level Indicator	NO
Reverse Float Level Indicator	NO

PART 2 – FITTINGS & ACCESSORIES

2.01 Tank Fittings

- Fittings - Bolted Double 150 lb. Flange Fittings

1. Bolted double flange fittings are required for below liquid level installation for sizes above 2 in. Fittings must be placed away from tank knuckle radius' and flange lines. Allowable fittings sizes based on tank diameter for curved surfaces are shown below.

<u>Tank Diameter</u>	<u>Maximum Bolted Fitting Size Allowable</u>
48 in. - 86 in.	3 in.
90 in. - 102 in.	6 in.
120 in. - 142 in.	8 in.

The bolted double flange fittings shall allow tank wall thickness up to 2 1/2 in.

2. The bolted double flange fitting shall be constructed with 2 ea. 150 lb. flanges, 2 ea. 150 lb. flange gaskets, and the correct number and size of all-thread bolts for the flange specified by the flange manufacturer. The flanges shall be constructed of PVC Type I, Grade I, or other specified material. Gaskets shall be a minimum of 1/4" thickness and constructed of 40-50 durometer EPDM, 60-70 durometer Viton[®]. There shall be a minimum of 4 ea. full thread bolts. The bolts diameter is to meet ANSI standards based upon the flange size. The bolts may have gasketed flanged metal heads or bolt heads encapsulated in Type II polyethylene material. The encapsulated bolt shall be designed to prevent metal exposure to the liquid in the tank and prevent bolt rotation during installation. The polyethylene encapsulation shall fully encapsulate the bolt head. The polyethylene shall be color coded to distinguish bolt material (white - 316 S.S.). Each encapsulated bolt shall have a gasket to provide a sealing surface against the inner flange.
3. Standard orientation of bolted double flange fittings shall have bolt holes straddling the principal centerline of the tank in accordance with ANSI/ASME B-16.5 unless otherwise specified.

B. Vents

1. Each tank must be properly vented for the type of material and flow rates expected. Vents must comply with OSHA 1910.106 (f) (2) (iii) or other accepted standard. All tanks must be vented for atmospheric pressure as well as any pressure created by filling and emptying the tank. A minimum of 2 U-Vents with mesh screening shall be provided.
2. All U-vents shall be constructed of PVC or other specified materials.

I. Flexible Connections

1. All tank fitting attachments shall be equipped with flexible couplers or other movement provisions. The tank will deflect based upon tank loading, chemical temperature and storage time duration. Tank piping flexible couplers shall be designed to allow 4% tank design movement. Movement shall be considered to occur both outward in tank radius and downward in fitting elevation from the neutral tank fitting placement.
2. The flexible connection is to be manufactured of the same material as the tank or a compatible material approved by the Engineer. If an elastomer flexible connection is used control bolts are required if recommended by the manufacturer. The flexible connection is to be designed for a minimum of 4% tank movement. The flexible connection is to be designed with 150# flange connections to allow for attachment to the tank and the piping system. The flexible connection is to be attached as close as possible to the tank to reduce stress.

2.02 Tank Accessories

A. Bolted Sealed Top Manway

1. Provide a sealed manway of 18-inches minimum clear opening.
2. The sealed manway shall be constructed of polyethylene material. The bolts shall be 316 stainless steel. The gaskets shall be closed cell, crosslinked polyethylene foam and Viton[®] o-rings to seal the bolts.

B. Down Pipes and Fill Pipes

1. Fill pipes shall be prepared per the customer approved drawings and specifications. All down pipes and fill pipes shall be supported at 5 ft. maximum intervals with support structures. Standard support structure design shall utilize bulkhead fitting tank attachments or welded attachments on Type II tanks. All designs shall be done in accordance with the drawings.
2. All down pipes and fill pipes shall be constructed of PVC or other specified materials.

C. Tie Down Systems

1. The tie down system shall be designed to withstand 150 MPH wind loads. Tie down systems are based on requirements for nonbuilding structures and must meet seismic requirements per IBC 2015 / CBC 2016 code with seismic loads $\leq .445g$ (Seismic Design Category "D" - $F_a=1.0$, $F_v=1.5$, $S_s=1.4$, $S_1=0.5$). Anchor bolts shall be provided by the contractor per the calculations and the base plates for the system.
2. The tie down system shall be of 316 stainless steel.

2.03 Warranty

- A. The tank shall be warranted for three years in regards to defects in materials and workmanship. The warranty on fittings and accessories supplied by the tank manufacturer will be for one year. The warranty will begin at time the tank is put into service.

2.04 Marking, Packing and Packaging

- A. The tank shall be marked to identify the product, date (month and year) of manufacture, capacity, and serial number. The tank shall be shipped with a 3 of 9, HRI bar code label containing tank description, manufacturing order number, part number, serial number, manufacturer, and date.
- B. All fittings that do not interfere with tank shipment shall be installed unless otherwise specified. Fittings and accessories that interfere with tank shipment or could be broken during shipment are shipped separately.
- G. Permanent Labels:
1. Provide one (1) engraved stainless steel identification plate.

PART 3 – EXECUTION

3.01 Shipping, Delivery & Storage

- A. Since there are variations in methods of shipping, the manufacturer's instructions shall be followed in all cases.
- B. Transportation, handling, storage of the tanks, and installation shall be in accordance with the manufacturer's printed instructions.
- C. Consult the manufacturer's "Guideline for Use and Installation" booklet included with the tank for unloading instructions on specific tanks.
- D. Upon receipt of the tank and accessories the contractor shall be responsible for inspection for damage and to verify that the system is complete. If damage has occurred, the manufacturer should be notified prior to the tank being put into service. All fittings and accessories must be installed and adjusted in the field according to the manufacturer's Guidelines for Use & Installation.
- E. If tank shall be stored for over one month before being put into service, it should be stored in an upright vertical position. If outdoors it shall be secured to prevent movement or overturn during high wind situations.

3.02 Installation & Field Testing

- A. Install the tanks in strict accordance with the manufacturer's guidelines and installation and shop drawings.
- B. The tank shall be hydro-tested (water test) for 24 hours before introduction of leachate. Once completed, remove all test water.
- C. All tank fitting attachments shall be equipped with flexible couplers or other movement provisions provided by the tank manufacturer or the Contractor. The tank will deflect based upon tank loading, liquid temperature and storage time duration. Tank piping flexible couplers shall be designed to allow 4 percent tank design movement. Movement shall be considered to occur both outward in tank radius and downward in fitting elevation from the neutral tank fitting placement.
- D. The installer is to certify in writing that the tank system has been installed according to the tank manufacturer's Guidelines for Use & Installation.

END OF SECTION

SECTION 15060-R
PIPE, VALVES, AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE

- A. The work described in this Section of the Specifications consists of furnishing all materials and equipment and performing all labor for the construction of the various piping systems depicted on the accompanying Drawings.
- B. All materials shall meet the requirements of the Morristown Utility Commission's latest approved Standard Specifications.

1.02 RELATED DOCUMENTS

- A. Section 01340: Shop Drawings, Product Data, and Samples
- B. Section 02100: Erosion Control
- C. Section 02221: Trenching, Backfilling, and Compacting

1.03 SUBMITTALS

- A. Submittals shall be submitted as specified in Section 01340, promptly and in accordance with approved schedule, in such a sequence that no delay to the work, or to the work of other Contractors is caused.
- B. Product data shall be submitted as required.
- C. Submit certification signed by manufacturer and Contractor that pipe, fittings and appurtenances meet specification requirements.
- D. Submit certifications relative to the Buy American requirements.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect ductile iron pipe from damage to coating and lining.
- B. PVC piping shall be stored to protect from long term exposure to direct sun light and shall be stacked in suitable support systems to prevent buckling and deformation.
- C. Immediately prior to lowering pipe or fittings into the trench, clean interior and mating surfaces of dirt and foreign material.
- D. Carefully examine each pipe, valve fitting, etc. for cracks and other defects immediately before installation.
- E. Keep valves and other items free of dirt and debris.
- F. Handle and store all materials per the manufacturer recommendations.

1.05 JOB CONDITIONS

- A. Whenever pipe laying is not actively in progress, open ends of all installed pipe and fittings shall be fitted with watertight plugs.
- B. Separation of Potable Water Mains and Sewers:
 - 1. New water mains have been located so that the proper horizontal and vertical separation from new or existing sewers has been provided where the water line parallels a sewer line. However, in the event field conditions reveal that a horizontal separation of ten (10') feet cannot be obtained, the potable water line shall be laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer so that the bottom of the water main is at least eighteen (18") inches above the top of the sewer pipe.
 - 2. Whenever, a water main crosses a sewer main, a minimum vertical distance of eighteen (18") inches shall be provided between the water line and sewer pipe. This distance shall be provided whether the water main is above or below the sewer pipe. At crossings, one full length of water pipe must be located so both joints will be as far from the sewer line as possible. Special structural support for the water and sewer lines shall be provided.
 - 3. Potable water lines shall not pass through or come in contact with sewer manholes.
- C. Inside pipe shall be properly supported and aligned in accordance with the plans.
- D. Air piping shall have proper expansion/contraction provisions.

PART 2 - PRODUCTS

2.01 GENERAL PIPING AND VALVE APPLICATIONS

- A. Unless otherwise depicted on the accompanying Drawings, the following piping and valve applications apply for this project.
 - 1. All buried non-chemical piping four (4") inch through twelve (12") inch shall be Pressure Class 350 ductile iron pipe with mechanical joint or push-on joint ends. Fittings shall be ductile iron with mechanical joint ends for pipe sizes forty-eight (48") inches and smaller and with push-on ends for pipe sizes fifty-four (54") inches and larger. Restrained joints shall be used where noted on the accompanying Drawings.
 - 2. All buried valves shall be as depicted on the accompanying Drawings.
 - 3. All interior and above-ground valves shall be as depicted on the accompanying Drawings.

2.02 DUCTILE IRON PIPE AND FITTINGS

A. General

1. Ductile iron pipe (DIP) shall be centrifugally cast meeting the requirements of ANSI/AWWA Standard C151/A21.51. Pressure Classes as described in ANSI/AWWA Standard C151 shall be used unless indicated otherwise on the Drawings.
2. The manufacturer of the DIP shall furnish a sworn, notarized statement that the inspection and specified tests required under section 5.1.1.2 of AWWA /ANSI standard C151/A21.51 have been made and that all results thereof comply with this standard.
3. One (1) copy of written transcripts of the results of the acceptance tests and low temperature impact tests on pipe manufactured for use in performing the scope of work described in these Specifications shall be furnished to the Engineer.
4. The weight, class, or nominal thickness, and casting period for each length of ductile iron pipe shall be shown on each length of DIP. The manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI" or "DUCTILE" shall be cast or metal stamped on the pipe. Letters and numerals on pipe sizes fourteen (14") inches and larger shall be not less than ½ inch in height. All required markings shall be clear and legible, and all cast or metal-stamped marks shall be on or near the bell.
5. Approved Manufacturers:
 - a. U.S. Pipe Company
 - b. American Ductile Iron Pipe Company
 - c. Griffin Pipe Products.

B. DIP Piping Installed Outside Above-Ground and Inside Structures

1. All ductile iron pipe installed outside above ground and inside structures shall conform to the wall thickness requirements of Pressure Class 350, and shall be flanged and shall conform to the requirements of AWWA/ANSI Standard C151/A1.15. Unless otherwise shown, flanges shall be dimensioned for facing and drilling in accordance with ASME/ANSI Standard B16.1 Class 125 and meeting the dimensional and bolting requirements of AWWA Standard C110/A21.10, Table 14. Bolts, gaskets, and installation of flanged DIP and ductile iron fittings shall comply with the requirements of AWWA/ANSI Standard C111/A21.1, Appendix B.
2. The outside of ductile iron pipe and fittings for installation outside above-ground or inside structures shall be provided to the job site prime coated as specified in Section 09910 of these Specifications.
3. Buried DIP Piping
 - a. All buried ductile iron pipe shall conform to the wall thickness requirements of Pressure Class 350 and shall have mechanical joints or push-on joints in accordance with AWWA/ANSI Standard C111/A21.11.

- b. The inside of all buried DIP for water and wastewater service shall be lined in accordance with the 2.01-B-3 above. In addition, the outside of the pipe shall be coated with bitumastic material at least one (1) mil thick that conforms to all appropriate requirements at AWWA/ANSI Standard C104/A21.4.
- c. All DIP for sewers shall be coated inside with PROTECTO 401 lining.
- d. Fittings for all buried DIP shall be delivered to the project site with their exterior coated with asphaltic material at least one (1) mil thick that conforms to all appropriate requirements at AWWA/ANSI Standard C104/A21.4.
- e. Fittings for all DIP installed outside above-ground or inside structures shall be delivered to the project site with their exterior prime coated as described at Section 09910 of these Detailed Specifications.
- f. ALL DIP fittings for sewers shall be coated inside with PROTECTO 401 lining.
- g. Fittings for buried DIP pipelines shall be ductile iron and furnished with ductile iron mechanical joint retainer glands suitable for a working pressure of 75 psi plus a surge allowance of 75 psi. Ductile iron mechanical joint retainer glands shall be manufactured by American Cast Iron Pipe Company, EBAA Iron Sales, Inc., or approved equal. All set screws on the retainer glands shall be tightened, in the presence of the Owner's Representative, using a torque wrench to the manufacturer's recommended torque. As an alternate to ductile iron mechanical joint fittings with ductile iron retainer glands, the contractor may furnish ductile iron fittings with Field Lok™ gaskets manufactured by United States Pipe and Foundry Company, or Fast-Grip® gaskets manufactured by American Cast Iron Pipe Company, both suitable for a working pressure of 100 psi plus a surge allowance of 100 psi.
- h. Ductile iron fittings meeting the requirements of AWWA/ANSI Standard C110/A21.10 shall have distinctly cast on them the pressure rating, nominal diameters of openings, manufacturer's identification, the country where cast, and the number of degrees or fraction of the circle on all bends and the letters "DI" or "DUCTILE". Cast letters and figures shall be on the outside body of the fitting and shall have dimensions no smaller than the following:

Size (in.)	Height of Letters (in.)	Relief (in.)
Less than 8	As large as practical	As large as practical
8-10	$\frac{3}{4}$	$\frac{3}{32}$
12-48	$1 \frac{1}{4}$	$\frac{3}{32}$

- i. Ductile iron fittings meeting the requirements of AWWA/ANSI Standard C153/A21.53 shall have distinctly cast on the outside of the body AWWA/ANSI C153/A21.53; the pressure rating; nominal diameter of openings; manufacturer's identification; the country where cast; the letters "DI" or word "DUCTILE"; and the number of degrees or fraction of the circle.

2.03 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. General
 1. All polyvinyl chloride (PVC) pipe shall be made from Class 12454-B polyvinyl chloride plastic as defined in ASTM Standard D1784 unless otherwise specified.
- B. Inside pipe shall be properly supported and aligned in accordance with the plans.
- C. Polyvinyl Chloride Pipe (PVC) for gravity sewers (6" to 12"): ASTM D-3034, min. SDR26. Pipe shall be manufactured from virgin resin approved by the National Sanitation Foundation (NSF) and conforming to ASTM D-1784.
 1. Gaskets: Shall conform to ASTM F-477.
 2. Markings: All PVC gravity sewer pipe shall be clearly marked with the manufacturer's name, nominal diameter, SDR, ASTM D-3034, and NSF approved seal.
- D. Polyvinyl Chloride Pipe (PVC), for gravity sewers (15" and larger): ASTM F679, min. wall thickness T-1. Pipe shall be manufactured from virgin resin approved by the National Sanitation Foundation (NSF) and conforming to ASTM D-1784.
 1. Gaskets: Shall conform to ASTM F-477.
 2. Markings: All PVC gravity sewer pipe shall be clearly marked with the manufacturer's name, nominal diameter, wall thickness class, ASTM F679, and NSF approved seal.
- E. Polyvinyl Chloride Pipe (PVC), for pressure sewers: AWWA C-905, CL200, DR14. All pipe shall meet a 200 psi (minimum) working pressure rating, and shall be marked with the manufacturer's name, nominal diameter, DR, and pressure rating.
 1. Fittings: Shall be Ductile-Iron (Protecto 401 Lined) as specified above.
 2. Joints: Shall be push-on with gaskets recommended by the manufacturer for the specific application.
- F. Polyvinyl Chloride Pipe (PVC): Schedule 80 Pressure Pipe.
 1. The pipe shall comply to ASTM D 1784, ASTM D 1785.
 2. Pipe and fitting shall be manufactured from virgin rigid PVC vinyl compounds and shall be manufactured in the United States.
 3. Buried pipe shall be installed in accordance with ASTM F 656 and ASTM D 2774.

4. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized vinyl products or other aggressive chemical agents not compatible with PVC compounds.

2.04 PIPING SYSTEM INSTALLATION

A. Buried Piping and Manholes

1. General

- a. The trench for buried piping shall be excavated to the depth and width depicted on the accompanying Drawings and the bedding prepared as described in these Specifications and depicted on the accompanying Drawings, in advance of pipe installation.
- b. Before each length of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure it is clean. Each length of pipe shall be lowered separately.
- c. Care shall be taken to prevent injury to the pipe and any pipe coating or lining. Pipe or fittings which are known to be defective shall not be installed. If any defective pipe or fitting is discovered after the pipeline is installed, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge.
- d. All bend-type fittings in the pipelines, either vertical or horizontal, shall be braced or anchored against the tendency of movement as depicted on the accompanying Drawings.
- e. Open ends of unfinished pipelines shall be securely plugged or closed to prevent the entrance of water or debris at the end of each day's work or when the pipeline is left temporarily at any other time.
- f. All excavated material not needed for backfilling purposes shall be disposed of by the Contractor in a manner satisfactory to the Owner.
- g. If wet, mucky and/or unstable or unsuitable material is encountered in a trench bottom, the Owner may require additional excavation to insure a firm foundation for the pipe. The quantity of undercutting will be determined by the theoretical ditch width (maximum diameter of the pipe plus 2.5 pipe diameters on each side of the pipe) multiplied by the difference between the depth of ditch ordered and six (6") inches below the invert elevation of the pipe. In such cases, the trench bottom shall be brought back up to proper grade with crushed stone bedding material meeting the quality requirements of ASTM Standard D692 and the gradation requirements for Size No. 7, TDOT Specification Subsection 903.22. Excavation for undercutting and crushed stone refill required shall be paid for at a negotiated price to be included in a change order to the Contract, if such excavation and refill is directed by the Engineer. If the Contractor has caused the extra work due to failure to properly dewater the pipeline trench or by over-excavating the

pipeline trench, no payment will be made. If undercutting is required by drawing notes or in other specification sections, no additional payment shall be made.

- h. All excavation shall be accomplished in accordance with applicable safety laws and regulations; the Engineer, as previously stated, does not assume responsibility of any degree or sort for acts of the Contractor.
2. Buried Ductile Iron Piping Installation
- a. Ductile iron pipe (DIP) shall be installed in accordance with the requirements of AWWA Standard C600.
 - b. In case a length of DIP is cut in the field, it shall be so cut as to leave a smooth end at a right angle to the longitudinal axis of the pipe in accordance with the requirements of Section 3.4.4 of AWWA Standard C600.
 - c. The maximum horizontal or vertical deflection allowed at a push-on type joint for DIP shall not exceed the deflection recommended by the manufacturer.
 - d. Final backfill may be materials excavated from the pipeline trench or other areas of the site if deemed acceptable by the Owner's representative and not specifically directed otherwise elsewhere on the drawings or in the Specifications.

B. Interior and Above-Ground Piping

- 1. General
 - a. Unless depicted otherwise on the Drawings, all pipe installation shall be parallel with or at right angles to walls, ceilings, equipment, etc.; angled installation shall be avoided where possible. Piping shall be neatly arranged and installed so that it both meets the intended service requirements and leaves the equipment it is supplying accessible. Insofar as possible, all valves shall be accessible for operation by a person standing on the floor. All valves more than six feet above floors shall be provided with operators that are accessible from the floor.
- 2. Through Existing Walls
 - a. Penetrations of piping through existing concrete or masonry walls shall be made using a coring machine.
- 3. Parallel Installation
 - a. All parallel installation of piping shall be arranged with equidistant spaces between the piping and shall be neatly grouped. Grouping shall be such that cross-overs, except at branches, are avoided.
- 4. Hangers and Supports
 - a. Piping systems shall be supported as depicted on the Drawings or as described hereinafter so as to prevent loosening under vibration and so as to prevent excessive or eccentric loads.
 - b. Maximum support spacing and hanger rod sizes for metallic piping

shall be as follows:

<u>Nominal Pipe Size, (In.)</u>	<u>Support Spacing, (Ft.)</u>	<u>Rod Diameter (In.)</u>	
		<u>Single Rod</u>	<u>Dual Rod</u>
1-1/2	8	3/8	3/8
2	10	3/8	3/8
2-1/2	11	1/2	3/8
3	12	1/2	3/8
4 and 5	12	1/2	3/8
6 and larger	12	3/4	7/16

- c. Maximum support spacing and hanger rod sizes for non-metallic piping shall be as follows:

<u>Nominal Pipe Size, (In.)</u>	<u>Support Spacing, (Ft.)</u>	<u>Rod Diameter (In.)</u>	
		<u>Single Rod</u>	<u>Dual Rod</u>
1-1/2	5-1/2	3/8	3/8
2	6	3/8	3/8
3	7	3/8	3/8
4	7-1/2	1/2	3/8
6	9	1/2	3/8
8 and larger	9-12	1/2	3/8

- d. Valves twelve (12") inch size and larger installed in horizontal pipelines shall have supports on both sides within twelve (12") inches of the valve. Additional supports shall be installed by the Contractor as necessary to prevent damaging stresses on the pipe, valves, or equipment.
- e. Piping one and one-quarter inch size and smaller in diameter shall not be supported from rod-type hangers but shall be installed adjacent to walls utilizing bracket-type supports. Rod-type hangers, where used for piping larger than one and one-half inch size, shall be of the adjustable split pattern type fabricated entirely from stainless steel meeting the requirements of ASTM Standard A276, Type 304. Piping shall not be installed directly on to wall surfaces. Stainless steel brackets meeting the requirements of ASTM Standard A276,

Type 304 shall be used to install piping adjacent to wall surfaces so that there will be a space (0.75 inches minimum) between the pipe and any wall. Piping one and one-quarter inch size and smaller shall be clamped to brackets with stainless steel fastening hardware meeting the requirements of ASTM Standard A276, Type 304 which shall allow no axial movement. Clamps and clamping arrangements shall be of the Unistrut type, properly supported for the required arrangement. Specially detailed supports shall be installed in accordance with the details depicted in the accompanying Drawings.

5. Pipe Stanchions
 - a. Adjustable stanchion-type pipe supports complying with the requirements of Federal Specification WW-H-171E, Type 39 and Manufacturers Standardization Society SP-69, Type 38 shall be furnished to conform to the pipe size, number of saddles and relative elevation from base as depicted on the Drawings. Pipe stanchions shall be cast iron construction consisting of saddle(s), lockout nipple for pipe adjustment shall allow for a minimum of 4 ½ inches.
 - b. Pipe stanchions shall be ITT-Grinnell Figure No. 264, or equal as determined by the Engineer.

2.05 COPPER PIPE AND TUBING

- A. Copper pipe in buildings and structures and other pipe that will remain exposed after construction shall be Type K, hard drawn. Copper tubing shall conform to ASTM B88 for seamless copper water tube with copper or brass fittings unless otherwise called for on the drawings. Copper pipe for underground service shall be Type K, soft drawn.
- B. All copper pipe, copper and brass fittings, and other items utilized in any water line connecting to a potable water main shall be certified Lead Free (LF) in accordance with NSF/ANSI 372.

2.06 REACTION OR THRUST BLOCKS

- A. All buried pressure pipelines shall be secured by Class C concrete reaction or thrust blocks at all bends as depicted on the accompanying Drawings, unless mechanical restraint is called for.
- B. Interior or above ground exterior pressure pipelines shall be secured by base elbows or Class A concrete reaction blocks at all bends.
- C. Concrete for thrust blocks for yard piping shall meet the requirements of Section 03300

and shall be placed in accordance with the Typical Details.

2.07 STEEL COUPLINGS

- A. Steel couplings, where depicted on the accompanying Drawings, shall be bolted, sleeve-type couplings for plain-end pipe meeting the requirements at ANSI/AWWA Standard C219. Steel couplings shall be Dresser Style 38, Rockwell 431 or Smith/Blair Type 421 steel couplings for ductile iron pipe, or equal.
- B. Stainless steel couplings, where depicted on the Drawings, shall be Baker Series 200, or equal.

2.08 CAST COUPLINGS

- A. Cast couplings, where depicted on the accompanying Drawings or where necessary to join two different types of pipe material or cut-in new piping or valves on buried pipelines, shall be bolted compression type couplings. The center sleeve and end rings shall be cast from ductile iron in compliance with the requirements at ASTM Standard A536 for 65-45-12 alloy ductile iron. Bolts shall comply with the requirements at ANSI/AWWA Standard C111. Couplings shall be Style FC manufactured by the Ford Meter Box Company, Inc., or equal.

2.09 WALL SLEEVES OR WALL PIPES

- A. Where ductile iron piping passes through reinforced concrete walls or floors, the Contractor shall furnish and install ductile iron wall pipe with an integral waterstop as depicted on the Drawings.
- B. Where PVC or other non-ductile iron pipe passes through reinforced concrete walls or floors, the Contractor shall furnish and install a heavy walled hot-dip galvanized steel wall sleeve with an integral waterstop and create a watertight seal around the pipe using an appropriate caulking or mechanical seal.
- C. Where any pipe passes through a masonry wall, the Contractor shall furnish and install a hot-dip galvanized steel wall sleeve for use with masonry and create a watertight seal around the pipe using an appropriate caulking or mechanical seal.
- D. Where wall sleeves are used, run pipe continuously through walls, and provide a joint within three (3') feet outside the wall. Formed openings in concrete walls for inserting ductile iron piping will not be allowed. Accurately locate and securely fasten wall pipe sleeves in place before pouring concrete. Use wall sleeves in locations where small piping and electric wiring connects with or passes through concrete walls, and caulk watertight.

2.10 FLANGED ADAPTERS

- A. Flanged adapters, where depicted on the accompanying Drawings, shall be Dresser Style 128 or Baker Series 600 for ductile iron pipe, or equal.

2.11 UNION FLANGES

- A. Union flange adapters, where depicted on the accompanying Drawings, shall be as manufactured by McWane Incorporated, or equal.

2.12 SWING CHECK VALVES

- A. Valves shall conform to AWWA Section C508 and be of the outside lever and weight design.
- B. Swing check valves shall be iron body, bronze mounted, with seat rings, faces, and hinge pins suitable for operation in horizontal or vertical lines.
- C. A removable cover shall be provided for the removal of internal parts without necessitating the removal of the valve from the line. The high point of the valve shall be tapped and equipped with a plug. When shown on the drawings, a valve or curb cock for the removal of air shall be provided. All check valves shall be flanged (ANSI 125) drilled and faced as shown on the drawings.
- D. Swing check valves shall have air or oil cushion options where indicated on the Drawings.

2.13 RESILIENT SEATED GATE VALVES

- A. Resilient seated gate valves shall comply with all requirements at ANSI/AWWA Standard C509. Submittals shall include catalog data and weight information. An affidavit of compliance is required. Bolting materials shall be cadmium plated. Stem sealing shall be by an O-ring.
- B. Actuators shall be manual unless otherwise indicated on the accompanying Drawings. All actuators shall comply with the requirements of ANSI/AWWA Standard C509. Manual actuators shall be wrenchnut, floorstand, handwheel or chainwheel operated as shown or noted on the accompanying Drawings. Valves shall open counterclockwise.
- C. Resilient seats shall be applied to both sides of the gate.
- D. End connections shall be as depicted on the accompanying Drawings.
- E. Resilient seated gate valves shall be Clow Valve Company Figure F-6100 MJ/F-6102 FLG, M & H Style 4067, U.S. Pipe & Foundry Company Metroseal 250, American Cast Iron Pipe Company Series – 2500 or AFC Series 500.
- F. Valves shall be furnished with standard operating nut for yard installations and operating handwheel for all interior installations unless otherwise specifically noted.

Valves shall operate smoothly through the entire lift and shall have an unobstructed waterway with a diameter not less than a full nominal diameter of the valve.

- G. Valve boxes shall be standard design cast-iron with cover. Boxes shall have an outside diameter of not less than four (4") inches with a minimum thickness of metal at any point of not less than 0.1875 inches. Boxes shall extend to one (1) above finished grade.
- H. All Resilient-Seated Gate Valves shall be mechanical joint type for yard installations and flanged joint type for all interior installations unless otherwise specifically noted.
- I. Gate valves for two (2") inch and smaller water service shall be iron body, bronze trim, non-rising stem, certified Lead Free, with operating nut for underground installations and hand-wheel for above ground installation.
- J. Minimum design working water pressure of 200 psi for valves with diameters of two (2") inches - twelve (12") inches and 150 psi for valves with diameters of fourteen (14") – fifty-four (54") inches, unless otherwise specified or shown on the plans.
- K. Bonnet or body markings: Manufacturer's name, year of casting, size, pressure rating, and OPEN with direction.

2.14 ECCENTRIC PLUG VALVES

- A. Plug valves shall be as manufactured by Milliken, or DeZurik, and be of the full port (round) opening type capable of passing line pigging equipment.
- B. Plug valves shall be mechanical joint type (AWWA C-111/ANSI A21.11) for buried application and flanged (ANSI B16.1, Class 125) for interior installation.
- C. Valve shall be capable of bi-directional shut-off.
- D. Body shall be ASTM A-126, Class B, with nickel seat.
- E. Trim shall be BUNA-N.
- F. Plug shall be ASTM A-536 ductile iron or solid one piece cast iron with resilient coating to resist corrosion and damage.
- G. Valves shall be equipped with gear operators including; a two (2) square operating nut (buried service), handwheel operator for plant/vault piping less than five (5') feet above finished floor, or chain wheel operator for valves five (5') feet or more above finished floor. Valves indicated on the drawings to have electric actuators shall be fitted at the factory with actuators complying with Section 15070.
- H. Worm gear operators shall be of heavy duty construction with the ductile iron quadrant supported on top and bottom by oil impregnated bronze bearings. The worm gear shall be manufactured of hardened steel and turn on high efficiency roller bearings.
- I. Plug valves shall be capable of being converted from worm gear to automatic actuator operation without removing the bonnet or plug from the valves.

2.15 DUAL ACTING ELECTRIC MOTOR OPERATED PINCH VALVES

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- A. Valves are to be of the full cast metal body, mechanical pinch type with flange joint ends. The valve length shall be as listed in ISA S75.08. The flanges shall be drilled and tapped to mate with ANSI B16.1.1, Class 125/ANSI B16.5, Class 150 flanges.
- B. The sleeve trim shall be one piece construction with integral flanges drilled to be retained by the flange bolts. The sleeve trim shall be reinforced with calendared nylon or calendared polyester fabric to match service conditions. The sleeve trim shall be connected to the pinch bar by tabs imbedded in the sleeve trim-reinforcing ply. All internal valve metal parts are to be completely isolated from the process fluid by the sleeve trim. For full port and reduced port sleeves, the port areas shall be 100% of the full pipe area at the valve ends. For Cone and Variable Orifice sleeves, the port area at the inlet shall be 100% of the full pipe area, reducing to a smaller port size at the outlet.
- C. The steel mechanism shall be double acting, closing the pinch sleeve on the centerline of the valve. The mechanism shall be interlocking so that any movement of the top pinch bar is mirrored by the lower pinch bar. The mounting yolk shall support the mechanism. There shall be no cast parts in the operating mechanism. The pinch mechanism shall be adjustable for stroke without removing the valve from the line. The mechanism shall be connected to the electric actuator by a stainless steel ACME threaded stem. The electric motor shall be as specified. Valve shall be manufactured in the USA.
- D. The pinch valve shall be controlled via bracket mounted electric actuator. The electric actuator shall modulate flow via a 4-20mA signal received from remote device and shall be IP68 rated. The electric actuator shall have the following construction and include the following features.
- E. The electric actuator shall be operated via 110V/1ph service or 480V/3phase service as shown on the drawings.
- F. The electric motor shall rotate a threaded nut, pushing the threaded stem into the valve body, causing the pinch bar to push the sleeve in one direction. Using a cantilevered mechanism, this action shall also simultaneously raise two (2) side bars to pull a second pinch bar, pushing the sleeve in the opposite direction, pinching the sleeve closed at the centerline of the valve.
- G. All valves shall be of the Series 5400E as manufactured by the Red Valve Co., Inc. of Carnegie, PA 15106 or pre-approved equal.
- H. Valve shall be installed in accordance with manufacturers written Installation and Operation Manual and approved submittals.
- I. Manufacturer's authorized representative shall be available for customer service during installation and start-up, and to train personnel in the operation, maintenance and

troubleshooting of the valve.

- J. Manufacturer shall also make customer service available directly from the factory in addition to authorized representatives for assistance during installation and start-up, and to train personnel in the operation, maintenance and troubleshooting of the valve.
- K. Manufacturer shall have at least ten (10) years experience in the manufacture of pinch style valves, and shall provide references and a list of installations upon request.

2.16 BURIED VALVE INSTALLATION

- A. Buried valves shall be specially designed for buried service and shall be furnished with a solid shaft stainless steel extension stem as described in this Section of these Specifications where required to place the operating wrench nut within three (3') feet of the finished grade. Wrench nuts shall be two (2") inch AWWA Standard for all types of buried valves. A valve box with concrete pad as depicted on the Drawings and described in these Specifications shall be installed over the valve stem. Where extension of the valve box is necessary, six (6") inch ductile iron pipe, secured with a flexible coupling to the valve box may be utilized. No PVC box extensions will be accepted.

2.17 VALVE BOXES AND PADS

- A. General
 - 1. All manually actuated buried valves shall be fitted with valve boxes. The valve boxes shall be manufactured by Opelika, Tyler, or Muller. Valve boxes shall be set vertically and properly adjusted so that the cover shall be in the same plane as the finished surface of the ground or street. For ease of location and identification, a 2'-0" square by six (6") inch thick concrete pad with four (4) bars twenty (20") inches long shall be furnished.
 - 2. Valve box caps shall be marked Sewer, Water, or Air according to the usage.
- B. Resilient Seated Gate Valves
 - 1. Valve boxes for resilient seated gate valves shall be cast iron, 5 ¼-inch shaft, three (3) piece, screw type with a number six round base and four-inch drop cover.

2.18 VALVE STEM EXTENSIONS, SUPPORTS AND ACCESSORIES

- A. Valve stem extensions shall be provided at locations where depicted on the accompanying Drawings or as required per Section 2.16(A). Stem extensions shall be stainless steel meeting the requirements of ASTM Standard A276, Type 304 with operators and shall be securely fastened to the valve stem. Stem extensions shall be of the diameter recommended by the manufacturer of the valve and must be of sufficient section to withstand any torsional or other load which will be imposed.
- B. Stem extension guides, where required, shall be stainless steel of the split type construction, machine bored 1/16 inch larger than the stem diameter, held in place by stainless steel anchor bolts. Stem guides shall be provided as recommended by the

valve and stem manufacturer and shall be coated as described at Section 09910 of these Detailed Specifications.

2.19 MANHOLE FRAMES AND COVERS

- A. Gray iron, Class 30 unless otherwise specified, meeting AASHTO M-108.
- B. Cleaned and coated with bituminous paint that will produce an acceptable finish that is not affected by exposure to hot or cold weather.
- C. Rings and covers for use on watertight manholes shall be machined smooth uniform bearing that will provide a watertight seal.
- D. Horizontal and vertical mating surfaces shall be machined.
- E. Water-tight manhole frame & cover shall have a minimum combined weight of 480 lbs. and shall be in accordance with the Typical Details.
- F. Standard manhole frame & cover shall have a combined weight of 375 lbs. and be in accordance with the Typical Details.
- G. See Typical Details for manhole cover markings.
- H. Frame and cover shall be capable of supporting 16,000 pounds wheel load, combined weight shall be as shown on the Typical Details.
- I. Cover shall have concealed pickhole.
- J. The words SANITARY SEWER shall be cast into the cover.
- K. Horizontal and vertical mating surfaces shall be machined.
- L. A twenty-four (24") inch (minimum) clear opening shall be provided in all castings.

2.20 PRE-CAST MANHOLES

- A. AASHTO M-199 SR or ASTM C-478, in accordance with the Typical Details.
- B. Openings shall be provided for the required number and size pipes and shall be marked to insure installation at proper locations.
- C. Lift loops shall be ASTM A416 steel strand. Lifting loops made from deformed bars are not allowed.
- D. Flexible Joint Sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B - Butyl Rubber and as follows: maximum of 1% volatile matter and suitable for application temperatures between 10 and 100 degrees F. Material shall be RV-30 as manufactured by RuVan Inc. (or approved

equal) with a minimum cross section 1¼ inches.

- E. Epoxy Gels for interior patching of wall penetrations when used as approved by the Engineer shall be a 2-component, solvent-free, moisture-insensitive, high modulus, high-strength, structural epoxy paste adhesive meeting ASTM C-881, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive.
- F. Precast Component Fabrication and Manufacture shall be as described in the following paragraph:
 - 1. Precast Manufacturing shall be in conformance with ASTM C478. Wall and inside slab finishes resulting from casting against forms standard for the industry shall be acceptable. Exterior slab surfaces shall have a float finish. Small surface holes, normal color variations, normal form joint marks, and minor depressions, chips and spalls will be tolerated. Dimensional tolerances shall be those set forth in the appropriate References and specified below.
 - 2. Joint Surfaces between Bases, Risers and Cones shall be manufactured to the joint surface design and tolerance requirements of ASTM C361. The maximum slope of the vertical surface shall be 2 degrees. The maximum annular space at the base of the joint shall be 0.10. The minimum height of the joint shall be four (4") inch.
 - 3. Lift Inserts and Holes shall be sized for a precision fit with the lift devices, shall comply with OSHA 1926.704, and shall not penetrate through the manhole wall.
 - 4. Step Holes: Step holes shall be cast or drilled in the Bases, Risers and cones to provide a uniform step spacing of sixteen (16") inch. Cast step holes shall be tapered to match the taper of the steps.
- G. Precast Base Sections shall be cast monolithically without construction joints or with an approved galvanized or PVC waterstop in the cold joint between the base slab and the walls. The bottom step in base sections shall be a maximum of twenty-six (26") inches from the top of the base slab. The width of the base extensions on Extended Base Manholes shall be no less than the base slab thickness.
- H. Precast Riser Sections shall have a minimum lay length of sixteen (16") inches.
- I. Precast Concentric and Eccentric Cone Sections shall have an inside diameter at the top of twenty-six (26") inches. The width of the top ledge shall be no less than the thickness required for the cone section. Concentric cones shall be used only for Shallow Manholes.
- J. Precast Transition Cone Sections shall provide an eccentric transition from sixty (60") inch and larger manholes to forty-eight (48") inch diameter risers, cones and flat slab top sections. The minimum slope angle for the cone wall shall be 45 degrees.
- K. Precast Transition Top Sections shall provide an eccentric transition from sixty (60) inch and larger manholes to forty-eight (48") inch diameter risers, cones and flat slab

top sections. Transition Top sections shall be furnished with vents as shown on the manhole details. The maximum amount of fill over the transition top section shall be twenty (20') feet. Transition Tops shall not be used in areas subject to vehicle traffic.

- L. Precast Flat Slab Top Sections shall have an inside diameter at the top of twenty-six (26") inch and shall be designed for HS-20 traffic loadings as defined in ASTM C890. Items to be cast into Special Flat Slab Tops shall be sized to fit within the manhole ID and the top and bottom surfaces.
- M. Precast Grade Rings shall be used to adjust ring and covers to finished grade. No more than ten (10) vertical inches of grade rings will be allowed per manhole. Grade Rings shall conform to ASTM C478 and shall be no less than four (4") inches in height.
- N. Precast Inverts shall meet the following requirements.
 - 1. Pipe openings shall provide clearance for pipe projecting a minimum of two (2") inches inside the manhole. The height of the transition from the pipe opening to the invert trough shall be equal to $\frac{1}{2}$ of the Opening ID minus Pipe ID, plus or minus $\frac{1}{4}$. The crown of small I.D. pipe shall be no lower than the crown of the outlet pipe.

When the fall between the inlet and the outlet holes is greater than four (4") inches, the inlet end of the trough shall be below the inlet pipe invert and aligned horizontally within one (1") inch.
 - 2. Invert Troughs shall be formed and finished to provide a consistent slope from the pipe outlet to the inlets up to four (4") inch tall. The minimum fall shall be one (1") inch. The minimum outside bending radius from influent to effluent shall be 1.5 times the pipe I.D. A one-half inch ($\frac{1}{2}$) radius shall be provided at the intersection of two (2) or more channels. The minimum concrete thickness from the bottom of the trough to the bottom of the base shall be seven (7") inches.
 - 3. Invert Benches shall have a float finish with a uniform 2- $\frac{1}{2}$ slope, plus or minus one (1), from the high point at the manhole wall to the low point at invert trough. A $\frac{1}{4}$ radius shall be provided at the edge of the bench and trough.
 - 4. Depressions, high spots, voids, chips, or fractured over $\frac{1}{4}$ inch in diameter or depth shall be filled with a sand cement paste and finished to a texture reasonably consistent with that of the formed surface.
- O. Precast Components and grade rings shall be sealed around the external perimeter as follows:
 - 1. External Seals shall consist of a polyethylene backed flat butyl rubber sheet no less than 1/16 thick and six (6") wide applied to the outside perimeter of the joint. Material to be RV-40-PW (or approved equal) as manufactured by RuVan, Inc.
 - 2. Internal Seals shall consist of a plastic or paper backed butyl rubber rope no less than fourteen (14') feet long and having a cross-sectional area no less than

the annular space times the height of the joint.

- P. Lifting devices for handling Pre-cast Components shall be provided by the Pre-cast Manufacturer and shall comply with OSHA Standard 1926.704.
- Q. Coatings
1. The exterior surface of all new manholes shall be coated with a minimum of one (1) coat of specified material. The coating shall be applied by the manhole manufacturer, and applied and cured in strict accordance with the coating manufacturer's requirements
 2. Coating and sealing material shall be:
 - DRYCON Water proofing/sealer (grey and white) as manufactured by IPA Systems, Inc.
 - PRECO Waterproofing/sealer (grey and white) as manufactured by FOSROC PRECO Industries, Ltd.

2.21 MANHOLE STEPS

- A. Steps shall be provided in Bases, Risers, Cones, Transition Cones, and Transition Top sections aligned vertically on sixteen (16") inch centers. Steps shall be secured to the wall with a compression fit in tapered holes or cast in place. Steps shall not be vibrated or driven into freshly cast concrete or grouted in place. The steps shall be Copolymer Polypropylene Plastic reinforced with a ½ diameter grade 60 bar and have serrated tread and tall end lugs. Step pullout strength shall be 2,000 lbs. minimum when tested according to ASTM C497.

2.22 PIPE ENTRANCE COUPLINGS FOR MANHOLES

- A. Pipe to Manhole Connectors shall conform to ASTM C923, and to ASTM C-425 for Pipe Diameters twelve (12") inches and smaller. The location of the pipe connectors shall vary from the location shown on the Project Plans no more than ½ inch vertically and 5 degrees horizontally. Provide for control of the OD to within the tolerances of the connector on flexible pipes larger than twelve (12") inches.
- B. Rigid cement or synthetic type grouts are not acceptable as a seal between the manhole and entry pipe.
- C. The manhole entrance coupling with the entry pipe shall be fitted with a Neoprene Boot insert, A-Loc or approved equal.
- D. Other specially designed flexible products such as KOR-N-SEAL may be approved for use in adding a pipe entrance to an installed manhole and for other uses where available and where materials meet the requirements of ASTM C-425.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install barriers and other devices to protect areas adjacent to construction.
- B. Protect and maintain all benchmarks and other survey points.
- C. Protect and maintain all pipe and equipment not scheduled for replacement, and/or all pipe and equipment scheduled for operation during the construction period of the new components.
- D. Prior to laying pipe, prepare a suitable bedding according to Section 02221.
- E. Before placing pipe in the trench, field inspect for cracks or other defect; remove defective pipe from the construction site.
- F. Swab the interior of the pipe to remove all undesirable material.
- G. Prepare the bell end and remove undesirable material from the gasket and gasket recess.
- H. Establish line and grade for pipe and appurtenances. Verify location and elevation of other utilities and manholes for gravity sewers.

3.02 INSTALLATION OF GRAVITY SANITARY SEWERS

- A. Lay pipe true to the lines and grades from the grade and alignment stakes, or equally usable reference.
 - 1. Where laser equipment is used, provide offset hubs at every manhole location for purposes of checking grade between sections.
 - 2. Where batter boards are used, furnish stakes at intervals of fifty (50') feet along the route of the pipeline.
 - 3. Set stakes at such distance from centerline of excavation as is suitable for the excavating method and machinery used.
 - 4. Provide and use accurately set batter boards at each fifty (50') foot interval in establishing the bottom invert of each pipe laid.
- B. Lay pipe progressively up grade, with bell upstream, in such a manner as to form close, concentric joints with smooth bottom inverts. Joining of all pipe shall be in accordance with manufacturer's specifications.
- C. Bed each pipe section in accordance with Section 02221.
- D. Unless otherwise specified, provide all gravity sewer lines with a minimum of four (4') feet of cover in roadways and 2-1/2 feet of cover in open areas, unless ductile iron pipe or concrete encasement is used.
- E. Do not allow walking on complete pipelines until backfill has been placed to a depth of at least six (6") inches above the crown of the pipe.
- F. Keep the interior of the pipe free of all unneeded material, and upon completion of a

section between any two (2) manholes it shall be possible to view a complete circle of light when looking through the pipe.

- G. When laying pipe ceases, close the open ends of the pipe with a suitable plug for preventing the entrance of foreign materials.
- H. Couplings and adapters used for joining dissimilar gravity pipe materials, for repairing and rejoining sections of gravity sewer, and for connecting the first full joint of pipe to a short stub through a manhole wall shall meet the requirements of ASTM C-425.
- I. All couplings and adapters for gravity sewer pipe shall be of rubber, plastic and metallic materials that will not be attacked by municipal wastewaters or aggressive elements in the soil and conform to ASTM - 425, Section 5.

3.03 INSTALLATION OF PRESSURE PIPE

- A. Trenching and backfill for yard and under slab piping shall meet the requirements of Section 02221.
- B. During pipe installation Contractor shall take every precaution to prevent foreign material from entering the pipe or fittings. The Contractor shall place a heavy, tightly woven canvas bag over each end of joint of pipe before lowering it into the trench.
- C. Jointing procedures, including cleaning of ends of pipe, and lubrication shall be in accordance with the manufacturer's recommendations. All push-joint and/or mechanical joint pipe shall be laid with the bells pointing in the direction of laying.
- D. Field cutting of pipe shall be done according to the manufacturer's recommendations. Cut end shall be smooth and at right angles to the axis of the pipe. Field cuts shall be filed or trimmed to resemble the spigot end of the pipe as manufactured. Depth marks shall be placed on the pipe to assure pipe is inserted to the full depth when joint is made.
- E. Thrust blocking shall be provided at all bends (of 11-1/4 degrees or greater) and tees and valves. Blocking shall be poured against undisturbed earth, be a minimum of twelve (12") inches thick, and constructed so that the pipe and fitting joints will be accessible for repairs. Install as shown in the Typical Details.
- F. All yard valves shall be installed plumb and true in a workmanlike manner.
- G. All interior valves shall be installed plumb and true in a workmanlike manner with operator positioned to allow ease of operations.

3.04 INSTALLATION: SEWER MANHOLES - GENERAL

- A. Unless otherwise specified, all manholes shall have inside diameter or not less than four (4') feet and a vertical wall height of not less than 2.5 feet.
- B. The clear opening in the manhole shall be not less than twenty-six (26") inches.

- C. Depth of the manhole shall be the vertical distance from the lowest invert in the manhole to the base of the ring.
- D. Backfill manholes with the same material used for pipeline.

3.05 INSTALLATION: STANDARD PRE-CAST CONCRETE MANHOLES

- A. Manhole shall be installed in accordance with ASTM C-478.
- B. Excavate to the required depth and remove materials that are unstable or unsuitable for a good foundation. Prepare a level, compacted foundation extending six (6") inches beyond the manhole base.
- C. When wet or unconsolidated material occurs or when over excavation of the base occurs, provide a sub-base with a minimum of twelve (12") inches of Class I, granular material, well compacted with mechanical tamping equipment.
- D. Set base plumb and level, aligning manhole invert with pipe invert.
- E. Secure Pipe Connectors to Pipe according to the Connector Manufacturer instructions. When pipe stub outs are installed, provide restraint from longitudinal movements before backfill.
- F. Inlets and outlets from each manhole shall be finished smooth and flush with the sides of manholes walls so as not to obstruct the flow of liquid through the manhole.
- G. Thoroughly clean bells and spigots to remove dirt and other foreign materials that may prevent sealing. Unroll the Butyl Sealant rope directly against base of spigot. Leave protective wrapper attached until sealant is entirely unrolled against spigot. Do not stretch. Overlap from side to side - not top to bottom.
- H. Set risers and cones so steps align, taking particular care to clean, prepare and seal joints.
- I. After joining manhole sections, apply the butyl sealant sheet around the outside perimeter of the joint.
- J. Lift Holes leaving less than two (2") inches of wall thickness shall be plugged from the outside using a sand cement mortar, then covered with butyl sealant sheet. Should Lift Holes penetrate the wall they shall be additionally sealed with an interior application of an epoxy gel 1/2 thick extending two (2") inches beyond the penetration.
- K. Perform the final finishing to the manhole interior by filling all chips or fractures greater than 1/2 in length, width or depth and depressions more than 1/4 deep in inverts with an approval hydraulic cement. Do not fill the joints between the precast concrete sections. Clean the interior of the manhole, removing all dirt, spills or other foreign matter.

3.06 INSTALLATION: MANHOLE RINGS AND COVERS

- A. Grout and anchor manhole rings and covers in place with butyl sealant rope and sheets and bolts in accordance with the Project Details.
- B. The bearing surfaces between cast rings and covers shall be machined, fitted together, and match marked to prevent rocking.
- C. All casting shall be of the types, dimensions, and weights as shown on the plans and shall be free of faults, cracks, blow-holes, or other defects.
- D. Set the manhole frames to the required elevation using no more than ten (10") inch of precast concrete grade rings, sealing all joints between cone, adjusting rings, and manhole frame.
- E. Standard manhole frames set above grade and all water tight frames shall be held in place by four (4) threaded anchors. Anchors shall consist of:
 - 1. Four (4) 3/4 inch diameter by eight (8") inch long stainless steel all-thread rod.
 - 2. Set all-thread rod into 3/4 inch holes six (6") inches deep into the precast manhole with approved two (2) component epoxy anchor bolt setting compound.
 - 3. Secure ring with stainless steel washers and nuts after setting compound has cured.

3.07 INSTALLATION: DROP MANHOLE ASSEMBLIES

- A. Drop manhole assemblies shall be constructed as outlined in the Standard Details and on the plans.
- B. The material used in the drop pipe construction shall be Ductile Iron Pipe and Class B concrete.

3.08 FIELD TESTS - PRESSURE PIPE

- A. All newly laid water and sewer pressure lines shall be tested before being placed in service. For yard piping, trenches may be backfilled as the pipe is laid, or where practicable and at the option of the Contractor, trenches or bell holes may be left open for visual inspection during tests. Prior to making tests, all air shall be expelled from the pipe. Contractor shall install taps at high points of the line for purpose of expelling air.
- B. Pressure Test: A two (2) hour test shall be performed in accordance with AWWA C600 on the pipe line between valves or temporary plugs at a test pressure of at a minimum of 1.5 times the working pressure of the pipe or the rated pressure of the pipe whichever is greater, except that the pressure rating of the pipe, fittings or valves shall not be exceeded. Any open trench or bell holes over dry joints may be backfilled following this test. Where trenches have been backfilled prior to making the tests, any leaks evident at the surface shall be uncovered. All leaking joints disclosed by this test

shall be remade and retested. All pipe, fittings, valves, and other materials found defective under this test shall be removed and replaced at the Contractor's expense.

C. Leakage Test:

1. A leakage test shall be performed on the pipe line concurrently with the pressure test between valves or temporary plugs at the constant test pressure as specified in B above. The test shall be run in accordance with AWWA C600 except as modified below.
2. The maximum allowable leakage shall not exceed ten (10) gallons per inch of pipe diameter per mile of pipe per twenty-four (24) hours.
3. The Contractor shall provide a straight-walled test tank of adequate volume to supply the maximum allowable leakage to the system. The test tank shall have an accurate scale to measure the volume of water pumped to the nearest one-half (1/2) gallon. Leakage through the system shall be measured as the volume of water pumped from the test tank to maintain the line segment being tested within 5 psig of the initial test pressure.
4. Should tests disclose leakage greater than the allowable amounts, the Contractor, at his expense shall locate and repair any and all defects until the leakage is within the specified tolerance.
5. All exposed plant piping, valves and appurtenances shall be pressure and leak tested in accordance with the foregoing requirements except that they shall have the added requirement that no visible leaking, dripping or weeping will be allowed for the test segment to be accepted.

D. All air piping shall be pressure tested for leaks at 1.5 times the working pressure continuously for 30 minutes with no measurable leakage. Air piping shall pass the required pressure test prior to being placed in service.

E. Air piping shall be inspected after being placed in service and operated continuously at design pressure and temperature for a minimum of twenty-four (24) hours. Any detected leak(s) shall subsequently be repaired and the line placed back in leak free service.

3.09 FIELD TEST - INITIAL PROOF TESTING OF SANITARY SEWERS

A. It is the intent to specify a test as you go procedure in order to establish confidence in the installation and avoid the necessary delay of final acceptance.

B. Before a reach of pipeline is approved for payment, successfully proof test that reach for grade, alignment, cleanliness, and leakage.

C. In the event that four or more reaches fail to satisfactorily pass proof testing procedures, cease pipe laying until deficiencies are identified and corrected.

D. The basis for grade, alignment and cleanliness testing will be visual inspection. Leakage testing will be by means of low pressure air or exfiltration or infiltration as deemed by the Engineer.

E. Proof test flexible pipeline installation for deflection by pulling a go, no-go test

mandrel through the line after the initial backfill is complete to avoid unnecessary dig-ups.

3.10 FIELD TEST - FINAL GRAVITY SEWER TESTING

- A. Before the Work is accepted and before any house services are connected, a final testing procedure is to be followed.
- B. Perform a visual inspection when groundwater levels are above the pipeline if possible. All visible leaks shall be repaired.
- C. The standard leak test for all gravity sewers shall be a low pressure air exfiltration test. Other exfiltration tests, if approved by the Engineer, will be conducted in accordance with ASTM C-828 or latest revision.
- D. If flexible pipe is used, pull an approved go-no go deflection mandrel of 95/100 pipe diameter through all reaches of gravity sewer main. This test shall be conducted no sooner than twenty-four (24) hours after completion of backfilling of the tested reach. No sections will be accepted that exhibits a deflection of more than five (5%) percent.

3.11 LOW PRESSURE AIR EXFILTRATION TEST - GRAVITY SEWERS

- A. Calculate the pressure drop as the number of minutes for the air pressure to drop from a stabilized pressure of 4.0 to 3.0 PSIG.
- B. Times for mixed pipe sized of varying lengths should be calculated as described in ASTM, C828-76T using formula $t = K d/q$ ($q = .0020$).
- C. Lengths of sections under test shall not exceed 500 linear feet.
- D. The following items are for one (1) pipe size only:

AIR TEST TABLE

SPECIFICATION TABLE (MIN:SEC) REQUIRED WHEN TESTING ONE PIPE DIAMETER ONLY

PIPE DIAMETER, INCHES

	4	6	8	10	12	15	18	21	24	27	38	33	36	39	42
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38	3:20	4:08	4:59	5:56	6:58	8:05
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17	6:41	8:15	9:59	11:53	13:57	16:10
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55	10:01	12:23	14:58	17:00	18:25	19:50
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34	12:45	14:10	15:35			
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20				20:25	19:58	23:06
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30			13:24	16:32	17:09	23:49	23:57	27:43
175	0:31	1:09	2:03	3:13	4:37	7:05			12:06	15:19	18:54	20:01	27:13	27:57	32:20
200	0:35	1:19	2:21	3:40	5:17			10:25	13:36	17:13	21:16	22:52	30:37	31:56	36:58
225	0:40	1:29	2:38	4:08	5:40		8:31	11:35	15:07	19:08	23:38	25:44	34:01	35:56	41:35
250	0:44	1:39	2:56	4:35			9:24	12:44	16:38	21:03	25:59	28:35	37:25	39:56	46:12
275	0:48	1:49	3:14	4:43		8:16	10:12	3:53	18:09	22:58	28:21	31:27	40:49	43:55	50:49
300	0:53	1:59	3:31		6:03	9:27	11:54	16:12	21:10	26:47	33:05	34:16	47:38	47:55	55:26
350	1:02	2:19	3:47		6:48	10:38	13:36	18:31	24:12	30:37	37:48	40:01	54:26	55:54	64:41
400	1:10	2:38			7:34	11:49	15:19	20:50	27:13	34:27	42:32	45:44	61:14	63:53	73:55
450	1:19	2:50		5:14	8:19	13:00	17:01	23:09	30:14	38:16	47:15	51:27	68:02	71:52	83:10
500	1:28			5:45	9:04	14:11	18:43	25:28	33:16	42:06	51:59	57:10	74:51	49:51	92:24
550	1:37		4:02	6:17	9:50	15:21	20:25	27:47	36:17	45:56	56:42	62:53	81:39	87:50	101:38
600	1:46	2:50	4:22	6:48			22:07	30:06	39:19	49:45	61:26	68:36	88:27	95:49	110:53
650	1:54											74:19		103:48	120:07

3.12 FIELD TEST - PRECAST MANHOLES

A. Manholes shall be physically and vacuum tested to assure compliance with the Contract Documents and the desired workmanship of the finished work has been achieved.

B. Manhole Vacuum Test:

1. Backfill shall be placed around the base of the manhole to a depth of one (1') foot over the top of the sewer pipe before the vacuum test is performed.
2. The maximum vacuum applied to a manhole shall be twelve (12") inches of mercury (Hg).
3. All manholes shall be subject to a vacuum test of a minimum of ten (10") inches Hg prior to acceptance by the Owner. The test shall be considered acceptable if the vacuum drops no more than one (1") inch within the time specified in the following table:

Manhole I.D. (inches)	48	60	72	84	96	120
Test Time for up to 8 feet in depth (seconds)	60	70	80	90	100	120
Additional Test Time for each 4 Foot Added Depth (Seconds)	10	15	20	30	40	60

4. Testing Sequence:
 - a. All manholes shall be physically and vacuum tested. Manholes failing the test shall be repaired by the Contractor, and retested.
 - b. Manholes failing the vacuum test two (2) times may, at the discretion of the Owner, be allow to be hydrostatically tested by an exfiltration test for acceptance.
 - c. The OWNER may require complete replacement of any manhole failing three (3) leak tests. Replacement shall be at no cost to the OWNER.
5. The CONTRACTOR shall furnish all necessary equipment and personal to conduct the tests in the presence of the ENGINEER.
6. Costs for initial testing shall be included within and incidental to the Contract Unit Price for manhole construction or rehabilitating.
7. Repairing, retesting, pressure grouting and/or replacement of defective manholes shall be at the sole cost and responsibility of the CONTRACTOR, and shall be pursued in a timely manner to prevent disruption to the Project and/or sewer services.
8. Manholes moved, disturbed, displaced and/or damaged in any way during the finishing and/or backfilling operation subsequent to successful testing shall be retested for acceptance as specified above, at the CONTRACTOR'S expense.

END OF SECTION