

SPECIFICATIONS AND TERMS & GENERAL BID CONDITIONS

For Unit Price Contract For:

Old Lee Highway Force Main Extension

PROJECT NUMBER 23-304

Prepared for:

HAMILTON COUNTY WATER & WASTEWATER TREATMENT AUTHORITY

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Prepared by:
CROY ENGINEERING, LLC
1270 Market Street
Chattanooga, TN 37402-2713
July 2024



Table of Contents

Bid and Contracting Requirements

SECTION	TITLE	NO. OF PAGES
<u>Bidding Requirements</u>		
00010	Invitation to Bid	2
00100	Instructions to Bidders	10
00300	Bid Form	7
00400	Acknowledgement of Addenda	1
00410	Bid Bond	2
00415	Drug Free Workplace Affidavit	2
00416	DBE Good Faith Effort Affidavit	1
00418	Statement of Compliance Illegal Immigrants	1
00420	Qualification Statement	12
00480	Iran Divestment Act Compliance Certification	1
00490	Authorization to Bind	1
00492	EPA Certification Regarding Debarment Suspensions	1
00493	Statement of Equipment	1
00494	Certification By Proposed Prime or Subcontractor Regarding Equal Employment Opportunity	1
<u>Contract Forms</u>		
00500	Agreement	17
00503	Notice of Apparent Successful Bidder	1
00510	DBE Solicitation Verification Form (Form B)	1
00511	DBE Sub-Contract Services Verification Form (Form C)	1
00610	Performance Bond	3
00620	Payment Bond	3
<u>Conditions of Contract</u>		
00700	General Conditions	69
00800	Supplementary Conditions	22
<u>Additional Conditions</u>		
00813	Certification Regarding Debarment, Suspension (USEPA)	1
00814	Certification by Proposed Prime or Sub Regarding EEO	1
00815	Certificate of Substantial Completion	1
00831	Equal Employment Opportunity Specifications	1
00832	Equal Employment Opportunity Clause	1
00913	Hamilton County DBE Guidelines and Overview	2
00914	DBE Sub-Contract Termination Substitution Verification	1

Table of Contents continued

Division 01 – General Requirements

011100	Summary of Work	1
012200	Price and Payment Procedures	7
012500	Substitution Procedures	3
013000	Administrative Requirements	5
013001	Certificate of Property Restoration	1
013119	Project Meetings	7
013216	Construction Progress Schedule	3
013233	Photographic Documentation	2
014100	Regulatory Requirements	1
014200	References	6
014529	Testing Laboratory Services	5
015526	Traffic Regulations	2
015616	Temporary Dust Barriers	1
015623	Temporary Barricades	1
015713	Erosion and Sediment Control	15
015723	Temporary Storm Water Pollution Control	7
016500	Product Delivery Requirements	2
016600	Product Storage and Handling Requirements	3
017329	Cutting and Patching	4
017400	Cleaning and Waste Management	2
017836	Warranties	9
017839	Project Record Documents	5

Division 3 – Concrete

031100	Concrete Forming	5
033000	Cast-in-Place Concrete	35

Division 9 – Finishes

098001	Manhole Lining	4
--------	----------------	---

Division 31 – Earthwork

311100	Clearing and Grubbing	3
312000	Earthwork	13
312300	Excavation and Fill	16

Division 32 – Exterior Improvements

321000	Bases, Ballasts, and Paving	14
321313	Concrete Paving	12
329219	Seeding	12

Division 33 – Utilities

330130.16	CCTV Inspection of Sewer Main Lines	4
330523	Jack and Bore	4
333100	Gravity Sewers	11
333140	Cured-In-Place Pipe	4
333400	Sanitary Sewerage Force Main	13

Appendix

Example Contract Documents	6
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Attachments

Attachment 1 - ARAP	157
Attachment 2 – Geotechnical Report	16
Attachment 3 – As-Built at Apison Intersection	1

INVITATION TO BID

Name of Project: Old Lee Highway Force Main Extension

WWTA Project Number: 23-304

Owner: Hamilton County Water & Wastewater Treatment Authority
1250 Market Street, Suite 3050
Chattanooga, TN 37402-2713

Submit Bids to:

David West, P.E
Project # 23-304/ Project Name: Old Lee Highway Force Main Extension
Croy Engineering
1270 Market Street
Chattanooga, TN 37404

SEPARATE sealed BIDS for the construction of the Old Lee Highway Force Main Extension that consists of the construction of a new force main along Old Lee Highway. An existing gravity sewer main will be upsized downstream of the force main tie-in. The proposed force main will be jack and bored 360 L.F. under Friar Branch Creek and Interstate 75 then run under Old Lee Highway. The force main will stop at the Old Lee Highway and Apison Pike intersection. The force main will also be jack and bored 30 L.F. under a tributary of Friar Branch Creek that runs under Old Lee Highway. This project also consists of the rehabilitation of existing gravity sewer manholes and pipe, as well as road rehabilitation, traffic control, and erosion control.

A non-mandatory pre-bid meeting will be held at 2:30 PM, local time, on Tuesday, July 23, 2024.
The meeting will be held at **Croy Engineering Office, 1270 Market St, Chattanooga, TN 37402.**

The scope of the project will include the furnishing of all labor, material, equipment, tools, supervision, incidental, and any other items necessary or convenient to satisfactorily complete the construction. The Hamilton County Water & Wastewater Treatment Authority will receive separate sealed BIDS for the construction of a wastewater project at **Croy Engineering Office, 1270 Market Street, Chattanooga, TN 37404** until **2:00 PM**, local time, on **August 13, 2024.**

Preliminary pricing will be read aloud for any vendor submission received prior to the listed deadline, with each vendor identified by name. Official Notification of Award, including bid tab, will be released once the solicitation has gone through evaluation and recommendation of award.

The allotted time for construction is 365 calendar days.

Bids will be received for a single prime Contract.

No bids will be received or accepted after the above specified time and will be deemed invalid and returned unopened to the bidder. The bidding Contractor must be licensed in appropriate classification before such bid will be considered and shall comply with applicable codes, laws and regulations. The successful bidder will be required to furnish acceptable Performance and Payment Bonds in the amount of one hundred percent (100%) of the contract price, each bond. The Owner reserves the right to waive any irregularity or reject any or all bids. Hamilton County Disadvantaged Business Enterprise (DBE) procedures will be part of bid evaluation. Any Bidder unfamiliar with this policy should contact the DBE Liaison at (423) 209-6146.

Copies of the BIDDING DOCUMENTS may be examined at the following location: Croy Engineering, LLC, 1270 Market Street, Chattanooga, TN, 37402.

Electronic copies of BIDDING DOCUMENTS may be obtained from Croy Engineering, LLC, 1270 Market Street, Chattanooga, TN 37402 at a cost of \$100.00, non-refundable, for each set. Contact Linetta Ross at lross@croyeng.com Phone: 423-708-5858.

No Bid may be withdrawn within (90) days after the scheduled time for receipt of bids.

++END OF INVITATION TO BID++

1.01 Contract Documents

- A. The Contract Documents include the Contract Agreement, Invitation to Bid, Instructions to Bidders, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the Owner prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings, and addenda, together with written amendments, change orders, field orders and the Engineer's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement.
- B. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils reports, and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site, are not Contract Documents.
- C. The Contract Documents shall define and describe the complete work to which they relate.

1.02 Definitions

- A. Where the following words or the pronouns used in their stead occur herein, they shall have the following meaning:
 - 1. "Owner" shall mean the Hamilton County Water and Wastewater Treatment Authority, party of the first part to the Contract Agreement, or its authorized and legal representatives.
 - 2. "Engineer" shall mean Croy Engineering, LLC.
 - 3. "Contractor" shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party.
 - 4. "Work" and "Project" shall mean the entire completed construction required to be furnished under the Contract Documents.
 - 5. "Contract Time" shall mean three-hundred and sixty-five (365) consecutive calendar days as provided in the Contract Agreement for completion of the Project, to be computed from the date of the Notice to Proceed.

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6. "Liquidated Damages" shall mean the sum of five-hundred dollars (\$1,000.00) which the Bidder agrees to pay for each consecutive calendar day beyond the Contract Time required to complete the Project. Liquidated Damages will end upon written notification from the Owner of final acceptance of the Project.
 7. "Products" shall mean materials or equipment permanently incorporated into the Project.
 8. "Provide" shall mean to furnish and install.
 9. "Balanced Bid" shall mean a Bid in which each of the unit prices and total amount bid for each of the listed items reasonably reflects the value of that item with regard to the entire job considering the prevailing cost of labor, material and equipment in the relevant market. A Bid is unbalanced when, in the opinion of the Owner, any unit prices or total amounts bid on any of the listed items do not reasonably reflect such values.

1.03 Preparation and Execution of Bid

- A. Each Bid must be prepared to represent that it is based solely upon the materials and equipment specified in the Contract Documents.
- B. Each Bid must be submitted on the Bid forms which are attached to the Contract Documents. All blank spaces for Bid prices, both words and figures, must be filled in, in ink. In case of discrepancy, the amount shown in words will govern. All required enclosed certifications must be fully completed and executed when submitted.
- C. Each Bid must be submitted in a sealed envelope, addressed to the Engineer. Contractor's Identification Form must be fixed to the outside of the sealed envelope containing the bid. Each sealed envelope containing a Bid must be plainly marked on the outside as, "**Bid for Old Lee Highway Force Main Extension WWTA Project No 23-304**".
- D. The Bidder shall comply with Tennessee Code Annotated (TCA) Chapter 6 of Title 62, hereby incorporated by reference. The Bidder shall provide the license number, expiration date thereof, and appropriate license classification of the contractor applying to the bid for electrical, plumbing or heating, ventilation or air conditioning using the Contractor's Identification Form on the outside of the envelope containing the Bid; otherwise, the Bid will not be opened or considered.
- E. The Bidder shall provide on the outside of the sealed envelope using the Contractor's Identification Form the following information:
 1. Contractor's Name
 2. Contractor's License Number
 3. Expiration Date of License
 4. Contractor's License Classification

- F. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to Croy Engineering Attn: David West, P.E., 1270 Market Street, Chattanooga, TN 37402. Each sealed envelope containing a Bid must be plainly marked on the outside as **“Bid for Old Lee Highway Force Main Extension WWTA Project No 23-304”**.
- G. Any and all Bids not meeting the aforementioned criteria for Bid submittal may be declared non-responsive, and subsequently returned to the Bidder.
- H. The Contractor, in signing a Bid on the whole or any portion of the Project, shall conform to the following requirements:
1. Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.
 2. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.
 3. Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officer of the corporation manually written below the corporate name following the wording “By_”. Corporation seal shall also be affixed to the Bid.
 4. The Bidder shall complete, execute and submit the following documents, which are attached to these Contract Documents:
 - a. The Bid Form
 - b. Acknowledgement of Addenda
 - c. The Bid Bond
 - d. Drug-Free Workplace Affidavit
 - e. DBE Good Faith Effort Affidavit
 - f. Statement of Compliance Illegal Immigrants
 - g. Qualification Statement
 - h. Iran Divestment Act Compliance Certification
 - i. Authorization to Bind
 - j. Contractor’s Identification (Page 10 of Instructions to Bidders)
 - k. EPA Certification Regarding Debarment, Suspension, and Other Responsibility Matter
 - l. Statement of Equipment
 - m. Certification by Proposed Prime Subcontractor Regarding EEO

1.04 Method of Bidding

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

1.05 Addenda and Interpretations

- A. No interpretation of the meaning of the Drawings, Specifications or other pre-bid documents will be made to any Bidder orally.
- B. Every request for such interpretation should be made in writing and addressed to Croy Engineering Attn: David West, P.E.; 1270 Market Street, Chattanooga, TN 37402 dwest@croyeng.com and to be given consideration must be received at least five business days prior to the date fixed for opening Bids.
- C. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be mailed, shipped or faxed to all prospective Bidders (at the respective addresses furnished) prior to the date fixed for the opening of Bids.
- D. Failure of Bidders to receive or acknowledge any Addendum shall not relieve them of any obligation under the Bid. All Addenda shall become part of the Contract Documents.

1.06 Bid Modifications

- A. An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- B. If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 1.06 A, and submit a new Bid prior to the date and time for the opening of Bids.
- C. If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

1.07 Bid Security

- A. Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond included herein or a Surety Company's Standard Bid Bond, duly executed by the Bidder as principal and having as surety thereon a surety company authorized to do business in the State of Tennessee

and listed in the latest issue of U.S. Treasury Circular 570, in the amount of ten percent (10%) of the Bid. Attorneys-in-fact who sign Bonds must file with each Bond a currently dated copy of their power of attorney.

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

1.08 Receipt and Opening of Bids

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

1.09 Subcontracts

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

1.10 Conditions of the Project

- A. Each Bidder must be informed fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the Contract. Insofar as possible, the Contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any Contractor.
- B. The Bidder is advised to examine the location of the Project and to be informed fully as to its conditions; the conformation of the ground; the character, quality and quantity of the products needed preliminary to and during the prosecution of the work; the general and local conditions and all other matters which can in any way affect the work to be done under the Contract. Failure to examine the site will not relieve the successful Bidder of an obligation to furnish all products and labor necessary to carry out the provisions of the Contract.
- C. The Bidder shall notify the Owner of the date and time Bidder proposes to examine the location of the Project. The Bidder shall confine examination to the specific areas designated for the proposed construction, including easements and public right-of-ways. If, due to some unforeseen reason, the Owner's proceedings for obtaining the proposed construction site (including easements), have not been completed, the Bidder may enter the site only with the express consent of the property owner. The Bidder is solely responsible for any damages caused by examination of the site.

1.11 Notice of Special Conditions

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

1.12 Obligation of Bidder

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

1.13 Method of Award

- A. The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Base Bid complying with the conditions of the Contract Documents.
- B. The Bidder to whom the award is made will be notified. The Owner reserves the right to reject any and all Bids and to waive any minor irregularities in Bids received whenever such rejection or waiver is in the Owner's interest. A responsive Bidder shall be one who submits a Bid in the proper form without qualification or intent other than as called for in the Contract Documents, and who binds himself or herself on behalf of the Bid to the Owner with the proper Bid Bond completed and attached, and who properly completes all forms required to be completed and submitted at the time of the Bidding. The Bidder shall furnish all data required by these Contract Documents. Failure to do so may result in the Bid being declared non-responsive.
- C. A responsible Bidder shall be one who can fulfill the following requirements:
 - 1. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is fifty percent (50%) or more owned by a person, corporation or firm.
 - 2. The Bidder shall demonstrate adequate construction experience and sufficient equipment resources to properly perform the work under and in conformance with the Contract Documents. This evaluation will be based upon a list of completed or active projects and a list of construction equipment available to the Bidder to perform the work. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may reasonably request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Project contemplated therein.
 - 3. The Bidder shall demonstrate financial resources of sufficient strength to meet the obligations incident to the performance of the work covered by these Contract Documents. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.
 - 4. One who has designated in the bid form one of the pre-qualified specialty sub-contractors which will perform the cured-in-place pipe work.
- D. Acceptance of the Bidder's documentation and substantiation or Contract Award by the Owner does not relieve the Bidder of liability for non-performance as covered in the Contract Documents, nor will the Bidder be exempted from any other legal recourse the Owner may elect to pursue.

1.14 Suitability and Acceptability of Proposed Bidders – Hamilton County

In determining the suitability and acceptability of proposed bidders, the County reserves the right to consider each bidder's commitment to hire minorities and/or subcontract with minority contractors, relative to certain phases of the contracted services. The contractor to be awarded this project must commit that neither it nor any of its subcontractors will discriminate on the basis of race, color, national origin, age, physical disability, or sex in the performance of this contract. The contractor shall carry out applicable government regulations in the award and administration of all governmentally assisted contracts. Failure by the contractor to carry out these requirements shall be a material breach of this contract, which may result in the termination of this contract or such other remedies as the County may deem appropriate.

Hamilton County has adopted certain Disadvantaged Business Enterprise Utilization Guidelines (Resolution No. 701-40, dated July 18, 2001), hereinafter referred to as DBE Guidelines, that are designed to encourage the participation of certain businesses in construction projects financed with federal, state and/or County funds. In its consideration of the bidder to be awarded this construction contract, the County will not only consider the lowest and best bid submitted by prospective bidders, but will also evaluate each bidder's demonstrated and documented efforts to utilize certified disadvantaged business enterprises by establishing joint ventures and partnerships, and/or the awarding of subcontracts for this project. See Specification entitled Hamilton County DBE Guidelines and Overview for verification submittal requirements. Hamilton County's annual goal is to award DBE's at least 10% of funds expended on construction projects.

Particular questions regarding the definition of a "Disadvantaged Business Enterprise", compliance with the Guidelines, or questions on how to receive a copy of the Guidelines may be addressed by visiting the Hamilton County website at <http://www.hamiltontn.gov> or contacting Hamilton County Disadvantaged Business Enterprise (DBE) Liaison Officer, Kenneth Jordan, II, Equal Employment Opportunity Office, MLK Building, 317 Oak Street, Suite 220, Chattanooga, Tennessee 37403, (423) 209-6146.

CONTRACTOR'S IDENTIFICATION

Croy Engineering
Attn: David West, P.E.

1270 Market Street
Chattanooga, Tennessee 37402

SEALED BID PROPOSAL FOR:

Old Lee Highway Force Main Extension

Project No.: 23-304

Attach this form to the sealed envelope containing the Bid. Failure to provide required information on the sealed envelope will be considered a non-responsive Bid.

Complete the following for all required Subcontractors:

BIDDER:
Name: _____

Address: _____

Tennessee License No. _____
Expiration Date _____
Classification _____
Monetary Limit \$ _____

Subcontractor (HVAC): _____

Tennessee License No. _____

License Expiration Date _____

License Classification _____

Subcontractor (Electrical): _____

Tennessee License No. _____

License Expiration Date _____

License Classification _____

Subcontractor (Plumbing): _____

Tennessee License No. _____

License Expiration Date _____

License Classification _____

Subcontractor (Other): _____

Subcontractor (Geothermal): _____

Tennessee License No. _____

License Expiration Date _____

License Classification _____

TDEC License No. _____

TDEC License Expiration Date _____

TDEC License Classification _____

Tennessee License No. _____

Expiration Date _____

License Classification _____

CAUTION: T.C.A. Section 62-6-119(b) requires all bidders to list the name, license number, expiration date thereof, and license classification of the contractors applying to bid for the prime contract and also for the electrical, plumbing, heating, ventilation, air conditioning, and geothermal heating and cooling contracts on the outside of the envelope containing the bid if the subcontractor's bid amount(s) is \$25,000.00 or more.

END OF SECTION 00100

BID FORM

**OLD LEE HIGHWAY FORCE MAIN EXTENSION
WWTA PROJECT NO. 23-304**

BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

Table of Contents

ARTICLE 1—BID RECIPIENT..... 3

ARTICLE 2—BIDDER’S ACKNOWLEDGEMENTS..... 3

ARTICLE 3—BIDDER’S REPRESENTATIONS 3

ARTICLE 4—BIDDER’S CERTIFICATION 4

ARTICLE 5—BASIS OF BID 5

ARTICLE 6—ATTACHMENTS TO THIS BID 7

ARTICLE 7—DEFINED TERMS 7

ARTICLE 8—BID SUBMITTAL 8

ARTICLE 1—BID RECIPIENT

1.01 This Bid is submitted to:

***Croy Engineering Attn: David West, P.E.,
1270 Market Street, Chattanooga, TN 37402***

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for one-hundred and twenty (120) days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3—BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum. Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- C. Bidder has carefully studied any applicable: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- D. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site- related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2)

the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- E. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- F. Bidder 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 Bidding Documents.
- G. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- I. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4—BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5—BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimate quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
1	Force Main Upgrades				
1.	Mobilization	1	LS		\$
2.	Erosion Control	1	LS		\$
3.	Traffic Control	1	LS		\$
4.	Bypass Pumping	1	LS		\$
5.	Remove and Replace 20-Inch Gravity w/ 24-Inch DIP Class 250	240	LF	\$	\$
6.	Jack & Bore w/ 36-Inch Steel Casing	390	LF	\$	\$
7.	Enlarged Manhole w/ Vent (Sta. 0+00)	1	EA	\$	\$
8.	Replace Manhole (Sta. 0+00)	1	EA	\$	\$
9.	18-Inch DIP Class 250 Force Main				
9a.	0 – 8’ Deep Trench and Bedding	5,270	LF	\$	\$
9b.	Over 8’ Deep Trench and Bedding	910	LF	\$	\$
10.	Trench Width Pavement Demolition & Replacement	2,560	SY	\$	\$
11.	Rock/ Concrete Excavation	560	CY	\$	\$
12.	Backfill (Flowable Fill)	3,660	CY	\$	\$
13.	Overlay & Striping	25,000	SY	\$	\$
14.	Connect Prop. 18-Inch Force Main to Ex. 20-Inch Force Main (Sta. 65+61)	1	EA	\$	\$
15.	Connect Ex. Pressurized Force Main w/ Ex. Gravity Force Main (Sta. 6+50)	1	EA	\$	\$
16.	Air Release Valve Assembly	4	EA	\$	\$
17.	Main Line Fittings	8,780	LB	\$	\$
18.	Thrust Blocking	20	CY	\$	\$
19.	Curb & Gutter	80	LF	\$	\$
20.	Concrete – Sidewalk	110	SY	\$	\$
21.	Concrete Anchor	12	EA	\$	\$

2	Sewer Rehab				
1.	18-Inch CCTV and CIPP	4,050	LF	\$	\$
2.	20-Inch CCTV and CIPP	670	LF	\$	\$
3.	Manhole Protective Lining	240	VF	\$	\$
3	Cash Allowances				
1.	Soils and Concrete Testing	Allowance	LS		\$ 10,000.00
BASE BID TOTAL PRICE:					\$
BASE BID TOTAL PRICE (WRITTEN IN WORD FORM):					

Mandatory Add Alternate #1: Bidder is required to provide pricing for the below Alternate.

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
1.	20-Inch HDPE DR-11 Force Main				
1a.	0 – 8’ Deep Trench and Bedding	5,270	LF	\$	\$
1b.	Over 8’ Deep Trench and Bedding	910	LF	\$	\$
ADD ALT. TOTAL PRICE:					\$
ADD ALT. TOTAL PRICE (WRITTEN IN WORD FORM):					

ALTERNATES

5.02 Additive Alternate Bid items are above for this project.

TIME OF COMPLETION

5.03 Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimate quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

5.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6—ATTACHMENTS TO THIS BID

6.01 The documents submitted with and made a condition of this Bid are listed in Section C- 200 Instructions to Bidders and should be included with this Bid.

ARTICLE 7—DEFINED TERMS

7.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 8—BID SUBMITTAL

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable) _____

**SECTION 00400
ACKNOWLEDGMENT OF ADDENDA**

I acknowledge receipt of the following addenda:

ADDENDA NUMBER	DATE ISSUED

SIGNATURE

NAME PRINTED

COMPANY

DATE

END OF SECTION

Section 00410 - BID BOND (PENAL SUM FORM)

Bidder Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: Address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Bid Project <i>(name and location)</i> : Hamilton County WWTA Old Lee Highway Force Main Extension WWTA Project No. 23-304 Bid Due Date:
Bond Penal Sum: [Amount] Date of Bond: [Date]	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
<i>(Full formal name of Bidder)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver 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.
3. This obligation will 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, 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 total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will 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 the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must 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 Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will 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 will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00415

**BIDDER AFFIDAVIT ON COMPLIANCE
WITH DRUG-FREE WORKPLACE ACT AND CERTIFICATE
DRUG-FREE WORKPLACE AFFIDAVIT OF PRIME BIDDER**

STATE OF _____

COUNTY OF _____

Comes the affiant after having first been duly sworn and testifies as follows:

1. My name is _____ . I hold the principal office of
_____ for _____.
(Name of Principal Office) *(Name of Bidding Entity)*

2. _____ has submitted a bid to the
(Name of Bidding Entity)
Hamilton County Water and Wastewater Treatment Authority for construction of Old Lee
Highway Force Main Extension

3. _____ employs more than five (5) employees.
(Name of Bidding Entity)

4. In accordance with Tenn. Code Ann. §50-9-113, this is to certify that
_____ after being first duly sworn, affirms that it
(Name of Bidding Entity)

Has a Drug-Free Workplace Program that complies with Tennessee Code Annotated, Title 50, Chapter 9, in effect at the time of submission of its bid to perform the construction of the Hamilton County Water & Wastewater Treatment Authority project identified above, at least to the extent required of governmental entities. Bidder affirms that:

1. It has received a Certificate of Compliance with the applicable proportions of the Drug-Free Workplace Act from the Department of Labor and Workforce Development and has attached a copy of such certificate to this Affidavit; or,

2. It operates a drug and alcohol testing program at least as stringent as the Hamilton County Water and Wastewater Treatment Authority's drug and alcohol testing program as contained in Employee Handbook and shall, upon request, provide documentation of such program to the Owner.

3. This affidavit is made on personal knowledge.

Further the affiant saith not this _____ day of _____

Signature

Subscribed and sworn to before me this _____ day of _____

Notary Public

My Commission Expires:

(Date)

END OF SECTION

**SECTION 00416
DBE GOOD FAITH EFFORT AFFIDAVIT**

The undersigned Contractor, having bid on the construction project commonly known as _____, as solicited by Hamilton County, Tennessee (a political subdivision of the State of Tennessee), on _____, 20__, does hereby attest that it has negotiated in good faith with the herein-below named Disadvantaged Business Enterprise(s) (DBE) to be included as sub-contractor(s) in the Contractor’s performance of said project.

<u>Name of DBE</u>	<u>Address</u>	<u>Phone</u>	<u>% of Project</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

In addition, the Contractor commits to promote Hamilton County’s expressed goals of inclusion of DBE’s whenever and wherever possible on the subject project.

Dated this _____ day of _____, 20____. _____
Name of Contractor

By: _____

Title: _____

SECTION 00418

**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 1.

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 bargainor, 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/she executed the foregoing document for the purposes recited therein.

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

Notary Public

My commission expires _____

QUALIFICATIONS STATEMENT

THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT PERMITTED BY LAWS AND REGULATIONS

1. SUBMITTED BY:

Official Name of Firm: _____

Address: _____

2. SUBMITTED TO: _____

3. SUBMITTED FOR: _____

Owner: _____

Project Name: _____

TYPE OF WORK: _____

4. CONTRACTOR'S CONTACT INFORMATION

Contact Person: _____

Title: _____

Phone: _____

Email: _____

5. AFFILIATED COMPANIES:

Name: _____
Address: _____

6. TYPE OF ORGANIZATION:

SOLE PROPRIETORSHIP

Name of Owner: _____

Doing Business As: _____

Date of Organization: _____

PARTNERSHIP

Date of Organization: _____

Type of Partnership: _____

Name of General Partner(s): _____

CORPORATION

State of Organization: _____

Date of Organization: _____

Executive Officers:

- President: _____

- Vice President(s): _____

- Treasurer: _____

- Secretary: _____

LIMITED LIABILITY COMPANY

State of Organization: _____

Date of Organization: _____

Members: _____

JOINT VENTURE

Sate of Organization: _____

Date of Organization: _____

Form of Organization: _____

Joint Venture Managing Partner

- Name: _____

- Address: _____

Joint Venture Managing Partner

- Name: _____

- Address: _____

Joint Venture Managing Partner

- Name: _____

- Address: _____

7. LICENSING

Jurisdiction: _____

Type of License: _____

License Number: _____

Jurisdiction: _____

Type of License: _____

License Number: _____

8. CERTIFICATIONS

CERTIFIED BY:

Disadvantage Business Enterprise: _____

Minority Business Enterprise: _____

Woman Owned Enterprise: _____

Small Business Enterprise: _____

Other (_____): _____

9. BONDING INFORMATION

Bonding Company: _____

Address: _____

Bonding Agent: _____

Address: _____

Contact Name: _____

Phone: _____

Aggregate Bonding Capacity: _____

Available Bonding Capacity as of date of this submittal: _____

10. FINANCIAL INFORMATION

Financial Institution: _____
Address: _____
Account Manager: _____
Phone: _____

INCLUDE AS AN ATTACHMENT AN AUDITED BALANCE SHEET FOR EACH OF THE
LAST 3 YEARS

11. CONSTRUCTION EXPERIENCE:

Current Experience:

List on **Schedule A** all uncompleted projects currently under contract (If Joint Venture list each participant's projects separately).

Previous Experience:

List on **Schedule B** all projects completed within the last 5 Years (If Joint Venture list each participant's projects separately).

Has firm listed in Section 1 ever failed to complete a construction contract awarded to it?

YES NO

If YES, attach as an Attachment details including Project Owner's contact information.

Has any Corporate Officer, Partner, Joint Venture participant or Proprietor ever failed to complete a construction contract awarded to them in their name or when acting as a principal of another entity?

YES NO

If YES, attach as an Attachment details including Project Owner's contact information.

Are there any judgments, claims, disputes or litigation pending or outstanding involving the firm listed in Section 1 or any of its officers (or any of its partners if a partnership or any of the individual entities if a joint venture)?

YES NO

If YES, attach as an Attachment details including Project Owner's contact information.

12. SAFETY PROGRAM:

Name of Contractor's Safety Officer: _____

Include the following as attachments:

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) OSHA No. 500- Log & Summary of Occupational Injuries & Illnesses for the past 5 years.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all OSHA Citations & Notifications of Penalty (monetary or other) received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all safety citations or violations under any state all received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide the following for the firm listed in Section V (and for each proposed Subcontractor furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) the following (attach additional sheets as necessary):

Workers' compensation Experience Modification Rate (EMR) for the last 5 years:

YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____

Total Recordable Frequency Rate (TRFR) for the last 5 years:

YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____

Total number of man-hours worked for the last 5 Years:

YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____

Provide Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) Days Away From Work, Days of Restricted Work Activity or Job Transfer (DART) incidence rate for the particular industry or type of Work to be performed by Contractor and each of Contractor's proposed Subcontractors and Suppliers) for the last 5 years:

YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____

13. EQUIPMENT:

MAJOR EQUIPMENT:

List on **Schedule C** all pieces of major equipment available for use on Owner's Project.

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HERewith, INCLUDING ANY ATTACHMENTS, IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME OF ORGANIZATION: _____

BY: _____

TITLE: _____

DATED: _____

NOTARY ATTEST:

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____, 20__

NOTARY PUBLIC - STATE OF _____

MY COMMISSION EXPIRES: _____

REQUIRED ATTACHMENTS

1. Schedule A (Current Experience).
2. Schedule B (Previous Experience).
3. Schedule C (Major Equipment).
4. Audited balance sheet for each of the last 3 years for firm named in Section 1.
5. Evidence of authority for individuals listed in Section 7 to bind organization to an agreement.
6. Resumes of officers and key individuals (including Safety Officer) of firm named in Section 1.
7. Required safety program submittals listed in Section 13.
8. Additional items as pertinent.

SCHEDULE A

CURRENT EXPERIENCE

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE C - LIST OF MAJOR EQUIPMENT AVAILABLE

ITEM	PURCHASE DATE	CONDITION	ACQUIRED VALUE

IRAN DIVESTMENT ACT CERTIFICATION

EFFECTIVE DATE JULY 1, 2016

Chapter No. 817 (HB0261/SB0377). "Iran Divestment Act" enacted. Amends Tennessee Code Annotated, Title 12 by adding Chapter 12, which is to be known as the "Iran Divestment Act." The Act requires the chief procurement officer for the State, no more than 120 days after the effective date of this Act, to publish on the State's website, using credible information freely available to the public, a list of persons determined to be engaged in investment activities with Iran. It prohibits a person identified on the list from contracting with a local government and makes any contract entered into void. It provides that after the effective date of this Act, **every bid or proposal made to a local government for goods or services, when competitive bidding is required, must contain the certification stated below,** subscribed and affirmed by the bidder as true under the penalty of perjury. The Act allows the certification to be submitted electronically. **It prohibits a bid from being considered or an award being made if the bidder does not provide the certification below to the local government,** except under limited enumerated circumstances.

I certify, under penalty of perjury, that the following statement is true:

"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 § 12-12-106."

Company Name: _____

Signature: _____

Print Name: _____

Signature: _____

Print Name: _____

Signature: _____

Print Name: _____

STATE OF _____

COUNTY OF _____

On this _____ day of _____, 20__, before me personally appeared, to me known to be the person (or persons) described in and who executed the foregoing instrument, and acknowledged that such person (or persons) executed the same as such person (or person's) free act and deed.

Notary Public _____

Print Name _____

My Commission Expires:

**SECTION 00490
AUTHORIZATION TO BIND**

By signing this proposal, I certify and acknowledge that the information contained in this document is true and correct, containing NO misrepresentations. The information is **NOT** tainted by any collusion. I certify and acknowledge that I have reviewed and approved the release of this bid for Hamilton County's consideration. Further, I am authorized to bind my company to the responses and pricing in these bid documents, and any subsequent negotiations, as well as execute the actual Contracted Documents, if selected.

AUTHORIZED SIGNATURE

NAME PRINTED

TITLE

FIRM NAME

TAXPAYER IDENTIFICATION NUMBER

FIRM ADDRESS (CITY, STATE, ZIP CODE)

TELEPHONE NUMBER

EMAIL ADDRESS

DATE

END OF SECTION

U.S. Environmental Protection Agency

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

I am unable to certify to the above statements. My explanation is attached.

Statement of Equipment

I/We hereby, certify that all machinery and equipment necessary to perform the scope of work contained in these contract documents is either owned by me/us or that we have made arrangements to obtain the same from others. I/We further agree that I/we will furnish a complete list of equipment/machinery with kind/size/capacity/ ownership, should the owner request the same.

Signed Name

Title

END OF SECTION

**CERTIFICATION BY PROPOSED PRIME OR SUBCONTRACTOR REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

Name of Prime Contractor

Project Number

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246, Part II, Section 203 (b), 30 F.R. 12319-25). Any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicated that the prime or subcontractor has not filed a compliance report due under applicable instruction, such contractor shall be required to submit a compliance report.

CONTRACTOR'S CERTIFICATION

Contractor's Name: _____

Address: _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. Yes No
2. Compliance Reports were required to be filed in connection with such contract or subcontract. Yes No

If yes, state what reports were filed and with what agency.

3. Bidder has filed all compliance reports due under applicable instructions, including SF-100. Yes No
4. If answer to Item 3 is NO, please explain in detail on reverse side of this certification.

Certification - The information above is true and complete to the best of my knowledge and belief. (A willfully false statement is punishable by law-U.S. Code, Title 18, Section 1001.)

Name and title of signer (Please type)

Signature

Date

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **Hamilton County Water and Wastewater Treatment Authority** (“Owner”) and _____ (“Contractor”).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby 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:

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: construction of a new force main along Old Lee Highway. An existing gravity sewer main will be upsized downstream of the force main tie-in. The proposed force main will be jack and bored 360 L.F. under Friar Branch Creek and Interstate 75 then run under Old Lee Highway, the force main will stop at the Old Lee Highway and Apison Pike intersection. The force main will also be jack and bored 30 L.F. under a tributary of Friar Branch Creek that runs under Old Lee Highway. This project also consists of the rehabilitation of existing gravity sewer manholes and pipe, as well as road rehabilitation, traffic control, and erosion control.

ARTICLE 3—ENGINEER

3.01 The Owner has selected Croy Engineering, LLC, (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Croy Engineering, LLC.

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 *Contract Times: Days*

A. The Work will be substantially complete within **335** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **365** 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 as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. 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 completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion*: Contractor shall pay Owner **\$1,000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work*: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **\$1,000** for each day that expires after such time until the Work is completed and ready for final payment.
 3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item) as stated in the attached, Contractor's Bid Form.

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 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 the basis of Contractor's Applications for Payment on or about the **5th** day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
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 Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

- a. **95** percent of the value of the Work completed (with the balance being retainage).
- B. 100 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage) Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of **3%** percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 - 1. This Agreement (00500).
 - 2. Performance bond (00610 - together with power of attorney).
 - 3. Payment bond (00620 - together with power of attorney).
 - 4. Other bonds – N/A
 - 5. General Conditions (00700).
 - 6. Supplementary Conditions. In the event of any conflict between the Agreement and Supplementary Conditions, the terms of this Agreement shall govern. If there is any conflict between the terms of the General Conditions and the terms of the Supplementary Conditions, the Supplementary Conditions shall govern.
 - 7. Specifications as listed in the table of contents of the Project Manual.
 - 8. Addenda (numbers____ to____, inclusive).
 - 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor’s Bid (00300 pages 1 to 7, inclusive).
 - 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The Contract Documents listed in Paragraph 7.01.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 7.

- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—CONTRACTOR’S REPRESENTATIONS

8.01 Contractor’s Representations

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied any applicable reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied any applicable reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor’s safety precautions and programs.
 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no 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.
 8. 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.
 9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 11. Contractor’s entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefit of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

ARTICLE 9 – MISCELLANEOUS

9.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

9.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests 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, money that may become due and money that is 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.

9.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9.04 *Severability*

- A. Any provision 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.

9.05 *No Damage for Delay*

- A. Contractor shall not be entitled to any damages (including, without limitation, expenses, costs, fees, extended field overhead and general conditions, equipment costs, home office overhead, lost productivity and inefficiency damages, additional payroll and labor costs, etc.) for any delay to its Work. Contractor's sole and exclusive remedy for a delay to its Work that is not caused by Contractor (or a person or entity performing a portion of Contractor's scope of Work) shall be an extension of time to substantially complete and finally complete the Project; provided, however, that Owner granting Contractor an extension of time is not a condition precedent to this no-damage-for-delay provision. Contractor shall also not be entitled to any damages for disruption or interference to its Work or for having to accelerate or incur additional labor or payroll costs in order to make up or overcome a delay to its Work so that it can maintain the dates for Substantial Completion and Final Completion. Contractor agrees that in determining and agreeing to the Contract Price it considered this no damage-for-delay provision and understands that it is not entitled to any damages whatsoever for a delay to its Work.

9.06 *No Third Party Beneficiaries*

- A. Contractor shall defend, hold harmless and indemnify Owner, its officers, agents, engineers, attorneys and employees from any and all losses, liability, damages, costs, expenses (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), claims, suits or actions whatsoever in nature, including intentional acts, resulting from or arising out of the activities of the Contractor or its subcontractors, agents, or employees under this Contract.

9.07 *Indemnification*

- A. Contractor shall defend, hold harmless and indemnify Owner, its officers, agents, engineers, attorneys and employees from any and all losses, liability, damages, costs, expenses (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), claims, suits or actions whatsoever in nature, including intentional acts, resulting from or arising out of the activities of the Contractor or its subcontractors, agents, or employees under this Contract.

9.08 *Amendments*

- A. The terms of this Agreement shall not be waived, altered, modified, supplemented, or amended, in any manner whatsoever, except by written, properly signed instrument by the parties duly authorized representative. This requirement include all change orders, which shall not arise under any other circumstances, including verbally, cumulatively, or by any course of conduct. Such waiver, alteration, modification, supplementation, or amendment, if made, shall be effective only in the specific instance and for the purpose given, and shall be valid and binding only if it is signed by all parties to this Agreement. The failure of Owner to enforce any provision of this Agreement shall not constitute a waiver by the Owner of that or any other provision.

9.09 *Choice of Law*

- A. This Agreement shall be governed by and construed in accordance with the laws of the State of Tennessee. All disputes will be resolved in accordance with Addendum B of the Supplementary Conditions. Provided, if any litigation arising under the Agreement must be brought in a federal forum, it shall be brought and maintained solely and exclusively in the United States District Court for the Middle District of Tennessee.

9.10 *Integration*

- A. This Agreement, which includes all Contract Documents as identified herein, constitutes the entire agreement between the parties. There are no understandings, agreements, or representations, oral or written, regarding this Agreement, except as specified or referenced herein. Contractor, by the signature below of its authorized representative, hereby acknowledges that it has read this Agreement, understands it, and agrees to be bound by its terms and conditions.

9.11 *Counterparts*

- A. This Agreement may be executed in counterparts, each of which shall be an original, and all of which shall constitute but one and the same instrument.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

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

Owner:

Hamilton Co. WWTA

(typed or printed name of organization)

By:

(individual's signature)

Date:

(date signed)

Name:

(typed or printed)

Title:

(typed or printed)

Attest:

(individual's signature)

Title:

(typed or printed)

Address for giving notices:

1250 Market Street, Suite 3050

Chattanooga, TN 37402

Attn: Eric Brooks

Designated Representative:

Name:

(typed or printed)

Title:

(typed or printed)

Address:

Phone:

Email:

Contractor:

(typed or printed name of organization)

By:

(individual's signature)

Date:

(date signed)

Name:

(typed or printed)

Title:

(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

(individual's signature)

Title:

(typed or printed)

Address for giving notices:

Designated Representative:

Name:

(typed or printed)

Title:

(typed or printed)

Address:

Phone:

Email:

License No.:

(where applicable)

State:

**SECTION 00503
NOTICE OF APPARENT SUCCESSFUL BID**

TO: _____
ATTENTION: _____
ADDRESS: _____

DATE: _____
VIA: X fax _____
<input type="checkbox"/> mail

OWNER'S PROJECT NO. : 23-304

PROJECT: Old Lee Highway Force Main Extension

You are notified that your Bid dated _____ for the above Project has been recommended as the apparent lowest and best bid.
--

In accordance with the Hamilton County WWTa Disadvantaged Business Policy, you have seventy-two (72) hours in which to submit your DBE Solicitation Verification (Form B) and DBE Sub-contract Services Verification (Form C). These forms are Sections 00510 and 00511 of the project bid specifications and are attached hereto for your convenience. This information will be evaluated by the DBE Liaison Officer for compliance with the County's DBE policy.

You must comply with the following conditions precedent within seventy-two (72) hours of the date of this Notice, which is by _____.

1. You must deliver to the Hamilton County WWTa, 1250 Market St., Suite 3050, Chattanooga, TN 37402-2713, (423) 209-7842, (423) 209-7843 fax, completed Forms B and C, see attached.

Failure to comply with these conditions within the time specified shall entitle the OWNER to consider your bid abandoned, to annul this Notice, and to proceed with evaluation of other Bids.

Hamilton County, Tennessee

By _____
(Authorized Signature)
Rodney Ashby
Wastewater Manager,
HCWWTA

cc: File: Contract Documents
Michael Patrick, Executive Director, Hamilton County WWTa
Procurement Department

**SECTION 00510
DBE SOLICITATION VERIFICATION**

The undersigned Contractor, having bid on the construction project commonly known as _____, as solicited by Hamilton County, Tennessee (a political subdivision of the State of Tennessee), on _____, 20__, does hereby attest that it has made a good faith effort to enter into a contractual agreement with the herein-below named Disadvantaged Business Enterprise(s) (DBE) for the providing of certain sub-contractual jobs and workings on this project:

	Trade	Name of Company	Address	Phone	% of Project	Quote
DBE						
DBE						
Selected Sub						
DBE						
DBE						
Selected Sub						
DBE						
DBE						
Selected Sub						
DBE						
DBE						
Selected Sub						

Dated this _____ day of _____, 20__.

Name of Contractor

By: _____

Title: _____

**SECTION 00511
DBE SUB-CONTRACT SERVICES VERIFICATION**

The undersigned Contractor, upon being awarded the construction project commonly known as _____, as solicited by Hamilton County, Tennessee (a political subdivision of the State of Tennessee), on _____, 20__, does hereby verify that it will enter into a contractual agreement with the herein-below named Disadvantaged Business Enterprise(s) (DBE) for the providing of certain subcontract work and/or the purchase of supplies and materials on this project:

<u>Name of DBE</u>	<u>Job Assignment</u>	<u>Percentage of Project</u>

Dated this _____ day of _____, 20__.

Name of Contractor

By: _____

Title: _____

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*: HAMILTON COUNTY WATER & WASTEWATER TREATMENT AUTHORITY
P. O. Box 8856
Chattanooga, TN 37414

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description: Old Lee Highway Force Main Extension
WWTA Project No. 23-304

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and 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 when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. 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;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. 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:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 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 a contractor selected with the Owners 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 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven 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 Paragraph 5.4, and the Owner refuses the payment 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.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, 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. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 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 5; and

7.3 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.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. 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, successors, and assigns.

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. 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 a declaration of Contractor Default or within two years after the Contractor ceased working or within 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 periods of limitations 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 page on which their signature appears.

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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 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 for the Contractor for 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.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*: HAMILTON COUNTY WATER & WASTEWATER TREATMENT AUTHORITY
P. O. Box 8856
Chattanooga, TN 37414

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description: Old Lee Highway Force Main Extension

WWTA Project No. 23-304

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

_____*(seal)*

Contractor's Name and Corporate Seal

_____*(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

1. The Contractor and 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, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. 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 Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. 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 the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. 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.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, 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.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. **Definitions**
- 16.1 **Claim:** A written statement by the Claimant including at a minimum:
1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 4. A brief description of the labor, materials, or equipment furnished;
 5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2 **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 Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the 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 maybe asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms	1
1.02 Terminology	5
Article 2 – Preliminary Matters.....	6
2.01 Delivery of Bonds and Evidence of Insurance	6
2.02 Copies of Documents	6
2.03 Before Starting Construction.....	6
2.04 Preconstruction Conference; Designation of Authorized Representatives	7
2.05 Initial Acceptance of Schedules.....	7
2.06 Electronic Transmittals.....	7
Article 3 – Documents: Intent, Requirements, Reuse.....	8
3.01 Intent.....	8
3.02 Reference Standards	8
3.03 Reporting and Resolving Discrepancies	8
3.04 Requirements of the Contract Documents	9
3.05 Reuse of Documents	10
Article 4 – Commencement and Progress of the Work	10
4.01 Commencement of Contract Times; Notice to Proceed	10
4.02 Starting the Work.....	10
4.03 Reference Points	10
4.04 Progress Schedule	10
4.05 Delays in Contractor’s Progress	11
Article 5 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions	12
5.01 Availability of Lands	12
5.02 Use of Site and Other Areas	12
5.03 Subsurface and Physical Conditions.....	13
5.04 Differing Subsurface or Physical Conditions.....	13
5.05 Underground Facilities	15

5.06	Hazardous Environmental Conditions at Site.....	16
Article 6 – Bonds and Insurance		18
6.01	Performance, Payment, and Other Bonds	18
6.02	Insurance—General Provisions	19
6.03	Contractor’s Insurance.....	20
6.04	Owner’s Liability Insurance	22
6.05	Property Insurance.....	22
6.06	Waiver of Rights	24
6.07	Receipt and Application of Property Insurance Proceeds.....	25
Article 7 – Contractor’s Responsibilities		26
7.01	Supervision and Superintendence	26
7.02	Labor; Working Hours	26
7.03	Services, Materials, and Equipment.....	26
7.04	“Or Equals”	26
7.05	Substitutes	27
7.06	Concerning Subcontractors, Suppliers, and Others	29
7.07	Patent Fees and Royalties	30
7.08	Permits	31
7.09	Taxes	31
7.10	Laws and Regulations.....	31
7.11	Record Documents.....	32
7.12	Safety and Protection.....	32
7.13	Safety Representative	33
7.14	Hazard Communication Programs	33
7.15	Emergencies	33
7.16	Shop Drawings, Samples, and Other Submittals.....	33
7.17	Contractor’s General Warranty and Guarantee.....	35
7.18	Indemnification	36
7.19	Delegation of Professional Design Services	37
Article 8 – Other Work at the Site		37
8.01	Other Work	37
8.02	Coordination	38
8.03	Legal Relationships.....	38
Article 9 – Owner’s Responsibilities.....		39

9.01	Communications to Contractor.....	39
9.02	Replacement of Engineer	39
9.03	Furnish Data	40
9.04	Pay When Due.....	40
9.05	Lands and Easements; Reports, Tests, and Drawings	40
9.06	Insurance.....	40
9.07	Change Orders.....	40
9.08	Inspections, Tests, and Approvals	40
9.09	Limitations on Owner’s Responsibilities	40
9.10	Undisclosed Hazardous Environmental Condition.....	40
9.11	Evidence of Financial Arrangements.....	40
9.12	Safety Programs	40
Article 10 – Engineer’s Status During Construction.....		41
10.01	Owner’s Representative.....	41
10.02	Visits to Site.....	41
10.03	Project Representative.....	41
10.04	Rejecting Defective Work.....	41
10.05	Shop Drawings, Change Orders and Payments.....	41
10.06	Determinations for Unit Price Work	42
10.07	Decisions on Requirements of Contract Documents and Acceptability of Work	42
10.08	Limitations on Engineer’s Authority and Responsibilities.....	42
10.09	Compliance with Safety Program.....	42
Article 11 – Amending the Contract Documents; Changes in the Work		43
11.01	Amending and Supplementing Contract Documents.....	43
11.02	Owner-Authorized Changes in the Work	43
11.03	Unauthorized Changes in the Work.....	44
11.04	Change of Contract Price.....	44
11.05	Change of Contract Times	45
11.06	Change Proposals.....	45
11.07	Execution of Change Orders.....	46
11.08	Notification to Surety.....	46
Article 12 – Claims.....		46
12.01	Claims.....	46
Article 13 – Cost of the Work; Allowances; Unit Price Work.....		48

13.01	Cost of the Work	48
13.02	Allowances	50
13.03	Unit Price Work.....	50
Article 14 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....		51
14.01	Access to Work.....	51
14.02	Tests, Inspections, and Approvals.....	51
14.03	Defective Work.....	52
14.04	Acceptance of Defective Work.....	53
14.05	Uncovering Work	53
14.06	Owner May Stop the Work	53
14.07	Owner May Correct Defective Work.....	54
Article 15 – Payments to Contractor; Set-Offs; Completion; Correction Period		54
15.01	Progress Payments.....	54
15.02	Contractor’s Warranty of Title	57
15.03	Substantial Completion.....	57
15.04	Partial Use or Occupancy	58
15.05	Final Inspection	59
15.06	Final Payment.....	59
15.07	Waiver of Claims	60
15.08	Correction Period	60
Article 16 – Suspension of Work and Termination.....		61
16.01	Owner May Suspend Work	61
16.02	Owner May Terminate for Cause.....	61
16.03	Owner May Terminate For Convenience	62
16.04	Contractor May Stop Work or Terminate	63
Article 17 – Final Resolution of Disputes		63
17.01	Methods and Procedures.....	63
Article 18 – Miscellaneous		63
18.01	Giving Notice	63
18.02	Computation of Times.....	64
18.03	Cumulative Remedies	64
18.04	Limitation of Damages	64
18.05	No Waiver	64
18.06	Survival of Obligations.....	64

18.07 Controlling Law 64
18.08 Headings..... 64

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. 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, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 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. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice 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.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *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.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. *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, and such other lands furnished by Owner which are designated for the use of Contractor.

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *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.
40. *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.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *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 a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *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 but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated 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 information in the Contract Documents and with the design concept of the 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 Article 10 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 15.03 or 15.04).
- 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. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four

words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. Unless stated otherwise in the Contract Documents, words or phrases that 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. *Bonds*: 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 Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), 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;
 - 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.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- 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 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *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 2.03.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 the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, 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.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, 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, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, 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 part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then 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 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
 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 had actual knowledge thereof.
- B. *Resolving Discrepancies:*
1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); 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 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers 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 its consultants, including electronic media editions, or reuse any 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 adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions 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.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *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 Contract 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 Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *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 such date.

4.03 *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.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

- B. 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, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, 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 Times and Contract Price. 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.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. 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. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. abnormal weather conditions;
 - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *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.
- 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 permanent improvements are to be made 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.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all 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 directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent 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 and adjacent areas 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 of 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 structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site 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 5.03 is materially inaccurate; or
 - 2. is of such a nature as to require a change in the Drawings or Specifications; 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 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
 1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, 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 fall within any one or more of the categories described in Paragraph 5.04.A;
 - 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 Paragraph 13.03; and,
 - c. 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.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a 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 otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study

of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent 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 do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; 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 information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then 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 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and

recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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 Paragraph 13.03;
 - c. 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; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against

Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors 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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) 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. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. 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, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. 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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, 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. 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 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S.

Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then 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 bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 - 2. claims for damages insured by reasonably available personal injury liability coverage.
 - 3. 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.
- C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against 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. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, 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 (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining

applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 5. be appropriate for the Work being performed and provide protection from claims that 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.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, 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.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable 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 Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under

such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or 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; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, 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 insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, 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 Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, 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 or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, 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 occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.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, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, 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 builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

7.01 *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.
- 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.

7.02 *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, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner’s written consent, which will not be unreasonably withheld.

7.03 *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, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work 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.

7.04 *“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 Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of material or

equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that 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, Engineer shall deem it an “or equal” item. For the purposes of this paragraph, 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
 - 4) it is not objectionable to Owner.
 - 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.
- B. *Contractor’s Expense:* Contractor shall provide all data in support of any proposed “or equal” item at Contractor’s expense.
- C. *Engineer’s Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each “or-equal” request. Engineer may require Contractor to furnish additional data about the proposed “or-equal” item. Engineer will be the sole judge of acceptability. No “or-equal” item will be ordered, furnished, installed, or utilized until Engineer’s review is complete and Engineer determines that the proposed item is an “or-equal”, which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer’s Determination:* Neither approval nor denial of an “or-equal” request shall result in any change in Contract Price. The Engineer’s denial of an “or-equal” request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent

possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 3. 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:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether 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
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable 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.
- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the

replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

- G. 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 the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. 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.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. 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.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. 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 create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *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, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *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.

7.10 *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 or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

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

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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, other work in progress, 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 Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.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 at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer 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).
- F. Contractor's duties and responsibilities for safety and protection 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 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *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.

7.14 *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.

7.15 *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.

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. *Shop Drawing and Sample Submittal Requirements:*
 - 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

- c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 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 of that submittal, and that Contractor approves the 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 set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
 1. *Shop Drawings:*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - 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 7.16.D.
 2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall 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 7.16.D.
 3. 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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- 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 or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample 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 7.16.A.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 will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

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.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawing, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *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 officers, directors,

members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on 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;
 - 6. the issuance of a notice of acceptability by Engineer;
 - 7. any inspection, test, or approval by others; or
 - 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, 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 officers, directors, members, partners, employees, agents, consultants, or subcontractors 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 7.18.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 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, 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.

7.19 *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 Laws and Regulations.
- 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, 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, 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 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner

may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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 such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The

entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. 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.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

- 9.03 *Furnish Data*
- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.
- 9.04 *Pay When Due*
- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.
- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *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.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.08. 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.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. 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.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer’s authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. 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, are set forth in Paragraph 7.19.
- C. Engineer’s authority as to Change Orders is set forth in Article 11.

D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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 15.06.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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
 3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the

Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee*: When applicable, 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 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.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 Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the

maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

- d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- 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 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
 - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 - 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 1. 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;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety 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), 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.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
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 on the Work. 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, and 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 13.01.
 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, as 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 6.05), 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 communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here 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 Paragraph 13.01.B.
- D. *Contractor's Fee*: When the Work as a whole 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, Change Proposal, Claim, set-off, or other 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 11.04.C.
- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, 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.

13.02 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*: Contractor agrees that:
1. 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
 2. 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*: 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.

13.03 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. Payments to Contractor for Unit Price Work will be based on actual quantities.

- 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. 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 the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price 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;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it 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 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- 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, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. 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, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the

measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Ownershall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then 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.

14.07 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, 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, then 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 14.07, 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, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 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 during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *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, a warehouse bond, 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.

C. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, 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 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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and 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; or
 - b. 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 money 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 15.01.C.2.
 - 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.
- D. *Payment Becomes Due:*
- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.
- E. *Reductions in Payment by Owner:*
- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

- f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. 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;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, 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, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- 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 preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the

preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- 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. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work 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 therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 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 6.05 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, 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, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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 have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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 15.07. 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. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *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 Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 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 to 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. 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 repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- 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, 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 are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and 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);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, 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 complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.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 the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds 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.
- F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *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; and
 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) 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 16.03.
- 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 are not intended to preclude Contractor from submitting a Change Proposal 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 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *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, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

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

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract 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.

18.03 *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. 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.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® 00700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

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

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

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

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

SC-2.01 Delete Paragraphs 2.01 B. and C. in their entirety and insert the following in their place:

- B. Evidence of Contractor's Insurance:** When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. Evidence of Owner's Insurance:** After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02 Copies of Documents

SC-2.02.A. Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor two (2) fully executed printed or hard copies of the Contract Documents.

SC-2.03 Delete Replace Paragraph 2.03.A.1 with the following:

Contractor shall deliver to the Engineer and Owner an estimated construction progress schedule in a form satisfactory to the Engineer and Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of the work required under the Contract Documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC 5.03 Add the following new Paragraphs immediately after 5.03.A in their entirety and insert the following:

3. The following reports of explorations and tests of subsurface conditions at or contiguous to the Site have been used by the Engineer in preparing the Contract Documents:
 - a. Report dated January 30, 2024 prepared by SM&E, Inc., entitled; “Report of Limited Geotechnical Exploration Old Lee Highway Gravity Sewer Line.”
None of the “technical data” contained in such report may be relied upon by the Contractor.
4. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site have been used by the Engineer in preparing the Contract Documents and have been incorporated into the Contract Documents:
 - a. Drawings dated October 17, 2011 prepared by Cornerstone Surveying, LLC, entitled: “East Tennessee Grading New Sewer Relocation/Construction Located Along S.R. 317, Old Lee HWY”.
None of the information in such drawings constitutes “technical data” on which Contractor may rely.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.02 Insurance—General Provisions

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.

SC-6.03 Contractor’s Liability Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 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 6.03.A.1 and A.2 of the General Conditions:

State: Statutory
Federal, if applicable (e.g., Longshoreman's): Statutory
Jones Act coverage, if applicable:
Bodily injury by accident, each accident \$ 1,000,000
Bodily injury by disease, aggregate \$ 1,000,000

Employer's Liability:

Bodily injury, each accident \$ 1,000,000
Bodily injury by disease, each employee \$ 1,000,000
Bodily injury/disease aggregate \$ 1,000,000

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate \$ 1,000,000
Products - Completed Operations Aggregate \$ 1,000,000
Personal and Advertising Injury \$ 1,000,000
Each Occurrence (Bodily Injury and Property Damage) \$ 1,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:
Each person \$ 1,000,000
Each accident \$ 1,000,000

Property Damage:
Each accident \$ 1,000,000
[or]
Combined Single Limit of \$ 1,000,000

4. Excess or Umbrella Liability:

Per Occurrence \$ 1,000,000
General Aggregate \$ 1,000,000

5. Contractor's Pollution Liability:

Each Occurrence	\$ <u>1,000,000</u>
General Aggregate	\$ <u>1,000,000</u>

If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following:

- a. Hamilton County Water and Wastewater Treatment Authority (WWTA) – Owner
- b. Croy Engineering, LLC – Engineer

7. Contractor's Professional Liability:

Each Claim	\$ <u>1,000,000</u>
Annual Aggregate	\$ <u>1,000,000</u>

SC-6.05 Property Insurance

SC-6.05.A. Add the following to the list of items in Paragraph 6.05.A, as numbered items:

- 14. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorneys fees and engineering or other consultants' fees, if not otherwise covered;
- 15. include by express endorsement coverage of damage to Contractor's equipment.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

- 1. Regular working hours will be defined as 8 hours per day, Monday through Friday, excluding Holidays.
- 2. Owner's legal holidays as presently defined.

SC-7.02.C. Add the following new paragraph immediately after Paragraph 7.02.B:

Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-7.02.C. Add the following new subparagraph immediately after Paragraph 7.02.C:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as the cost to the Owner for time and expenses exceeding 40 hours per week of providing Owner's Representative of Engineer's Resident Project Representative, whichever cost is greater.

SC-7.09 Taxes

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Tennessee and of cities and counties thereof on all materials to be incorporated into the Work.
 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

SC-9.13 Owner's Site Representative

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

SC-9.13 Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee. Owner's Site Representative will be identified at pre-construction meeting. The authority and responsibilities of Owner's Site Representative follow: Add the following paragraphs after SC 9.13

1. **Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.**
2. **Review of Work and Rejection of Defective Work:**
 - a. **Conduct on Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.**
 - b. **Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.**

3. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups

4 Records

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
 - 1. **General:** RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
 - 2. **Schedules:** Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 - 3. **Conferences and Meetings:** Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 - 4. **Liaison:**
 - a. **Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.**

- b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
- 5. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
- 6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
- 7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- 10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather

conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).**
- 2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.**
- 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.**
- 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work.**
- 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.**
- 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.**
- 7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.**
- 8. Authorize Owner to occupy the Project in whole or in part.**

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01 Cost of the Work

SC 13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

c. Construction Equipment and Machinery:

- 1) Rentals of all construction equipment and machinery, and the parts thereof, 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.**
- 2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Associated Equipment Distributors An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.**

SC 13.03.E Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:**
 - 1. if the extended price of a particular item of Unit Price Work amounts to 20 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and**
 - 2. if there is no corresponding adjustment with respect to any other item of Work; and**
 - 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.**

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC 15.03.B Add the following new subparagraph to Paragraph 15.03.B:

- 1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.**

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the rules of American Arbitration Association subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.**
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.**

- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 - 1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and
 - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

SC-17.03 Attorneys' Fees

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02.

SC-17.03 Attorneys' Fees: For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 19 – ARP GUIDELINES

Consistent with the obligations set out in Division I, WWTa General Requirements, Section 01061, the contractor certifies to WWTa that Service Provider is, and shall continue to be, in compliance with the applicable requirements of federal Executive Order 11246 (as amended), 41 CFR 60-1.40, 60-300.5(a), 60741.5(a) and all other relevant employment regulations issued by the Office of Federal Contactor Compliance Programs ("OFCCP") (the "Regulatory Requirements"). These Regulatory Requirements prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity, national origin, and for inquiring about, discussing or disclosing compensation. Moreover, the Regulatory Requirements require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, or veteran status.

19.01 Equal Employment Opportunity

During the performance of this contract, the contractor agrees as follows:

- A. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.**
- B. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.**
- C. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.**
- D. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.**
- E. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.**
- F. The contractor will furnish all information and reports required by Executive**

Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

- G. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- H. The contractor will include the requirements in paragraphs (19.01)(A) through (H) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

19.02 Davis Bacon Act

During the performance of this contract, the contractor agrees as follows:

- A. All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.
- B. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.
- C. Additionally, contractors are required to pay wages not less than once a week.

19.03 Copeland Anti-Kickback Act

During the performance of this contract, the contractor agrees as follows:

- A. Contractor. The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.
- B. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and a clause requiring the subcontractors to include these clauses in

any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

- C. **Breach.** A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.”

19.04 Contract Work Hours and Safety Standards Act

During the performance of this contract, the contractor agrees as follows:

- A. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- B. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (19.04)(A) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (19.04)(A) of this section, in the t \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (19.04)(A) of this section.
- C. **Withholding for unpaid wages and liquidated damages.** The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (19.04)(B) of this section.
- D. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (19.04)(A) through (D) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (19.04)(A) through (D) of this section.

19.05 Clean Air Act and Federal Water Pollution Control Act

During the performance of this contract, the contractor agrees as follows:

Clean Air Act

- A. The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
- B. The contractor agrees to report each violation to the (name of subrecipient entering into the contract) and understands and agrees that the (name of the subrecipient entering into the contract) will, in turn, report each violation as required to assure notification to Treasury, and the appropriate Environmental Protection Agency Regional Office.
- C. The contractor agrees to include these requirements in each subcontract exceeding \$150,000.

19.06 Federal Water Pollution Control Act

- A. The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
- B. The contractor agrees to report each violation to the (name of the subrecipient entering into the contract) and understands and agrees that the (name of the subrecipient entering into the contract) will, in turn, report each violation as required to assure notification to the Treasury, and the appropriate Environmental Protection Agency Regional Office.
- C. The contractor agrees to include these requirements in each subcontract exceeding \$150,000.

19.07 Debarment and Suspension

During the performance of this contract, the contractor agrees as follows:

- A. This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- B. The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
- C. This certification is a material representation of fact relied upon by (insert name of recipient/subrecipient/applicant). If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (insert name of recipient/subrecipient/applicant), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

- D. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

19.08 Byrd Anti-Lobbying Amendment

During the performance of this contract, the contractor agrees as follows:

A. Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352

Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a

Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

19.09 Procurement of Recovered Materials

During the performance of this contract, the contractor agrees as follows:

- A. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired competitively within a timeframe providing for compliance with the contract performance schedule; meeting contract performance requirements; or at a reasonable price.
- B. Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines webpage.

The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

19.10 Domestic Preference for Procurement

During the performance of this contract, the contractor agrees as follows:

- A. As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.

For purposes of this clause:

Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. Manufactured products mean items and

construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

19.11 Access to Records

During the performance of this contract, the contractor agrees as follows:

- A. The Contractor agrees to provide The County, Treasury, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.
- B. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- C. The Contractor agrees to provide the Treasury or authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

19.12 Compliance with Federal Law, Regulations and Executive Orders

- A. This is an acknowledgement that Treasury ARP SLFRF financial assistance will be used to fund all or a portion of the contract. The contractor will comply with all applicable Federal law regulations, executive orders, Treasury policies, procedures, and directives.

19.13 Program Fraud and False or Fraudulent Statements or Related Acts

- A. The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract."

19.14 Non-Boycott of Israel Certification

- A. Service Provider certifies that it is not currently engaged in, and will not for the duration of the Original Agreement, engage in, a boycott of Israel, as defined by Tenn. Code. Ann. 12-4-119. This provision shall not apply to contracts with a total value of less than two hundred fifty thousand dollars (\$250,000.00), or to contractors with less than ten (10) employees. Under the law, a boycott of Israel means engaging in refusals to deal, terminating business activities, or other commercial actions that are intended to limit commercial relations with Israel, or companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel to do business, or persons or entities doing business in Israel, when such actions are taken: (i) in compliance with, or adherence to, calls for a boycott of Israel; or (ii) in a manner that discriminates on the basis of nationality, national origin, religion, or other unreasonable basis, and is not based on a valid business reason.

19.15 Iran Divestment Act Compliance Certification

- A. In accordance with Tennessee Code Annotated (TCA) Chapter 12, by submission of this bid, each bidder and each person signing on behalf of any bidders 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 TCA §12-12-106.**

19.16 Buy American Preference

During the performance of this contract, the contractor agrees as follows:

- A. All of the iron and steel in the project is produced in the United States.**
- B. The manufactured products used in the project are produced in the United States.**
- C. The construction materials used in the project are produced in the United States.**
- D. The Buy American preference applies to an entire infrastructure project, even if it is funded by both Federal and non-Federal funds under one or more awards. The Buy American preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. It does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy American preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of or permanently affixed to the structure.**



STATE OF TENNESSEE
CERTIFICATION REGARDING DEBARMENT, SUSPENSION
AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- Have not within a three-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Signature of Authorized Representative	Date
Printed Name	Phone Number / Email Address

I am unable to certify to the above statements. Explanation is attached.



**STATE OF TENNESSEE
IRAN DIVESTMENT ACT CERTIFICATION**

SUBJECT CONTRACT NUMBER(S):	
CONTRACTOR LEGAL ENTITY NAME:	
EDISON SUPPLIER IDENTIFICATION NUMBER:	

The Iran Divestment Act, Tenn. Code Ann. § 12-12-101 et. seq. requires a person that attempts to contract with the state, including a contract renewal or assumption, to certify at the time the bid is submitted or the contract is entered into, renewed, or assigned, that the person or the assignee is not identified on a list created pursuant to § 12-12-106.

Currently, the list is available online at the following website: <https://www.tn.gov/generalservices/procurement/central-procurement-office--cpo-/library-/public-information-library.html>

The Contractor, identified above, certifies by signature below that it is not included on the list of persons created pursuant to Tenn. Code Ann. § 12-12-106 of the Iran Divestment Act.

CONTRACTOR SIGNATURE

NOTICE: This certification MUST be signed by an individual with legal capacity to contractually bind the Contractor.

PRINTED NAME AND TITLE OF SIGNATORY

DATE



STATE OF TENNESSEE
NON-BOYCOTT OF ISRAEL CERTIFICATION

The Bidder certifies that it is not currently engaged in, and will not for the duration of the contract engage in, a boycott of Israel as defined by Tenn. Code Ann. § 12-4-119. This provision shall not apply to contracts with a total value of less than two hundred fifty thousand dollars (\$250,000) or to contractors with less than ten (10) employees.

According to the law, a boycott of Israel means engaging in refusals to deal, terminating business activities, or other commercial actions that are intended to limit commercial relations with Israel, or companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel to do business, or persons or entities doing business in Israel, when such actions are taken:

- 1) In compliance with, or adherence to, calls for a boycott of Israel, or
- 2) In a manner that discriminates on the basis of nationality, national origin, religion, or other unreasonable basis, and is not based on a valid business reason. Tenn. Code Ann. § 12-4-119.

Signature of Authorized Representative	Date
Printed Name	Phone Number / Email Address

STATE WATER INFRASTRUCTURE GRANTS

IDENTIFICATION SIGN

All plans and specifications for each project approved shall contain provisions for requiring the general contractor to provide identification signs. The signs shall conform to the following basic features:

1. The following diagram shall be used as a design:



2. The sign shall be a 4'0" X 8'0" sheet of exterior grade plywood and shall be built so as to remain erected during the entire construction phase of the project.
3. The background of both sides shall be white. The lettering shall be black and shall be large enough to take advantage of the full size of the plywood. The stars shall be white set on a blue field and surrounded by a white ring placed inside a state map in red with a stripe of white and blue on the right side. The sign shall be bordered by a one-inch blue stripe.

U.S. Environmental Protection Agency

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

_____ I am unable to certify to the above statements. My explanation is attached.

**CERTIFICATION BY PROPOSED PRIME OR SUBCONTRACTOR REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

Name of Prime Contractor

Project Number

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246, Part II, Section 203 (b), 30 F.R. 12319-25). Any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicated that the prime or subcontractor has not filed a compliance report due under applicable instruction, such contractor shall be required to submit a compliance report.

CONTRACTOR'S CERTIFICATION

Contractor's Name: _____

Address: _____

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. Yes No
2. Compliance Reports were required to be filed in connection with such contract or subcontract. Yes No

If yes, state what reports were filed and with what agency.

3. Bidder has filed all compliance reports due under applicable instructions, including SF-100. Yes No
4. If answer to Item 3 is NO, please explain in detail on reverse side of this certification.

Certification - The information above is true and complete to the best of my knowledge and belief. (A willfully false statement is punishable by law-U.S. Code, Title 18, Section 1001.)

Name and title of signer (Please type)

Signature

Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

Contract No. _____ Engineer's Project No. _____

Project _____

Contractor _____

Contract For _____ Contract Date _____

This Certificate of Substantial Completion applies to all Work under the Contract documents or to the following specified parts thereof:

To _____
Owner

And To _____
Contractor

The work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR AND ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on:

(Date of Substantial Completion)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. When this certificate applies to a specified part of the Work the items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

Recommended by _____
Engineer/Architect Date

Recommended by _____
Project Manager Date

SECTION 00831

EQUAL EMPLOYMENT OPPORTUNITIES SPECIFICATIONS

Following is the standard language which must be incorporated into all solicitations for offers and bids on all construction contracts or subcontracts in excess of \$10,000 to be performed in designated geographical areas:

"Minority" includes:

1. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
2. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
3. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
4. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

END OF SECTION

SECTION 00832

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

The OWNER is an equal opportunity employer and during the performance of this contract, the Contractor agrees to abide by the equal opportunity goals of the OWNER as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. In all construction contracts or subcontracts in excess of \$10,000 to be performed for the OWNER, any Contractor and/or subcontractor is further required to file in duplicate within ten (10) days of being notified that it is the lowest responsible bidder, an affirmative action plan with the EEO Director of the OWNER. This plan shall state the Contractor's goals for minority and women utilization as a percentage of the work force on this project.
5. This Plan or any attachments thereto shall further provide a list of employees annotated by job function, race and sex who are expected to be utilized on this project. This plan or attachment thereto shall further describe the methods by which the Contractor or subcontractor will utilize to make good faith efforts at providing employment opportunities for minorities and women.
6. The Contractor will include the portion of the sentence immediately preceding Paragraph 1 and the provisions of Paragraphs 1 through 6 in every subcontract so that such provisions will be requested of each subcontractor. The Contractor agrees to notify the OWNER of any subcontractor who refuses or fails to comply with these equal opportunity provisions. Any failure or refusal to comply with these provisions by the Contractor and/or subcontractor shall be a breach of this contract.

END OF SECTION

**SECTION 00913
HAMILTON COUNTY DBE GUIDELINES AND OVERVIEW**

PART I – GENERAL

1.01 WHAT IS HAMILTON COUNTY’S DBE POLICY?

- A. Hamilton County shall provide Disadvantaged Business Enterprises (DBE’s) with the maximum equitable opportunity to participate in the performance of contracts financed in whole or in part with federal, state or county funds. Hamilton County's annual goal shall be to award DBE's at least 10% of the funds expended for said contracts.

1.02 WHAT IS A DBE?

- A. As used in these Guidelines, "Disadvantaged Business Enterprises (DBE's)" shall mean a for-profit small business concern—
1. That is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals; and
 2. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.
- B. "Socially and economically disadvantaged individual means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is—
1. Any individual who is a recipient finds to be a socially and economically disadvantaged individual on a case-by-case basis.
 2. Any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
 - (a) "Black Americans", which includes persons having origins in any of the Black racial groups of Africa;
 - (b) "Hispanic Americans", which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
 - (c) "Native Americans", which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
 - (d) "Asian-Pacific Americans", which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong;
 - (e) "Subcontinent Asian Americans", which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
 - (f) "Women"

1.03 HOW DOES THE DBE POLICY WORK WITH THE CURRENT HAMILTON COUNTY PURCHASING RULES?

- A. Hamilton County has adopted certain Purchasing Rules that govern the County's purchase of all goods and services. The adoption of this DBE Plan in no way is intended to circumvent those Purchasing Rules, but is designed to encourage DBE participation in the County's purchase of said goods and services pursuant to those Purchasing Rules.

1.04 HOW DOES HAMILTON COUNTY IDENTIFY DBE'S?

- A. Hamilton County Government will coordinate with the State of Tennessee, U.S. Government, and other agencies to identify qualified DBE's. These DBE's will be offered opportunities to participate in bidding and contracting with Hamilton County for all types of services such as construction and purchase of materials and services. To that end, Hamilton County will set and enforce program goals through its Implementation Plan. Additionally, Hamilton County will set and enforce program goals as specified in 49 CFR 26 – Title 49 and other applicable federal and state laws, rules and procedures.

1.05 WHERE CAN ONE OBTAIN A LIST OF DBE'S IN THIS REGION?

To determine the DBE's in this region, contact the following agencies:

Hamilton County DBE Liaison Office (ask for DBE listing to be faxed or e-mailed)	(423)-209-6146
Tennessee Department of Transportation https://www.tn.gov/tdot/topic/small-business	(615)-741-3681
Chattanooga Chamber of Commerce – Maria Noel http://www.chattanooga-chamber.com/diversityandinclusion	(423)-763-4338
Urban League of Chattanooga – Lilly Sanchez http://www.ulchatt.net	(423)-756-1762

1.06 WHO CAN I CONTACT IF I HAVE ANY QUESTIONS ABOUT THIS PROGRAM?

All questions should be directed to the DBE Liaison Office. The contact number for that office is (423) 209-6146.

END OF SECTION 01062

**SECTION 00914
DBE SUB-CONTRACT TERMINATION/SUBSTITUTION VERIFICATION**

The undersigned Contractor, having been awarded the construction project commonly known as _____, as awarded by Hamilton County, Tennessee, does hereby verify that it has terminated its subcontract with _____ (previously designated and accepted by Hamilton County as a Disadvantaged Business Enterprise (DBE)) on this project, and that it has subsequently contracted with, or unsuccessfully made efforts to contract with, the herein-below named business(s), also designated and recognized by Hamilton County as a DBE for the continuation of the services previously subcontracted:

<u>Name of DBE</u>	<u>Job Assignment</u>	<u>Date Contacted</u>	<u>Response</u>

Dated this ____ day of _____, 20__.

Name of Contractor

By: _____

Title: _____

PART 1 GENERAL

1.01 SCOPE

Old Lee Highway Force Main Extension consists of the construction of a new 18" force main along Old Lee Highway. An existing gravity sewer main will be upsized downstream of the force main tie in. The proposed force main will be Jack and Bored 360 L.F. under Friar Branch Creek and Interstate 75 then run under Old Lee Highway, the force main will stop at the Old Lee Highway and Apison Pike intersection. The force main will also be Jack and Bored 30 L.F. under a tributary of Friar Branch Creek that runs under old lee highway. This project also consists of the rehabilitation of existing gravity sewer manholes and pipe, as well as road rehabilitation, traffic control, and erosion control.

The project includes the installation and maintenance of erosion and sedimentation controls, compliance with applicable permit conditions, testing, cleanup, final stabilization and appurtenant items for a complete and operational system.

The allotted time for construction is three-hundred and sixty-five (365) calendar days.

- B. The equipment and materials to be furnished will be installed at the locations shown on the Drawings.

1.02 Quantities

The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

Part 1 General

1.01 Summary

- A. This section describes the methods by which measurement will be made of the quantities for which payment will be made for the Project. It is the intention of this Specification that payment will be made for those items listed in the Bid Schedule only. All items of Work not specifically listed in the Bid Schedule shall be included in the prices for the various items listed on the Bid Schedule.
- B. Measurement for payment on a unit price basis shall be as described below. Payment for each unit installed shall be made according to the unit price bid, as listed in the Bid Schedule. Only those items appearing in the Bid Schedule will be considered for payment on a unit price basis. References to measurement and payment in other sections shall not apply.
- C. Even though an item of work is included in the technical specifications, if it is not both covered herein and specifically itemized in the Bid Schedule, payment for it shall not be separately made. Such work shall be considered a necessary part of or incidental to its related work.
- D. The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for 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. Unit prices are used as a means of computing the final figures for Bid and Contract purposes, for periodic payments for work performed, and for determining value of additions or deletions and wherever else as is reasonable.
- E. 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, cleanup, 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 Drawings and as described in the Specifications.
- F. 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 items for which the Owner does not receive the benefit described or intended.

Part 2 Products

2.01 Measurement and Payment

- A. Partial payment shall be made for approved materials stored at the project site at the presentation of material invoices in the proper manner.

Part 3 Execution

3.01 Mobilization

- A. Mobilization including general project administration costs shall include mobilization and demobilization of the prime contractor's and all sub-contractor's work forces, supplies, equipment, and incidentals at the project. It shall include all contractor and sub-contractor costs associated with obtaining performance and payment bonds, insurance required by this contract and others, permits required to be obtained by the contractor, attendance at progress meetings, site inspections required by the Storm Water Pollution Prevention Plan and Notice of Coverage, and other preconstruction and project costs incurred after award of the contract which are necessary costs to the project and are of a general nature rather than directly attributable to other pay items. All necessary preconstruction costs not attributable to a specific pay item shall be included in the contract lump sum price for Mobilization and not in any other pay item.
- B. Payment for Mobilization shall be made in accordance with the following schedule:
 - a. 60% of the lump sum price upon full mobilization of manpower and equipment to the project site.
 - b. 40% of the lump sum price upon full demobilization of manpower and equipment, and removal of all temporary facilities, waste materials, debris, and restoration of the site.

3.02 Erosion Control Measures

- A. Payment shall be made for furnishing and installing erosion control measures in accordance with the drawings, the TDEC Erosion and Sediment Control Handbook, and the Storm Water Pollution Prevention Plan (SWPPP), keeping streets and driveways broom cleaned, twice weekly stormwater inspections, and cleaning and/or replacement of measures which become loosened, torn, undermined, or washed out. All requirements as described in the Landscape Plans of these drawings are also to be included in this bid item. Stream crossing measures, like cofferdams and trench plugs shall be included in this bid item.

3.03 Traffic Control

- A. Payment for furnishing all qualified labor, material, equipment, and services required for traffic control, as required by the plans and specifications, shall be made at the lump sum price listed in the Bid Schedule. Payment shall include the cost for the contractor to implement and maintain the traffic control plan throughout the construction period. Payment shall be made according to the following schedule:
 - a. 20% of the lump sum price upon submittal of approved traffic control plan and full implementation and placement of the advance warning signs.
 - b. 60% of the lump sum price upon completion of all work in public rights of way that require lane closures and advance notice to vehicular traffic.
 - c. 20% of the lump sum price upon full removal of all advance warning signs.

3.04 Bypass Pumping

- A. Payment for furnishing all qualified labor, material, equipment, and services required for bypass pumping during the complete and final construction of the gravity sewer line upsizing and force main connection, located north of Interstate 75 as needed to maintain normal operations.
- B. The downstream force main will not require bypass pumping. Owner will coordinate flow diversion as required.
- C. Bypass pumping required for manhole lining is not included in this pay item.

3.05 Remove & Replace 18-Inch Gravity w/ 24-Inch DIP Class 250

- A. Payment for furnishing all material, equipment, labor, tools, and incidentals to remove existing 18-inch gravity main and replace with a 24-Inch DIP Class 250 gravity main via open trench as shown on plans. Replacement shall be made at the unit price listed on the Bid Schedule for each linear foot. Payment shall include all necessary labor, tools, equipment, disposal of material, and connections to manholes.

3.06 Jack & Bore w/ 36-Inch Steel Casing

- A. Unit price shall be paid by the linear foot of installed 36-Inch steel casing pipe as shown on the drawings and these specifications, rounded to the nearest whole foot. Excess casing pipe installed shall be at the Contractor's expense and shall not be paid for the Owner. Unit cost shall include bore pit, receiving pit, casing pipe, end closures, carrier pipe supports, and spacers. 18-Inch DIP Class 250 carrier pipe shall be included in this pay item.

3.07 Enlarged Manhole w/ Vent (Sta. 0+00)

- A. Payment for furnishing all material, equipment, labor, tools, and incidentals to install a new enlarged manhole where shown on the plans at station 0+00 per the standard details, shall be made at the unit price listed on the Bid Schedule per each. Payment shall include all necessary labor, equipment, and materials required for a complete and workable system including but not limited to steps, water-tight lids, a vent, connection of the proposed force main, the proposed gravity main, and the existing gravity main.

3.08 Replace Manhole (Sta. 0+00)

- A. Payment for furnishing all material, equipment, labor, tools, and incidentals to remove an existing manhole and install a new precast manhole with xypex admixture where shown on the plans at station 0+00 per the standard details, shall be made at the unit price listed on the Bid Schedule per each. Payment shall include all necessary labor, equipment, and materials required for a complete and workable system including but not limited to steps, water-tight lids, connection of the proposed gravity main, and the temporary connection of the existing gravity main with an enlarged invert filled with either a boot or brick and mortar.

3.09 18-Inch DIP Class 250 Force Main

- A. Unit price shall be paid for furnishing and installing 18-Inch DIP Class 250 force main with proper lining between the designation stationing shown on the drawings per linear foot at the designated depth of trench. The price paid will include all necessary equipment, labor, tools, materials, and incidentals for furnishing and laying the pipe; Measurement of the pipe will be to the nearest foot along the centerline of the pipe installed in the trench.
 - a. Separate payment items will be made for, pavement demolition, pavement repair, overlay and striping, rock and concrete excavation, and backfilling flowable fill as required and detailed in the following sections.

3.10 Trench Width Pavement Demolition and Replacement

- A. Payment for asphalt pavement demolition, as shown on the plans or as directed by the Engineer, shall be made at the unit price listed in the Bid Schedule. Payment shall include furnishing all labor, equipment, tools, and material for saw cutting, demolition, loading, hauling, and disposing of all demolition material in accordance with the drawings and specifications. Measurement of pavement demolition will be to the nearest square yard as determined by surface measurements.
- B. Payment for furnishing and installing asphalt, and compacted crushed stone pavement will be made at the unit price bid listed in the Bid Schedule and shall include all necessary equipment, labor, tools, materials, and incidentals for furnishing and installing the pavement repair including subgrade preparation and compaction, concrete pavement surface installation to match existing lines and grades of existing adjacent pavement surfaces for a smooth transition from existing to new pavement; saw cutting existing pavement and curbs; concrete finish to match existing; protection of existing pavements for a complete repair.

3.11 Rock/ Concrete Excavation

- A. Payment for rock and concrete demolition, as found in the field along the proposed pipe alignment, shall be made at the unit price listed in the Bid Schedule. Payment shall include furnishing all labor, equipment, tools, and material for saw cutting, demolition, loading, hauling, and disposing of all demolition material in accordance with the drawings and specifications. Measurement of excavation will be to the nearest cubic yard as confirmed in the field and initially determined by a geotechnical investigation and TDOT as-built plans which estimate approximately 7-inches of concrete under the first layer of pavement of Old Lee Highway.

3.12 Backfill (Flowable Fill)

- A. Payment for flowable fill concrete, as shown by the standard details inside the trench under the road or at stream crossings, shall be made at the unit price listed in the Bid Schedule. Payment shall include furnishing all labor, equipment, tools, and material in accordance with the drawings and specifications. Measurement of flowable fill will be to the nearest cubic yard.

3.13 Overlay & Striping

- A. Unit price shall be paid for by the square yard installed, complete at the minimum surface area specified per the pay item. The overlay and striping installed shall be of the type removed and shall be of equal or better quality and shall be conducted on all lanes perpendicular to the road work. Quantities shall be determined by field measurement agreed to by the Owner.

3.14 Connect Prop. 18-Inch Force Main to Ex. 20-Inch Force Main (Sta. 65+61)

- A. Unit price shall be paid for each connection to existing infrastructure where shown on the drawings or called for by the Owner. The price paid will include furnishing and installing all components on the detail "Force Main Connection Detail," on sheet C-307 of the drawings, included but not limited to a 20x18-inch wye, one 18-inch gate valve, two 20-inch gate valves, one 20 by 18-inch reducer, a clean out, pipe sleeves, excavation, labor, backfill, and bedding (as required per the standard details) needed to properly complete the connection as required. Payment will be for the complete installation of the specified size and material installed at the location(s) indicated on the Drawings.
- B. Included in this payment shall be potholing to locate the existing buried manhole and relocating existing service lines to existing manhole.

3.15 Connect to Ex. Pressurized Force Main w/ Ex. Gravity Force Main (Sta. 6+50)

- A. Unit price shall be paid for each connection to existing infrastructure where shown on the drawings or called for by the Owner. The price paid will include the 20-inch DIP as required, removal of the existing manhole, excavation, labor, backfill, and bedding (as required per the standard details) needed to properly complete the connection as required. Payment will be for the complete installation of the specified size and material installed at the location(s) indicated on the Drawings.

3.16 Air Release Valve Assembly

- A. Payment for furnishing and installing combination air release valve/cleanout assemblies, where shown on the plans or as directed by the Engineer, shall be made at the unit price listed in the Bid Schedule. Payment shall include, but not be limited to, valves, sleeves, pipe, retainer glands, concrete vault and lid (as shown in the standard details), and all necessary labor, equipment, and materials required for a complete and workable system.

3.17 Main Line Fittings

- A. Payment for furnishing and installing iron fittings, where shown on the plans or directed by the Engineer, shall be made at unit price by the total weight of all ductile iron fittings for the complete installation of bends, wyes, and other iron fittings required. Payment

will be for the complete installation of 4-inch and greater fittings and material installed at the location(s) indicated on the Drawings and the payment includes all appurtenant accessories required to complete the installation of the fitting.

3.18 Thrust Blocking

- A. Payment for furnishing and installing thrust blocking, where shown on the plans or as directed by the Engineer, shall be made at the unit price listed in the Bid Schedule. Payment shall include all necessary labor, equipment, and materials required for a complete installation.

3.19 Curb & Gutter

- A. Payment for curb and gutter, where shown on the plans or as directed by the Engineer, shall be made at the unit price listed in the Bid Schedule. Payment shall include saw-cutting, removing demolished material, replacing curb and gutter with a smooth transition to the existing curb and gutter; all necessary labor, equipment, material, and disposal required for completing the site's curb and gutter per the plans.

3.20 Concrete - Sidewalk

- A. Unit price shall be paid for by the square yard installed, complete at the minimum surface area specified per the pay item. Payment shall include saw-cutting, removing demolished material, replacing sidewalk. The concrete installed shall be of the type removed and shall be of equal or better quality. Quantities shall be determined by field measurement and agreed to by the Owner. Contractor shall safely dispose of all removed materials. No material will be buried on site or along the ditch line.

3.21 Concrete Anchor

- A. Payment for furnishing and installing concrete anchors, where shown on the plans or as directed by the Engineer, shall be made at the unit price listed in the Bid Schedule. Payment shall include, but not be limited to, concrete and all necessary labor, equipment, and materials required for a complete and workable system.

3.22 18-Inch CCTV and CIPP

- A. Unit price shall be paid for performing CCTV and Cured in Place Pipe of 18-Inch DIP gravity sewer between the designation stationing shown on the drawings per linear foot. The price paid will include all necessary equipment, labor, tools, materials, and incidentals. Measurement of the pipe will be to the nearest foot along the centerline of the pipe installed in the trench.

3.23 20-Inch CCTV and CIPP

- A. Unit price shall be paid for performing CCTV and Cured in Place Pipe of 20-Inch DIP gravity sewer between the designation stationing shown on the drawings per linear foot. The price paid will include all necessary equipment, labor, tools, materials, and incidentals. Measurement of the pipe will be to the nearest foot along the centerline of the pipe installed in the trench.

3.24 Manhole Protective Lining

- A. Payment for furnishing all material, equipment, labor, tools, and incidentals to line manholes where shown on the plans or directed by the Engineer, shall be made at the unit price listed on the Bid Schedule for each vertical foot. Payment shall include all necessary labor, equipment, and materials required for a complete and workable system including bypass pumping.

3.25 Cash Allowances

- A. General
 - a. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
 - b. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition.
 - c. No payment shall be provided for services which fail to verify required results.
- B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.
- C. Documentation
 - a. Submit copies of the invoices with each periodic payment request from the firm providing the services.
 - b. Submit results of services provided which verify required results.
- D. Schedule of Cash Allowances
 - a. Soils and Concrete Testing: Allow the amount provided in the Bid for the services of a geotechnical engineering firm and testing laboratory to verify soils conditions including trench excavation and backfill and similar issues and for the testing of concrete cylinders for poured in place concrete.

3.26 20-Inch HDPE DR-11 Force Main

- A. Unit price shall be paid for furnishing and installing 20-Inch HDPE DR11 DIPS force main with proper lining between the designation stationing shown on the drawings per linear foot. The price paid will include all necessary equipment, labor, tools, materials, and incidentals for furnishing and laying the pipe; Measurement of the pipe will be to the nearest foot along the centerline of the pipe installed in the trench.

- a. Separate payment items will be made for pavement demolition, pavement repair, overlay and striping, rock and concrete excavation, and backfilling flowable fill as required and detailed in the sections above.

END OF SECTION

PART 1 – GENERAL

1.01 SCOPE

- A. This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.
- B. Related Requirements:
 - 1. Section 013000 – Administrative Requirements

1.02 STORAGE

- A. For the purposes of these Contract Documents, a “substitute item” shall be defined as one of the following:
 - 1. A product or manufacturer offered as a *replacement* to a specified product or manufacturer.
 - 2. A product or manufacturer offered *in addition* to a specified product or manufacturer.
- B. For the purposes of these Contract Documents, a “substitute construction method” shall be defined as one of the following:
 - 1. A mean, method, technique, sequence or procedure of construction offered as a *replacement* for a specified mean, method, technique, sequence, or procedure of construction.
 - 2. A mean, method, technique, sequence or procedure of construction offered *in addition* to a specified mean, method, technique, sequence, or procedure of construction.

1.03 GENERAL

- A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence, or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and

shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.

- B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.
- C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.
- D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:
 - 1. Verify that the item being furnished will fit in the space allowed, perform the same functions, and have the same capabilities as the item specified,
 - 2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,
 - 3. Include the cost of any architectural, structural, mechanical, piping, electrical, or other modifications required, and
 - 4. Include the cost of required additional work by the Engineer, if any, to accommodate the item.
- E. Whenever a product specification includes minimum experience requirements which the manufacturer selected by the Contractor cannot meet, the manufacturer shall furnish the Owner with a cash deposit or bond acceptable to the Owner in an amount equal to the cost of the product, which shall remain in effect until the experience requirement has been met.

1.04 APPROVALS

- A. Approval, of a substitution as an acceptable manufacturer, of the Engineer is dependent on determination that the product offered:

1. Is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life, and other criteria to that on which the design is based, and
2. Will require no major modifications to structures, electrical systems, control systems, or piping systems.

1.05 SUBSTITUTIONS AND OPTIONS

- A. No substitutions will be considered for the manufacturers listed in the Bid.
- B. After Notice to Proceed
 1. Substitute items will be considered only if the term “equal to” precedes the names of acceptable manufacturers in the Specification.
 2. Where items are specified by referenced standard or specified as indicated above in Article 1.03, Paragraph A, such items shall be submitted to the Engineer for review.
 3. The Contractor shall submit shop drawings on the substitute item for the Engineer's review in accordance with the *Section 013000 – Administrative Requirements*.
- C. Prior to Opening of Bids
 1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.03, Paragraph A, above. Such consideration may occur only after the Notice to Proceed.
 2. No consideration or approvals will be made for products being offered where the term “equal to” precedes the name of an approved product. Such substitution consideration may occur only after the Notice to Proceed.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

Part 1 General

1.01 Equipment Delivery and Construction Schedule

CONTRACTOR shall provide a tentative schedule of work at the pre-construction conference in the form of a Gantt Chart outlining individual work tasks, the anticipated start date, the anticipated finish date, and pertinent associated details.

Not later than ten (10) consecutive calendar days after the issuance of the "Notice to Proceed", the CONTRACTOR shall submit to the ENGINEER for review a detailed schedule of major equipment delivery and installation and general construction operations, indicating the sequence of the work, the estimated dates of starting each task, and the estimated time of completion of each task. The schedule shall be broken down with respect to individual structures and facilities, indicating when existing structures or equipment would be taken out of service (if applicable). The form and content of the schedule shall be satisfactory to the ENGINEER.

1.02 Shop Drawings and Product Data

- A. The CONTRACTOR shall submit to the ENGINEER for review, for design concept, electronic submittals in PDF format and shall include successive page numbers for each page of the PDF file. In lieu of electronic PDF copies, six (6) copies of complete drawings and engineering data for all equipment, materials, and products to be incorporated into the work shall be submitted to ENGINEER. Final reviewed submittals will be posted by ENGINEER on a ShareFile site hosted by ENGINEER and made available to both CONTRACTOR and OWNER. Otherwise, hard copies that have been reviewed by ENGINEER will be distributed.

Shop drawings shall be submitted to ENGINEER for review no later than fifteen (15) days after a fully executed contract has been received by CONTRACTOR. CONTRACTOR shall not mobilize to the site without first providing all required submittals. CONTRACTOR will be held to the contract time as indicated in the Notice-to-Proceed regardless of whether submittals have been provided to ENGINEER.

Shop drawings and engineering data shall be provided and the ENGINEER'S review will be conducted in accordance with the requirements of the General Provisions. Shop drawings and/or engineering data, as appropriate, shall be submitted for the following items, including, but not limited to:

1. All piping, pipe fittings, pipe supports, hangers, couplings, and insulation including mill tests if requested by the ENGINEER.
2. Hatches, valve boxes, manhole frames and covers, PVC riser connections, miscellaneous iron castings and gratings, manhole frames and covers, curb inlets, manhole steps.
3. All concrete and masonry accessories and steel reinforcement, including bending diagrams and bar schedules, ties, spreaders, chairs, and inserts.
4. Form coatings, waterstops, curing and sealing compounds, and epoxy bonding agents.
5. Premixed grouts and mortars.
6. All paints and protective coatings.
7. Grass seed, fertilizer, and commercial mulches.
8. Precast concrete manhole and/or wet well structures.
9. Precast concrete drop inlets, grates and covers, steps, junction boxes, etc., inclusive of pipe connection boots, and joint material, etc.
10. Septic tank top replacement concrete design information.
11. New septic tank precast concrete design information.
12. Any pumping equipment and associated control panel units and other associated ancillary items.
13. Any septic field equipment and associated ancillary items.
14. Electrical System components and associated materials.
15. Portland Cement Concrete design mix for Class A and Class B Concrete.
16. All equipment and ancillary mechanical and electrical components.
17. Paving mix design inclusive of sieve analysis and bituminous content.

- B. Shop drawings and engineering data for equipment supplied as a pre-engineered or pre-assembled system shall include complete shop drawings and engineering data on each component of that system. In all cases, the information provided shall be sufficient to determine if the material or product conforms with the requirements of the specifications.
- C. Shop drawings and engineering data shall be prepared by the original equipment vendors or fabricators, as applicable. Purchased specifications by the CONTRACTOR or his Supplier shall not be acceptable as a substitute for actual vendor drawings and data.
- D. All shop drawings shall include a legend or other suitable means to identify all symbols and abbreviations used on the drawing. Where an accepted, industry-wide drafting symbol or standard has been established for a particular item, information depicted on the shop drawings shall conform to that standard.
- E. Shop drawings shall be dimensioned using the U.S. standard unit of measurement (feet and/or inches). Size of drawing shall not exceed twenty-four inches (24") by thirty-six inches (36"). All scaled drawings and details shall have the scale clearly noted on the drawing or detail. All information shall be clear and legible.
- F. Each shop drawing and each item of engineering data shall bear the CONTRACTOR's APPROVED stamp indicating that the CONTRACTOR has reviewed the drawing or data for conformance with the Contract Documents.
- G. All design calculations and drawings for foundation and footings, sheeting and shoring, and concrete formwork shall bear the signed and dated stamp of a licensed professional ENGINEER.

1.03 Miscellaneous Submittals

- A. The CONTRACTOR shall submit to the ENGINEER miscellaneous information, procedures, test data, samples, etc., in the manner and at the time specified in these Specifications and Contract Documents. Miscellaneous submittals shall include, but not be limited to, the following:
 - 1. Procedures for handling and disposing of sewage flows during construction.
 - 2. Factory test data and results where specified for specific items of equipment.

3. Preliminary concrete mix design reports.
4. Satisfactory written evidence in the form of laboratory or mill test reports indicating that all cement, aggregate, masonry, structural steel, fencing, castings, steel reinforcement, conduit, pipe, grout, waterproof materials, grass seed, and other items incorporated into the work are in compliance with the requirements of these Specifications.
5. Project record documents.
6. Copies of original invoices of all equipment delivered to the site.
7. When requested, analysis and design data on concrete formwork and sheeting and shoring.
8. Drawings and details of erosion and sediment control structures, if significantly different from Drawings.
9. Written evidence of equipment warranties.

1.04 Schedule of Work

CONTRACTOR shall submit a SCHEDULE OF WORK in sequential order by dates in which he expects to perform the contract specifying the areas or locations in the order the work is anticipated beginning with work commencement date. "The Work" may include related sections or items (individually or grouped) such as clearing and grubbing, gradework (cut & fill), structure installation, rehabilitation of storm sewer pipelines, manholes, catch basins, and related construction, erosion control, base, paving, etc., as examples.

1.05 Samples

At the ENGINEER's request, the CONTRACTOR shall furnish certified samples of materials utilized in the fabrications or production of equipment, materials, and products supplied under these Contract Documents. Cost of all such samples shall be borne by the CONTRACTOR. The samples will be tested by a qualified, independent, testing laboratory selected by the OWNER to determine if the mechanical and chemical properties of the materials supplied are in accordance with the requirements of these Specifications and Contract Documents.

The OWNER shall pay for the laboratory testing of material samples provided by the CONTRACTOR. The CONTRACTOR shall pay for all retests made necessary by the failure of materials to conform to the requirements of these Specifications and Contract Documents.

1.06 Schedules, Reports, and Records

- A. The CONTRACTOR shall submit to the ENGINEER such schedule of quantities and costs, progress schedules, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the Work to be performed.
- B. Prior to the first partial payment estimate, the CONTRACTOR shall submit construction schedules showing the order in which the CONTRACTOR proposes to carry on the Work, including dates, at which the various parts of the Work will be started, estimated date of completion of each part, and, as applicable:
 - 1. The dates on which special detail drawings will be required. Submittal must allow sufficient time for review by the ENGINEER. Final approval must be obtained prior to commencement of construction of that portion of work to which they pertain.
 - 2. Respective dates for submission of shop drawings, the beginning of manufacture, the testing and the installation of materials, supplies, and equipment.
- C. The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the Work.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

CERTIFICATE OF PROPERTY RESTORATION
(To be obtained by OWNER Personnel)

Project _____ Date _____
Contractor _____
Property Owner _____
Property Address _____

The contractor for this project has cleaned up and restored my property to my satisfaction where the property was disturbed during construction.

- I agree
- I do not agree (please explain below)

_____ Property Owner	_____ Date
_____ Witness	_____ Date

Please explain why you do not agree:

Note: A copy will be forwarded to the Contractor if the Property Owner is not satisfied with the restoration for further action.

END OF DOCUMENT

PART 1 General

1.01 Scope

- A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Pre-Construction Conference.
 - 2. Progress Meetings.
- B. Construction schedules are specified in another Division 1 section.

1.02 Related Documents

- A. Drawings and General Provisions of the Contract and other Division 1 specification sections apply to this section.

1.03 Pre-Construction Conference

- A. Attend and participate in a pre-construction conference and organizational meeting at the project site or other convenient location no later than fifteen (15) days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees – The OWNER, ENGINEER, their consultants, the CONTRACTOR and its superintendent, major subcontractors, manufacturers, suppliers, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda – Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical work sequencing.

3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of shop drawings, product data, and samples.
8. Preparation of record documents.
9. Use of the premises.
10. Office, work, and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.04 Progress Meetings

- A. Conduct progress meetings at the project site at regularly scheduled intervals but not less than monthly. Notify the OWNER and ENGINEER of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees – In addition to representatives of the OWNER and ENGINEER, each CONTRACTOR, subcontractor, supplier, representative of governmental or other regulatory agency, or other entity concerned with current progress, or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

- C. Agenda – Review and correct or approve minutes of the previous progress meeting. Minimum agenda shall include:
1. Review work progress since last meeting.
 2. Note observations of work in progress, problems and decisions.
 3. Identify problems which impede planned progress.
 4. Review fabrication problems.
 5. Develop corrective measures and procedures to regain planned schedule.
 6. Revise construction schedule as indicated.
 7. Coordinate projected progress with other CONTRACTORS and Suppliers.
 8. Review submittal schedules and expedite as required to maintain schedule.
 9. Maintain quality and work standards.
 10. Complete other current business.
- D. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.
1. CONTRACTOR's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the CONTRACTOR's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.
 2. CONTRACTOR's Submittal Schedule: Review progress since the last meeting. Determine where each activity is in relation to the CONTRACTOR's Submittal Schedule, whether on time or ahead or behind schedule. Determine how submittals behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether

schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.

3. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - i. Hours of work.
 - j. Hazards and risks.
 - k. Housekeeping.
 - l. Quality and work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.

- E. Reporting – No later than three (3) days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.
- F. The ENGINEER will schedule and administer progress meetings and shall:
1. Prepare agendas.
 2. Distribute written notice and agendas of called meetings two (2) days in advance of meeting date.
 3. Make physical arrangements for meetings.
 4. Preside at meetings.
 5. Record minutes, including significant proceedings and decisions.
 6. Furnish copies of minutes to participants within seven (7) days after meetings.
 7. Distribute copies of minutes to participants within seven (7) days after meetings.
- G. The ENGINEER will attend meetings to ascertain that work is expedited consistent with construction schedule and with Contract Documents.
- H. The CONTRACTOR shall attend progress meetings, as specified, during and until final acceptance of the work described under these Contract Documents.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

- A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.
- B. The purpose of the schedule is to demonstrate that the CONTRACTOR can complete the overall Project within the Contract Time and meet all required interim milestones.

1.02 Submittals

- A. Overall Project Schedule (OPS)
 - 1. Submit the schedule within ten (10) days after date of the Notice to Proceed.
 - 2. The ENGINEER will review the schedule and return it within ten (10) days after receipt.
 - 3. If required, resubmit within ten (10) days after receipt of a returned copy.
- B. Near Term Schedule (NTS)
 - 1. Submit the first Near Term Schedule within ten (10) days of the Notice to Proceed.
 - 2. The ENGINEER will review the schedule and return it within ten (10) days after receipt.
- C. Submit an update of the OPS and NTS with each progress payment request.
- D. Submit the number of copies required by the CONTRACTOR, plus four (4) copies to be retained by the ENGINEER.

1.03 Approval

Approval of the CONTRACTOR's detailed construction program and revisions thereto shall in no way relieve the CONTRACTOR of any of CONTRACTOR's duties and obligations under the Contract. Approval is limited to the format of the schedule and does not in any way

indicate approval of, or concurrence with, the CONTRACTOR's means, methods and ability to carry out the Work.

1.04 Overall Project Schedule (OPS)

- A. The CONTRACTOR shall submit to the OWNER for approval a detailed Overall Project Schedule (OPS) of the CONTRACTOR's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/Bar Chart.
- B. Gantt/Bar Chart Schedule
 - 1. Each activity with a duration of five (5) or more days shall be identified by a separate bar. Activities with a duration of more than twenty (20) days shall be sub-divided into separate activities.
 - 2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items.
 - 3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/Bar Chart.
 - 4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.
 - 5. The schedule shall be printed on a maximum 11x17 inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.
 - 6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.
 - 7. The schedule shall show the precedence relationship for each activity.

1.05 Near Term Schedule (NTS)

- A. The CONTRACTOR shall develop and refine a detailed Near Term Schedule (NTS) showing the day to day activities with committed completion dates which must be

performed during the upcoming thirty (30) day period. The detailed schedule shall represent the CONTRACTOR's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule (OPS).

- B. The NTS shall be in the form of Gantt/Bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.
- C. If regular working hours are to be exceeded, a week advance to the ENGINEER shall be given and shall be reflected in the NTS

1.06 Updating

- A. Show all changes occurring since previous submission of the updated schedule.
- B. Indicate progress of each activity and show actual completion dates.
- C. The CONTRACTOR shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:
 - 1. A description of the overall Project status and comparison to the OPS.
 - 2. Identify activities which are behind schedule and describe corrective action to be taken.
 - 3. A description of changes or revisions to the Project and their effect on the OPS.
 - 4. A description of the Near Term Schedule of the activities to be completed during the next thirty (30) days. The report shall include a description of all activities requiring participation by the ENGINEER and/or OWNER.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.1 Scope

- A. The CONTRACTOR shall furnish all equipment and labor materials required to provide the OWNER with digital construction videos and photographs of the Project. Videos shall be recorded on a USB Thumb Drive in a media format deemed acceptable by the ENGINEER.
- B. Photo and video files shall become the property of the OWNER and none of the videos or photographs herein shall be published without express permission of the OWNER.

1.2 Pre- and Post-Construction Videos and Photographs

- A. Prior to the beginning of any work, the CONTRACTOR shall take project videos and photographs of the work area to record existing conditions. The pre-construction videos and photographs shall be submitted to the ENGINEER within thirty (30) calendar days after the date of receipt by the CONTRACTOR of Notice to Proceed.
- B. Following completion of the work, another recording and photos shall be made showing the same areas and features as in the pre-construction videos and photographs.
- C. Post-construction videos and photographs shall be provided prior to final acceptance of each pipe in the Project scope.
- D. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

1.3 Progress Photographs

- A. Photo files shall be provided in *.jpeg* format on compact discs (CD's) or on a portable USB drive, as requested by the ENGINEER/OWNER.
- B. The photographs shall include the date and time marking of the recording. All

Construction Videos and Photographs

photographs shall be labeled on a tab connected to the bottom of the photo to indicate date and description of work shown.

1.4 Submittals

- A. Construction photographs shall be submitted with each payment request.
- B. Videos shall be submitted with a log of the items video-taped and referenced to stations and property numbers.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

- A. Permits and Responsibilities: The CONTRACTOR shall, without additional expense to the OWNER, be responsible for obtaining all necessary licenses, and permits, including building permits, and for complying with any applicable federal, state, county, and municipal laws, codes, and regulations, in connection with the prosecution of the Work.
- B. The CONTRACTOR shall take proper safety and health precautions to protect the Work, the workers, the public, and the property of others.
- C. The CONTRACTOR shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Description

- A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code, or standard, it shall be construed to mean the latest standard, code, specification, or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication, and installation practices. In those cases where the CONTRACTOR's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.
- B. The inclusion of an organization under one category does not preclude that organization's standards from applying to another category.
- C. In addition, all work shall comply with the applicable requirements of local codes, utilities, and other authorities having jurisdiction.
- D. All material and equipment, for which a UL Standard, an AGA, or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.
- E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 Standard Organizations

- A. Piping and Valves

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

References

MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni-Bell	PVC Pipe Association

B. Materials

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

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready-Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

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

References

OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

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

J. Roadways

AREA American Railway Engineering Association
DOT Department of Transportation

K. Plumbing

AGA American Gas Association
NSF National Sanitation Foundation
PDI Plumbing Drainage Institute
SPC SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

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

M. Equipment

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

References

RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 Symbols

Symbols and material legends shall be as scheduled on the Drawings.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

- A. This Section includes testing which the OWNER may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.
- B. This work also includes all testing required by the OWNER to verify work performed by the CONTRACTOR is in accordance with the requirements of these Specifications, i.e., concrete strength and slump testing, soil compaction, etc.
- C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, e.g., testing of pipe.
- D. The testing laboratory or laboratories will be selected by the OWNER. The testing laboratory or laboratories will work for the OWNER.

1.02 Payment for Testing Services

- A. The cost of testing services required by the Contract to be provided by the CONTRACTOR shall be paid for by the OWNER through the CASH ALLOWANCE, i.e., concrete testing, soil compaction, and asphalt testing.
- B. The cost of additional testing services not specifically required in the Specifications, but requested by the OWNER or ENGINEER, shall be paid for by the OWNER through the CASH ALLOWANCE.
- C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the OWNER.
- D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the CONTRACTOR. Retesting shall be performed by the testing laboratory working for the OWNER.

1.03 Laboratory Duties

- A. Cooperate with the OWNER, ENGINEER, and CONTRACTOR.

- B. Provide qualified personnel promptly on notice.
- C. Perform specified inspections, sampling and testing of materials.
 - 1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance with requirements of the Contract Documents.
- D. Promptly notify the ENGINEER and CONTRACTOR of irregularity or deficiency of work which are observed during performance of services.
- E. Promptly submit three (3) copies (two [2] copies to the ENGINEER and one [1] copy to the CONTRACTOR) of report of inspections and tests in addition to those additional copies required by the CONTRACTOR with the following information included:
 - 1. Date issued
 - 2. Project title and number
 - 3. Testing laboratory name and address
 - 4. Name and signature of inspector
 - 5. Date of inspection or sampling
 - 6. Record of temperature and weather
 - 7. Date of test
 - 8. Identification of product and Specification section
 - 9. Location of Project
 - 10. Type of inspection or test
 - 11. Results of test
 - 12. Observations regarding compliance with the Contract Documents

- F. Perform additional services as required.
- G. The laboratory is not authorized to release, revoke, alter, or enlarge on requirements of the Contract Documents, or approve or accept any portion of the Work.

1.04 Contractor Responsibilities

- A. Cooperate with laboratory personnel; provide access to Work and/or manufacturer's requirements.
- B. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.
- C. Furnish copies of mill test reports.
- D. Furnish required labor and facilities to:
 - 1. Provide access to Work to be tested;
 - 2. Obtain and handle samples at the site;
 - 3. Facilitate inspections and tests;
 - 4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.
- E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.
- F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the ENGINEER, and shipped to the laboratory by the CONTRACTOR at CONTRACTOR's expense.
- G. Copies of all correspondence between the CONTRACTOR and testing agencies shall be provided to the ENGINEER.

1.05 Quality Assurance

Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 Product Handling

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.07 Furnishing Materials

The CONTRACTOR shall be responsible for furnishing all materials necessary for testing.

1.08 Code Compliance Testing

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the CONTRACTOR, unless otherwise provided in the Contract Documents.

1.09 Contractor's Convenience Testing

Inspection or testing performed exclusively for the CONTRACTOR's convenience shall be the sole responsibility of the CONTRACTOR.

1.10 Schedules for Testing

A. Establishing Schedule

1. The CONTRACTOR shall, by advance discussion with the testing laboratory selected by the OWNER, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule,

but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back-charged to the CONTRACTOR and shall not be borne by the OWNER.

1.11 Taking Specimens

Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the ENGINEER.

1.12 Transporting Samples

The CONTRACTOR shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.1 Requirements

- A. Provide, install, and maintain traffic controls in accordance with the Manual on Uniform Traffic Control Devices as necessary to maintain safe and orderly vehicular and pedestrian traffic flow along the Project.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.2 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.
- B. Provide traffic control, directional signs, and warning signs mounted on barricades or standard posts:
 - 1. Each change of direction of roadway and each crossroads
 - 2. Detours
 - 3. Parking Areas
 - 4. Well in advance of the Work Area toward oncoming traffic

1.3 Flagmen

- A. Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic.

1.4 Barricades

- A. Provide reflective barricades with 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

1.5 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 on or adjacent to access roads, or in non-designated areas.

1.6 Haul Routes

- A. Consult with governing authorities and establish public thoroughfares that 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

Part 1 General

1.01 Scope

Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the OWNER. As a minimum, this may require the use of a water wagon two (2) times per day to suppress dusty conditions.

1.02 Protection of Adjacent Property

- A. The Bidders shall visit the site and note the buildings, landscaping, roads, parking areas, and other facilities near the Work site that may be damaged by their operations. The CONTRACTOR shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from CONTRACTOR's operations.

- B. Protect all existing facilities (indoors or out) from damage by dust, fumes, spray, or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation, and building or other surfaces from dirt, dust, welding fumes, paint spray, spills, or droppings causing wear, corrosion, malfunction, failure, or defacement by enclosure, sprinkling, or other dust palliatives, masking and covering, exhausting, or containment.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Barricades, Lights, and Signals

- A. The CONTRACTOR shall furnish and erect such barricades, fences, lights, and danger signals, and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the CONTRACTOR shall furnish and maintain at least one (1) light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.

- B. The CONTRACTOR will be held responsible for all damage to the Work due to failure of barricades, signs, and lights, and whenever evidence is found of such damage, the CONTRACTOR shall immediately remove the damaged portion and replace it at CONTRACTOR's cost and expense. The CONTRACTOR's responsibility for the maintenance of barricades, signs, and lights shall not cease until the Project has been accepted by the OWNER.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

A. Submittals

1. Provide and maintain temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.
2. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations, and laws of local and municipal authorities having jurisdiction. If a Storm Water Pollution Prevention Plan (SWPPP) is obtained for this project, all erosion and sedimentation controls contained in it shall be followed.
3. Submit product data in accordance with the requirements of *Section 013000 – Administrative Requirements* of these Specifications.
4. At the Preconstruction Conference, submit a written plan for both temporary and permanent grassing. The plan shall include selection of species, dates, and rates of application for seeding, fertilizer, and mulching. No work shall be started until the erosion and sedimentation control schedule and methods of operation have been approved by the ENGINEER.

B. Related Work:

1. Section 013000 – Administrative Requirements
2. Section 329219 – Seeding

C. Basic Principles

1. The CONTRACTOR is responsible for inspecting and maintaining all existing erosion and sedimentation control measures.
2. Conduct the earthwork and excavation activities in such a manner to fit the

topography, soil type, and condition.

3. Minimize the disturbed area and the duration of exposure to erosion elements.
4. Stabilize disturbed areas immediately.
5. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.
6. Retain sediment on site that was generated on site.
7. Minimize encroachment upon watercourses.

D. Construction Requirements

1. The ENGINEER has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface of erodible earth material exposed by excavation, borrow and fill operations and to direct the CONTRACTOR to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other water impoundment. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, seeding or other control devices or methods as necessary to control erosion. Cut and fill slopes shall be seeded and mulched as the excavation proceeds.
2. The CONTRACTOR shall be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in his accepted schedule. Temporary pollution control measures shall be used to correct conditions that develop during construction that were not foreseen during the design state; that are needed prior to installation of permanent pollution control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.
3. Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit, otherwise erosion control measures may be required between successive construction stages.

4. The ENGINEER will limit the area of excavation, borrow, and embankment operations in progress commensurate with the CONTRACTOR's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent pollution control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.
5. Under no condition shall the amount of surface area or erodible earth material exposed at one time be excavation or fill within the project area exceed seven-hundred-fifty-thousand square feet (750,000 ft²) without prior approval by the ENGINEER.
6. The ENGINEER may increase or decrease the amount of surface area of erodible earth material to be exposed at one time by clearing and grubbing, excavation, and borrow and fill operations as determined by his analysis of project conditions.
7. In the event of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State, or Local agencies, the more restrictive laws, rules, or regulations shall apply.

E. Implementation

1. The erosion and sedimentation control measures shown on the Drawings are minimal requirements. The CONTRACTOR's methods of operation may dictate additional erosion and sedimentation control measures not shown on the Drawings which shall be the CONTRACTOR's responsibility to determine and install said measures. The CONTRACTOR's failure to stabilize disturbed areas immediately following intermediate or final grading may dictate additional erosion and sedimentation control measures not shown on the Drawings which shall be the CONTRACTOR's responsibility to determine and install said measures.
2. The CONTRACTOR shall notify the ENGINEER of any changes and/or additions to the erosion and sedimentation control plan necessary to accommodate the CONTRACTOR's methods of operation. No additional payment shall be made for erosion and sedimentation control measures made necessary by the CONTRACTOR's methods of operation.

3. The CONTRACTOR shall be solely responsible for control of erosion within the Project site and prevention of sedimentation of any adjacent waterways.
 4. The CONTRACTOR shall install controls which will ensure that stormwater and drainage from the disturbed area of the Project site shall pass through some type of filter system before being discharged. The filter system must meet the requirements of the Tennessee Department of Environment & Conservation (TDEC).
- F. Temporary Erosion and Sedimentation Control: In general, temporary erosion and sedimentation control procedures shall be directed toward:
1. Preventing soil erosion at the source.
 2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
 3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.
- G. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

1.02 Quality Assurance

- A. General: Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated herein and these Specifications.
- B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

Part 2 Products

2.01 Temporary Erosion and Sedimentation Control Materials

- A. Silt Fence
 1. Silt fence shall be polymer type netting with a built-in cord running throughout

the top edge of the fabric. Posts shall be either steel or pressure treated fir, southern pine, or hemlock, and shall be spaced not more than six feet (6') on center. Silt fence shall be provided with netting to provide reinforcing when necessary. Silt fence shall have an Equivalent Opening Size (EOS) of forty (40) to one-hundred (100). Silt fence fabric shall have a maximum permeability of forty gallons per minute per square foot (40 gpm/ft²).

2. Silt fence fabric shall be equal to Mirafi 100X, Amoco 1380, or Exxon GTF-100 Series.
- B. Hay bales shall be clean, seed free, cereal hay type containing five cubic feet (5 ft³) or more of material. Hay or straw erosion checks shall be embedded in the ground four to six inches (4" to 6") to prevent water flowing under them. The bales shall also be anchored securely to the ground by wooden stakes driven through the bales into the ground. Bales shall be removed after they have served their purpose and the area is stabilized. The CONTRACTOR shall keep the checks in good condition by replacing broken or damaged bales immediately after damage occurs. Normal debris clean-out will be considered routine maintenance.
 - C. Netting shall be one-half inch (1/2") galvanized steel, chicken wire mesh.
 - D. Filter stone shall be crushed stone conforming to Tennessee Department of Transportation (TDOT) Specifications, mineral aggregate size 57.
 - E. Concrete block shall be hollow, non-load-bearing type.
 - F. Plywood shall be three-fourth inch (3/4") thick exterior type.
 - G. Erosion Control Matting shall be North American Green S-75 or approved equal.

2.02 Riprap

- A. Stone Riprap: Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Riprap shall have less than sixty-six percent (66%) wear when tested in accordance with AASHTO T-96. Unless shown or specified otherwise, stone riprap shall be Type 1 riprap.
 1. Type A-1 Machined Riprap: The pieces shall vary in size from two inches (2") to 1.25 feet, with no more than twenty percent (20%) by weight being less

than four inches (4"). The thickness of the stone layer shall be 1.5 feet with a tolerance of three inches (3"). Riprap size shall conform to the Tennessee Department of Transportation (TDOT) Section 709.03-machined riprap, Type A-1.

2. Type A-2 Machined Riprap: Shall be identical to Class A-1 except that hand placed rubble stone riprap placed one foot (1') thick in accordance with Section 709 of the TDOT Specifications for Roadway Design may be substituted for 1.5 feet of machined riprap.
3. Type A-3 Machined Riprap: Shall vary in size from two inches (2") to six inches (6"), with no more than twenty percent (20%) by weight being less than four inches (4").
4. Type B machined riprap shall vary in size from three inches (3") to twenty-seven inches (27"), with no more than twenty percent (20%) by weight being less than six inches (6").
5. Type C machined riprap shall vary in size from five inches (5") to thirty-six inches (36"), with no more than twenty percent (20%) by weight being less than nine inches (9")

2.03 Filter Fabric

- A. The filter fabric for use under riprap shall be a monofilament, polypropylene woven fabric meeting the specifications as established by Task Force 25 for the Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of seventy (70).
- B. Filter fabric shall meet the requirements of Trivera Spunbound 011/280, Mirafi 180N, or Amoco 4553.

2.04 Additional Construction of Structures

- A. Temporary Berms

A temporary berm shall be constructed of compacted soil, with a minimum width of twenty-four inches (24") at the top and a minimum height of twelve inches (12"), with or without a shallow ditch, constructed at the top of fill slopes or transverse to centerline on fills. Temporary berms shall be graded so as to drain to a compacted

outlet at a slope drain. The area adjacent to the temporary berm in the vicinity of the slope drain must be properly graded to enable this inlet to function efficiently and with minimum ponding in this area.

All transverse berms required on the downstream side of a slope drain shall extend across the grade to the highest point at approximately a ten degree (10°) angle with a perpendicular to centerline. The top width of these berms may be wider and the side slope flatter on transverse berms to allow equipment to pass over these berms with minimal disruptions. When practical, and until final roadway elevations are approached, embankments should be constructed with a gradual slope to one (1) side of the embankment to permit the placement of temporary berms and slope drains on only one (1) side of the embankment.

B. Temporary Slope Drains

1. Temporary slope drains shall consist of stone gutters, fiber mats, plastic sheets, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe, flexible rubber, or other materials which can be used as temporary measures to carry water, accumulating in the cuts and on the fills, down the slopes prior to installation of permanent facilities or growth of adequate ground cover on the slopes.
2. Fiber matting and plastic sheeting shall not be used on slopes steeper than four-to-one (4:1) except for short distances of twenty feet (20') or less.
3. All temporary slope drains shall be adequately anchored to the slope to prevent disruption by the force of the water flowing in the drains. The base for temporary slope drains shall be compacted and concavely formed to channel the water or hold the slope drain in place. The inlet end shall be properly constructed to channel water into the temporary slope drain.

Energy dissipaters, sediment basins, or other approved devices shall be constructed at the outlet end of the slope drains to reduce erosion downstream. An ideal dissipater would be dumped rock or a small sediment basin which would slow the water as well as pick up some sediment. All temporary slope drains shall be removed when no longer necessary and the site restored to match the surroundings.

C. Sediment Structures

1. Sediment structures shall be utilized to control sediment at the foot of

embankments where slope drains exit, at the bottom as well as in the ditch lines atop waste sites, and in the ditch lines or borrow pits. Sediment structure may be used in most drainage situations to prevent excessive siltation of pipe structures. All sediment structures shall be at least twice as long as they are wide.

2. When use of temporary sediment structures is to be discontinued, all sediment accumulation shall be removed, and all excavation backfilled and properly compacted. The existing ground shall be restored to its natural or intended condition.

D. Check Dams

1. Check dams shall be utilized to retard stream flow and catch small sediment loads. Materials utilized to construct check dams are varied and should be clearly illustrated or explained in the CONTRACTOR's erosion control plan.
2. All check dams shall be keyed into the sides and bottom of the channel a minimum depth of two feet (2'). A design is not needed for check dams but some typical designs are available from the ENGINEER.

E. Temporary Seeding and Mulching

Seeding and mulching shall be performed in accordance with the *Section 329219 – Seeding*.

F. Brush Barriers

Brush barriers shall consist of brush, tree trimmings, shrubs, plants, and other approved refuse from the clearing and grubbing operation. The brush barriers shall be constructed approximately parallel to original ground contour. The brush barrier shall be compressed to an approximate height of three to five feet (3' to 5') and approximate width of five to ten feet (5' to 10'). The embankment shall not be supported by the construction of brush barriers.

G. Riparian Live Stakes

When required, placement of Riparian Live Stakes shall consist of the harvest, transport, maintenance, and installation of live stake materials into the bank from low flow to bank-full at hydraulic structures and locations specified within the Plans or as directed by the ENGINEER

1. Live Stakes for this item shall be a mixture of species specified within the Plans and the ENGINEER. Live cuttings for live stakes shall be 0.5 to 1.5 inches in diameter and two to three feet (2'-3') in length. Side branches shall be removed and the bark left intact prior to installation. Buds on the stakes shall be oriented in an upward position. The basal ends shall be tapered to a point for easy insertion into the soil. The top shall be cut smooth and square to the length of the stake.
2. Source and Supplier Requirements – The source of all live cuttings shall be from purchased stock, located on-site, or within twenty-five (25) miles of the project site. If the CONTRACTOR is unable to locate sufficient harvesting sites for the live stakes, the CONTRACTOR may, upon approval from the ENGINEER, purchase live branch material from a state-certified nursery or other source approved by the ENGINEER. The material shall meet all of the specifications found in this section.
3. Substitutions – Any proposed species substitutions or changes in percent composition of species shall require prior written approval by the ENGINEER. Only specified plant species will be accepted. No cultivated varieties (cultivars) are acceptable.

Part 3 Execution

3.01 General

Standards: Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Tennessee Department of Environment & Conservation (TDEC), local enforcing agency guidelines, and these Specifications.

3.02 Temporary Erosion and Sedimentation Control

- A. Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the creeks. The preferred method is to provide an undisturbed natural buffer, extending a minimal twenty-five feet (25') from the top of the bank, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the creek, or if the amount of sediment overwhelms the buffer, the CONTRACTOR shall place silt fences to filter the run-off and, if necessary, place permanent riprap to stabilize the creek banks.

When excavation activities disturb the previously stated preventative measures, or if they are not maintained, or whenever the construction activities cross the creeks, the check dams shall be installed downstream and within two-hundred feet (200') of the affected area.

- B. Silt dams, silt fences, traps, barriers, check dams, appurtenances, and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials. Detention ponds, if constructed, shall be maintained in a condition ensuring that unfiltered water will not leave the pond.
- C. Where permanent grassing is not appropriate, and where the CONTRACTOR's temporary erosion and sedimentation control practices are inadequate, the ENGINEER may direct the CONTRACTOR to provide temporary vegetative cover with fast growing seedings. Such temporary vegetative cover shall be provided by the CONTRACTOR in compliance with the Tennessee Department of Environment & Conservation (TDEC), specifically in the selection of species, planting dates, and application rates for seedings, fertilizer, and mulching, with the exception that kudzu shall not be permitted.
- D. All erosion and sedimentation control devices, including check dams, shall be inspected by the CONTRACTOR at least weekly and after each rainfall occurrence, and cleaned out and repaired by the CONTRACTOR as necessary.
- E. Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

3.03 Permanent Erosion Control

- A. Permanent erosion control shall include:
 - 1. Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the ENGINEER.
 - 2. Permanent vegetative cover shall be performed in accordance with Article 3.04 of this Section.

1. Permanent stabilization of steep slopes and creeks shall be performed in accordance with Article 3.05 of this Section.
- B. Permanent erosion control measures shall be implemented as soon as practical after the completion of pipe installation or land disturbance for each segment of the Project. In no event shall implementation be postponed when no further construction activities will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

3.04 Riparian Live Stakes

- A. Schedule and Conditions – The harvest and installation of live stakes shall be performed only during the dormant season between November 1 and March 31, or as directed by the ENGINEER. When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval by the ENGINEER.
- B. Harvesting The CONTRACTOR shall notify the ENGINEER seventy-two (72) hours prior to harvesting to review and approve all harvesting sites. The CONTRACTOR shall locate, flag, and code the live cutting sites. Upon approval by the ENGINEER, the CONTRACTOR shall be responsible for harvesting and transporting the cuttings to the job site.
- C. Protection During Delivery – Live materials must be protected against drying out and overheating before/during transport (e.g., they shall be covered, transported in unheated vehicles, moistened, kept in soak pits).
- D. Inspection – All materials and construction techniques shall be inspected and approved by the ENGINEER prior to installation.
- E. Storage - Live materials must be protected against drying out and overheating on-site prior to installation (e.g., by storing in controlled conditions, storing in shade, covering with evergreen branches or plastic, placing in moist soil, or spraying with anti-transparent chemicals). Live materials shall receive continuous shade, shall be sheltered from the wind, and shall be continuously protected from drying by being heeled into moist soils. Where water is available, live cuttings shall be sprayed or immersed. Warm water (over one-hundred-fifty degrees Fahrenheit [150° F]) stimulates growth and should be used only upon the approval of the ENGINEER. Any costs associated with such storage are incidental to the overall unit costs. Live materials shall be installed the same day that the cuttings are harvested. If installation

of live materials cannot be accomplished on the same day and storage is required, live materials shall be stored for a period no longer than two (2) days. Any storage of live materials must be approved by the ENGINEER prior to storing.

F. Installation

1. Planting Area – Live stakes shall be installed in areas specified by the Plans and the ENGINEER. In general, live stakes are planted on stream banks at an elevation no higher than bankfull and no lower than the low-flow water surface. Live stakes shall not be planted on the inside bank of meander bends.
2. Installation – Drive live stakes through the erosion control fabric and into the ground so that eighty percent (80%) of the stake is below the ground surface. The CONTRACTOR shall use a dead-pan hammer for driving the stake directly into the ground or drive a pilot hole, smaller in diameter than the live stake, and then driving the live stake into the pilot hole. Stagger the live stakes in a random pattern throughout the specified planting area at the density specified by the Plans and the ENGINEER. Live stakes shall be installed above the low flow water surface and below bankfull elevation. All live stakes split during installation may be left in place, but must be supplemented with a new live stake that remains un-split after installation.
3. Establishment Commencement – The period of care and replacement shall begin after inspection and approval of the initial installation of all live stakes, and continue for one (1) year, with one (1) potential replacement period.

- G. Warranty – The CONTRACTOR shall provide a period of care and replacement after inspection and approval of the initial installation of all live stakes, continuing for one (1) year, with one (1) potential replacement period. This shall consist of eighty-five percent (85%) care and replacement warranty for all live stakes. Replacement of live stakes shall be conducted in accordance with the materials and construction methods shown in these specifications. The CONTRACTOR will not be responsible for live stakes that have been damaged by vandalism, fire, flooding, wildlife predation, or other activities beyond the CONTRACTOR'S control.

3.05 Grassing

A. General

1. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein or shown on the Drawings for seeding, fertilizing, mulching, etc.
 2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the ENGINEER.
 3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
 4. Permanent grassing shall be of a perennial species.
- B. Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Where sod is removed or damaged, replant such areas using sod of the same species of grass at the first appropriate season. Outside of residential or landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.
- C. Grassing activities shall comply with the Tennessee Department of Environment & Conservation (TDEC) Specifications, specifically for the selection of species with the exception that kudzu shall not be permitted, planting dates, and application rates for seeding, fertilizer, and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances), the CONTRACTOR shall provide temporary vegetative cover. The CONTRACTOR must return to the site (at the appropriate season) to install permanent vegetation in areas that have received temporary vegetative cover.

3.06 Riprap

- A. Unless shown otherwise on the Drawings, riprap shall be placed where ordered by the ENGINEER, at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where natural vegetation is removed from banks of the streams or drainage ditches. Carefully compact backfill and place riprap to prevent subsequent settlement and erosion. This requirement applies equally to construction alongside a stream or drainage ditch as well as crossing a stream or drainage ditch.

- B. When trenching across a creek, place riprap a distance of ten feet (10') upstream and ten feet (10') downstream from the top of the trench excavation. Place riprap across creek bottom, across creek banks, and extend riprap placement five feet (5') beyond the top of each creek bank.
- C. Preparation of Foundations: The ground surface upon which the riprap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, riprap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet (2') deep in original ground, and the side next to the fill or cut shall have that same slope. After the riprap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement.
- D. Placement of Filter Fabric: The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions, and debris. The fabric shall be placed with the long dimension running up the slope, and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot (1') of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within three inches (3") of the centerline of the overlap.
- The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three feet (3') during construction. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals, or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of riprap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the OWNER.
- E. Placement of Riprap: The riprap shall be placed on a six inch (6") layer of soil, crushed stone or sand overlaying the filter fabric. This six inch (6") layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Riprap shall be placed with its top elevation conforming with the finished grade or the natural slope of the stream bank and stream bottom.
- F. Stone Riprap: Stone riprap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course

shall be minus-six inches (-6") and plus-twelve inches (+12"). If the Drawings or the Bid do not specify a thickness, the course shall be placed to a thickness of not less than eighteen inches (18").

3.07 Maintenance

- A. The temporary erosion control features installed by the CONTRACTOR shall be maintained by the CONTRACTOR until no longer needed or permanent erosion control methods are installed. Any materials removed shall become the property of the CONTRACTOR.

- B. In the event that temporary erosion and pollution control measures are required due to the CONTRACTOR's negligence, carelessness, or failure to install permanent controls as a part of work as scheduled, such work shall be performed by the CONTRACTOR at his own expense.

END OF SECTION

Part 1 General

1.01 Description

- A. The work covered in this section consists of implementing Best Management Practices (BMP's) to prevent and minimize erosion and resultant sedimentation in all disturbed areas during and after construction. The CONTRACTOR shall furnish all material, labor, and equipment necessary for the proper installation, maintenance, monitoring, reporting, and removal (where applicable) of erosion prevention and control measures and to cause compliance with the General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Storm Water Associated with Construction Activities: Permit No. TNR100000.

- B. Related Work:
 - 1. Section 013300 – Administrative Requirements
 - 2. Section 015713 – Erosion and Sediment Control
 - 3. Section 329219 – Seeding
 - 3. Storm Water Pollution Prevention Plan (SWPPP)

1.02 Submittals

- A. The following submittals shall be made in accordance with the requirements of this Section and of the NPDES Permit as applicable:
 - 1. Notice of Intent (NOI)
 - 2. Credentials of Certified Personnel
 - a. Prior to construction activities, the CONTRACTOR shall submit to the OWNER in writing the name(s) of the CONTRACTOR's designated Certified Personnel, and shall provide credentials indicating that the named Certified Person has completed an appropriate erosion and sediment courses that fulfills the requirements of the NPDES Permit.

- b. The OWNER reserves the right to reject any candidate it deems unqualified for the position and, furthermore, may require the CONTRACTOR to replace an unqualified individual with a suitable substitute at anytime throughout the life of the Project, at no additional cost to the OWNER.
 3. Inspection Checklists and Reports
 4. Monitoring Reports
 5. Notice of Termination (NOT)
- B. Shop drawings and product data for materials furnished under the ES&PC Plan and this Section shall be submitted to the OWNER in conformance with the requirements of *Section 013300 – Administrative Requirements* of these Specifications.

1.03 References

- A. CONTRACTOR shall be familiar with the following referenced documents. These documents shall be complied with as applicable.
1. General NPDES Permit for Discharges of Storm Water Associated with Construction Activities: Permit No. TNR100000.
 2. *Tennessee Erosion and Sediment Control Handbook* (latest edition).
 3. State of Tennessee Department of Transportation (TDOT) *Standard Specifications for Road and Bridge Construction* (latest edition).
 4. Local Issuing Authority's Soil Erosion and Sedimentation Control Ordinances.
 5. Storm Water Pollution Prevention Plan (SWPPP), as required by the NPDES Permit.
- B. The General NPDES Permit for Discharges of Storm Water Associated with Construction Activities: Permit No. TNR100000 is incorporated into these Specifications by reference. A copy of the permit may be downloaded from the Tennessee Department of Environment & Conservation's (TDEC's) website:

<http://www.state.tn.us/environment/permits/conststrm.shtml>

1.04 Definitions

- A. Design Professional: For the purpose of this Section the term Design Professional is synonymous with consulting ENGINEER, licensed professional, designer, and consultant used in permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references. For the purposes of this Specification the OWNER may at any time during the Project provide direction. This direction shall be considered equivalent to direction from the Design Professional.
- B. ENGINEER: For the purposes of this Section, the term ENGINEER refers to a person or representative for the OWNER performing construction oversight and managing construction activities and inspections.
- C. CONTRACTOR: For the purposes of this Section, the term CONTRACTOR is synonymous with General Contractor, Discharger, Operator, Primary Permittee, and Permittee (permit holder) as used in permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references.
- D. Certified Personnel or Certified Person: For the purposes of this Section, the terms Certified Personnel and Certified Person mean a person who has successfully completed an erosion and sediment controls short course eligible for continuing education units, or an equivalent course approved by Tennessee Department of Environment & Conservation (TDEC).
- E. Other Definitions: Definitions as listed in the NPDES Permit shall apply in this Section.

1.05 Regulatory Compliance

- A. Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained from the United States, the State of Tennessee, and/or Local Issuing Authority. The CONTRACTOR is the operator, and therefore a Co-Primary Permittee, under the provisions of the NPDES Permit. As such, CONTRACTOR will be required to sign certain certifications as described in the NPDES Permit.

CONTRACTOR shall comply with requirements specified in the Contract Documents or by the OWNER. CONTRACTOR shall also comply with all other laws, rules, regulations, ordinances, and requirements concerning soil erosion and sediment control established in the United States, the State of Tennessee, and/or Local Issuing

Authority. The following documents and the documents referenced therein define the regulatory requirements for this Section.

1. NPDES Permit: The Tennessee General NPDES Permit for Discharges of Storm Water Associated with Construction Activities: Permit No. TNR100000 governs land disturbance or construction activities of one acre or more. On applicable sites, the CONTRACTOR is responsible for complying with terms and conditions of this permit.
 2. State of Tennessee *Erosion and Sediment Control Handbook*, (latest edition): CONTRACTOR shall follow Practices and Standards of the State of Tennessee *Erosion and Sediment Control Handbook*.
- B. The CONTRACTOR is responsible for any applicable fees associated with NPDES Permit.
- C. Fines resulting from non-compliance with the NPDES permit shall be paid by the CONTRACTOR at no additional expense to the OWNER.

Part 2 Products

As specified in the SWPPP, *Section 015713 – Erosion and Sediment Control*, and *Section 329219 – Seeding*

Part 3 Execution

3.01 Notice of Intent (NOI)

- A. The Notice of Intent (NOI) shall be signed by the CONTRACTOR as Co-Primary Permittee in accordance with the Signatory Requirements of the National Pollutant Discharge Elimination System (NPDES) Permit and returned to the OWNER for submission. A copy of the NOI may be downloaded from the Tennessee Department of Environment & Conservation's (TDEC's) website:

<http://www.state.tn.us/environment/permits/conststrm.shtml>

- B. The NOI must be submitted in accordance with the NPDES Permit prior to the start of construction activities. The CONTRACTOR may not start construction activities until written authorization from Tennessee Department of Environment &

Conservation (TDEC) is received in the form of a letter of coverage under the terms and conditions of the NPDES Permit.

3.02 Installation

- A. Erosion control measures shall be installed as shown on the Contract Drawings and in accordance with *Section 015713 – Erosion and Sediment Control* and *Section 329219 – Seeding*.
- B. Rainfall and storm water monitoring equipment shall be installed as identified in the SWPPP and/or as shown on the Contract Drawings.

3.03 Inspections and Reporting

- A. The ENGINEER who prepared the SWPPP shall inspect the installation of the erosion control measures within one (1) week after initial construction activities begin. The ENGINEER shall notify the Primary Permittee of any deficiencies. The CONTRACTOR must correct all deficiencies within two business days of receipt of the ENGINEER's inspection report.
- B. The CONTRACTOR will designate a Certified Person who shall perform all inspections required by the NPDES Permit and this Specification.
- C. Reports
 - 1. All inspections shall be summarized in a report. A sample inspection checklist is included at the end of this Section for the CONTRACTOR's reference and/or use.
 - 2. Reports shall identify any deficiencies and incidents of non-compliance, major observations relating to the SWPPP, and any revisions or amendments to the SWPPP. Where incidents of non-compliance are not identified within the report, the report shall contain a certification that the facility is in compliance with the SWPPP and the NPDES Permit.
 - 3. All inspection reports shall contain a summary of the inspection, the name and signature of the Certified Person making the inspection, and the date of the inspection.
 - 4. All inspection reports shall be submitted to the OWNER or the ENGINEER

on a weekly basis for review and retention. The OWNER may withhold payments to the CONTRACTOR if such reports are not submitted in a timely manner.

5. All reports shall contain signed certification statements as required by the NPDES Permit.
6. Inspection documentation will be maintained on site and made available upon request. Inspection reports must be submitted to the Tennessee Department of Environment & Conservation (TDEC) within ten (10) days of the request. Permittees discharging into impaired or high quality waters are required to use the inspection form provided in Appendix C of the NPDES Permit.

3.04 Maintenance

- A. Erosion and sediment controls as described in these Contract Documents shall be maintained in good working condition throughout the life of the project. Any part of the erosion and sediment control components found to be damaged or defective shall be promptly repaired or replaced.
- B. After completion of area surfacing, and with the approval of OWNER or ENGINEER, the CONTRACTOR shall remove and dispose off-site all temporary erosion control measures and shall restore the ground to its original condition.

3.05 Monitoring and Reporting

- A. The CONTRACTOR shall monitor and record daily (once each twenty-four [24] hour period) rainfall data in accordance with the SWPPP and the NPDES Permit. Rainfall measurements shall be made at the same time each day.
 1. The following information shall be recorded for each daily rainfall measurement:
 - a. Project name and number
 - b. CONTRACTOR's Certified Person
 - c. Date and time
 - d. Reading and name of person taking reading

- B. The OWNER reserves the right to use its own resources to duplicate monitoring and verify the work required by the CONTRACTOR in this Section.

3.06 Notice of Termination (NOT)

When all construction activities have ceased, final stabilization has been implemented by the CONTRACTOR, and the site is in compliance with the NPDES permit, the CONTRACTOR shall provide a written statement to the OWNER that the site is in compliance with the NPDES permit and that CONTRACTOR is prepared to sign and submit the Notice of Termination (NOT). The OWNER shall make the final submittal of the NOT to Tennessee Department of Environment & Conservation (TDEC). A copy of the NOT may be downloaded from the TDEC website:

<http://www.state.tn.us/environment/permits/conststm.shtml>

END OF SECTION

Part 1 General

1.01 Scope

The CONTRACTOR shall make provisions for transportation of all equipment, materials, and products furnished under these Contracts Documents to the site of the work. In addition, the CONTRACTOR shall provide preparation for shipment and storage, unloading, handling and re-handling, short term storage, extended storage, storage facilities, maintenance, and protection during storage, preparation for installation, and all other work and incidental items necessary or convenient to the CONTRACTOR for the satisfactory prosecution and completion of the work.

1.02 Transportation

- A. All equipment shall be suitably boxed, crated, or otherwise protected during transportation.
- B. All equipment shall be shipped and delivered in the largest assembled sections practical or permitted by carrier regulations to minimize the number of field connections.
- C. The CONTRACTOR shall be responsible for ensuring that the equipment is assembled and transported in such a manner so as to clear buildings, power lines, bridges, and similar structures encountered during shipment or delivery to the site of the work.
- D. Where equipment will be installed using existing cranes or hoisting equipment, the CONTRACTOR shall ensure that the weights of the assemble sections do not exceed the capacity of the cranes or hoisting equipment.
- E. Small items and appurtenances such as gauges, valves, switches, instruments, and probes which could be damaged during shipment shall be removed from the equipment prior to shipment and packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.
- F. Temporary shipping braces and supports shall be painted orange or yellow for easy Identification.

1.03 Handling

- A. All equipment, materials, and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation. All equipment, materials, and products damaged during transportation or handling shall be repaired or replaced by the CONTRACTOR at no additional cost to the OWNER prior to being incorporated into the work.
- B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.
- C. Under no circumstances shall equipment or products, such as pipe structural steel, casting, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.
- D. Items such as nonmetallic pipe, nonmetallic conduit, flagpoles, and lighting poles shall be handled using nonmetallic slings or straps.
- E. Plastic pipe and fittings shall not be exposed to direct sunlight for an extended period of time, (if more than one [1] year, see Specifications,) as specified by the manufacturer of these materials.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Product Storage and Handling Requirements

Part 1 General

1.01 Scope

Equipment and materials used in the project shall be received inspected, unloaded, handled, stored, maintained, and protected by the CONTRACTOR in a suitable location on or off site, if necessary, until such time as installation is required.

1.02 Storage

- A. The CONTRACTOR shall be responsible for providing satisfactory storage facilities which are acceptable to the ENGINEER. In the event that satisfactory facilities cannot be provided on site, a bonded warehouse, acceptable to the OWNER and ENGINEER, will be provided by the CONTRACTOR for such time until the equipment, materials, and products can be accommodated at the site.

- B. Original unaltered invoices from manufacturers and suppliers must be presented with the pay request, with no erasures, white-outs or other alterations. Payment will be authorized for no more than the amounts of the invoices (material, freights and taxes). The subcontractor shall submit his requests for payment to the General CONTRACTOR. The General CONTRACTOR will review and, if acceptable, will include the request on the monthly Application for Payment from the General CONTRACTOR to the OWNER submitted through the ENGINEER for review and approval.

Each request for payment which includes amounts for materials or equipment stored off-site in a bonded warehouse in said County of the project, and must have an original Certificate of Insurance attached to the request for payment stating on the face of the original Certificate of Insurance a description of the insured stored material, the name and address of the bonded warehouse, and naming the General CONTRACTOR, the OWNER, and the OWNER's Agents, each as Certificate Holders, each as Additional Insureds and each as Loss Payee for the said material at the said location.

Materials and Equipment that are properly and securely stored: 1) on the project site, or (2) in a bonded warehouse in said County of the project, will be eligible to be included on an application for payment. "Materials" and "Equipment" are defined as items which have been manufactured or fabricated to the point they are

ready for delivery to the Project Site and ready for installation, but the CONTRACTOR has chosen for his own purposes to delay their delivery and installation.

For example: Such Materials and Equipment would include assembled cabinets and casework, but would not include unassembled panels and other components to be used in fabricating cabinets and casework; such Materials and Equipment would also include the structural and miscellaneous steel which has been punched, drilled, fitted, and otherwise uniquely fabricated for this project, but would not include steel shapes which have not been through the fabricator's shop; such Materials and Equipment would not include lumber and plywood for the purpose of constructing formwork, but would include lumber and plywood to be incorporated as part of the building construction as framing and decking.

- C. The CONTRACTOR shall be responsible for the maintenance and protection of all equipment, materials, and products placed in storage, and shall bear all costs of storage, preparation for transportation, transportation, re-handling, and preparation for installation.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.
- E. Unless otherwise permitted in writing by the ENGINEER, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc. shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.
- F. Tarps and other covering shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 Extended Storage

In the event that certain items of major equipment such as air compressors, pumps, and mechanical aerators have to be stored for an extended period of time, the CONTRACTOR shall provide satisfactory long-term storage facilities which are acceptable to the

ENGINEER. The CONTRACTOR shall provide all special packaging, protection coverings, protective coatings, power, nitrogen purge, desiccants, lubricants, and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

- A. The work under this Section includes, but is not necessarily limited to, cutting and patching work as indicated on the Drawings, herein specified and as necessary for proper and complete performance of the work.
- B. Requirements for cutting and patching may be described in various sections of these Specifications.
- C. Related Work:
 - 1. Section 312300 – Excavation and Fill
- D. Execute cutting, including excavating and filling, or patching of work required to:
 - 1. Make several parts fit properly.
 - 2. Uncover work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of the Contract Documents.
 - 5. Remove samples of the installed work as specified for testing.
 - 6. Install specified work in existing construction.
- E. In addition, upon written instruction of the ENGINEER:
 - 1. Uncover work to provide for the ENGINEER's observation of covered work.
 - 2. Remove samples of the installed materials for testing.
 - 3. Remove work to provide for alteration of existing work.
- F. Protection of Work
 - 1. Do not endanger any work by cutting or altering the work or any part of it.

Cutting and Patching

2. Do not cut or alter the work of another CONTRACTOR without written consent of the ENGINEER.

1.02 Submittals

- A. Prior to cutting which affects the structural safety of the Project or the work of another CONTRACTOR, submit a written notice to the ENGINEER requesting consent to proceed with cutting. The notice shall include:
 1. Identification of Project
 2. Description of defective work
 3. Necessity for cutting
 4. Affect on other work or on the structural integrity of the Project.
 5. Description of the proposed work including:
 - a. Scope of cutting and patching
 - b. Subcontractor and trades to execute work
 - c. Products proposed to be used
 - d. Extent of refinishing
 6. Alternatives to cutting and patching.
 7. Designation of party responsible for the cost of cutting and patching.
- B. Cost Estimate: Prior to cutting and patching performed on instruction of the ENGINEER, submit a cost estimate.
- C. Should conditions of the work or the schedule necessitate alternative materials or methods, submit a written recommendation to the ENGINEER that includes:
 1. Compelling conditions for alternative materials or methods.
 2. Recommended alternative materials or methods.
 3. Submittals as required for substitutions.
- D. Uncovered Work: Submit written notice to the ENGINEER designating the time the

work will be uncovered for the ENGINEER's observation.

1.03 Payment For Cost

- A. CONTRACTOR's Costs: Costs caused by ill-timed or defective work, or work not conforming to the Contract Documents, including costs for additional services of the ENGINEER, shall be paid by the CONTRACTOR.
- B. OWNER's Costs: Cost of work done as the result of the ENGINEER's/OWNER's instructions, which is not shown on the Drawings or specified, other than defective or non-conforming work, will be paid for by the OWNER.

Part 2 Products

2.01 Materials

All products and materials shall conform to the requirements of the Specifications for the type of work being performed, except where no products are specified in these Specifications for the item being replaced; then the products and materials shall be of an equivalent type, quality, thickness, and width of the item removed.

Part 3 Execution

3.01 Inspection

- A. Inspect existing conditions of the work including elements subject to movement or damage during cutting and patching, or excavating and backfilling.
- B. After uncovering work, inspect conditions affecting the installation of new products.

3.02 Preparation

- A. Provide shoring, bracing, and support as required to maintain structural integrity of the Project.
- B. Provide protection for other portions of the Project, and provide protection from the elements.

3.03 Performance

- A. Execute fitting and adjustments of products to provide finished installation that complies with specified tolerances and finishes.

- B. Execute cutting and demolition by means that will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
- C. Execute excavating and backfilling as specified in *Section 312300 – Excavation and Fill* of these Specifications.
- D. Restore work which has been cut or removed and install new products to provide completed work in accordance with the requirements of the Contract Documents.
- E. Refinish entire surfaces as necessary to provide an even finish. Continuous surfaces shall be refinished to the nearest intersection and assemblies shall be entirely refinished.

END OF SECTION

Part 1 General

1.01 Scope

This section covers the general cleaning which the CONTRACTOR shall be required to perform during the construction process and a thorough cleaning before final acceptance of the project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 Hazard Control

- A. The CONTRACTOR shall store volatile wastes in covered metal containers and remove from premises daily.
- B. The CONTRACTOR shall prevent accumulation of wastes which create hazardous conditions.
- C. Burning or burying rubbish and waste materials on the site shall not be allowed.
- D. Disposal of volatile wastes into sanitary or storm sewers shall not be allowed.
- E. CONTRACTORS shall control dust on streets, and remove debris, dust, and etc. from all properties during the construction process.

1.03 Disposal of Surplus Materials

- A. Unless otherwise shown on the Drawings specified or directed, the CONTRACTOR shall dispose of all surplus excavated materials and materials and equipment from demolition, legally off the site, and shall provide his own suitable, off-site spoil area, or on a site designated by the OWNER.
- B. The OWNER shall have the opportunity to inspect any equipment or materials removed prior to disposal by the CONTRACTOR. If said equipment and/or materials are determined to be salvageable by the OWNER, the CONTRACTOR shall transport said equipment and material to a building or area designated by the OWNER.

1.04 Final Cleaning

- A. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.
- B. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as needed basis until building is ready for substantial completion or occupancy.
- C. Employ experienced workmen or professional cleaners for final cleaning.
- D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.
- E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.
- F. Repair, patch, and touch up marred surfaces to specified finish to match adjacent surfaces.
- G. Broom clean paved surfaces. Rake clean other surfaces of ground.
- H. Remove snow and ice for access to building.
- I. Replace air conditioning filters if units were operated during construction.
- J. Clean ducts, blowers, and coils if air conditioning units were operated without filters during construction.
- K. Maintain cleaning until project or portion thereof is occupied by OWNER.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Project Maintenance and Warranty

- A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the OWNER.
- B. The CONTRACTOR shall warrant for a period of one (1) year from the date of OWNER's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects.
- C. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.
- D. Manhole Liners: In addition to this one (1) year warranty, the CONTRACTOR shall provide proof that all manhole liners installed in the project have a ten (10) year manufacturers' and installers' warranty.
- E. CIPP (Cured-in-Place Pipe): In addition to this one (1) year warranty, the CONTRACTOR shall provide proof that all manhole liners installed in the project have a ten (10) year manufacturers' and installers' warranty.
- F. The CONTRACTOR shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another CONTRACTOR or the OWNER, or to perform any work which is normally performed by a maintenance crew during operation.
- G. In the event of multiple failures of major consequences prior to the expiration of the one (1) year warranty described above, the affected unit shall be disassembled, inspected, and modified or replaced as necessary to prevent further occurrences. All

related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new twelve (12) month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation.

- H. As used herein, multiple failure shall be interpreted to mean two (2) or more successive failures of the same kind in the same item or failures of the same kind in two (2) or more items. Major failures may include, but are not limited to: cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear, or excessive leakage around seals.
- I. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures, or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over-lubrication or under-lubrication, and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one (1) year warranty. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified, or replaced as necessary, and re-warranted for one (1) year.
- J. The CONTRACTOR shall, at CONTRACTOR's own expense, furnish all labor, materials, tools, and equipment required, and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship, or faulty materials, in any part of the Work performed by the CONTRACTOR. Such repair shall also include refilling of trenches, excavations, or embankments, which show settlement or erosion after backfilling or placement.
- K. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from the CONTRACTOR's operations, shall be promptly repaired by the CONTRACTOR at no cost to the OWNER.
- L. The CONTRACTOR shall be responsible for all road and entrance reconstruction and repairs, and maintenance of same, for a period of one (1) year from the date of final acceptance. In the event the repairs and maintenance are not made immediately

and it becomes necessary for the OWNER of the road to make such repairs, the CONTRACTOR shall reimburse the OWNER of the road for the cost of such repairs.

- M. In the event the CONTRACTOR fails to proceed to remedy the defects upon notification within fifteen (15) days of the date of such notice, the OWNER reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the CONTRACTOR and the sureties on CONTRACTOR's bond liable for the cost and expense thereof.
- N. Notice to CONTRACTOR for repairs and reconstruction will be made in the form of a registered letter addressed to the CONTRACTOR at CONTRACTOR's home office.
- O. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the CONTRACTOR's liability within the law of the place of construction.
- P. For Sewer Rehabilitation projects, the OWNER will perform Closed Circuit Television (CCTV) inspections prior to the end of the warranty period on a percentage of the total footage rehabilitated within the scope of the project, at the expense of the OWNER.
- Q. Should the results indicate that greater than twenty percent (20%) of the inspections are found to be defective in any part, the CONTRACTOR shall be required to perform CCTV inspections on the remaining segments where rehabilitation was performed to verify conditions, at no expense to the OWNER, and shall be completed prior to the end of the warranty period.

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

GUARANTEES AND WARRANTIES

In accordance with Section VII (B), Paragraph 16 of the "*WWTA Sewer Use Rules and Regulations for Wastewater Collection Systems*", the applicant for a public sewer extension, or the Contractor working for the WWTA, shall provide an agreement to repair or cause to be repaired at no cost to the WWTA any defects in the work, including but not limited to, defective equipment, materials, or supplies, breaks, leaks, and faulty construction or workmanship occurring within the time frame specified below after acceptance of the project from the Hamilton County WWTA.

The warranty for repair shall include all required parts, material, labor, equipment, as well as factory trained technician support on-site as required to make all necessary repairs. This form shall be completed by the applicant and submitted to the WWTA Executive Director along with a copy of the contractor's warranty form submitted by the contractor to the applicant.

WARRANTY PERIOD:

- 1. Gravity and Low Pressure Sewers: all materials and workmanship shall be covered by warranty for a period of one (1) year.

- 2. Pump Station and Force Mains:
 - a. Force main and all appurtenances: all materials and workmanship shall be covered by warranty for a period of one (1) year.

 - b. Pumps and motors: all materials and workmanship shall be covered by warranty for a period of seven (7) years.

 - c. Pump controllers: all materials and workmanship shall be covered by warranty for a period of two (2) years.

Project: _____

Location: _____

Applicant: _____

Contractor: _____

I (We), _____ do hereby warrant all
(Contractor)

equipment, materials, products, and workmanship provided in conjunction with the above referenced project from defects as described above occurring within the time frame specified from the date of acceptance of the project in writing by the Hamilton County WWTA.

If, during the warranty period (a) any equipment, materials, or products furnished and/or installed are found to be defective in service by reason of faulty construction process, structural and/or mechanical design or specifications, or (b) any equipment, materials, or products furnished and/or installed are found to be defective by reason of defects in material or workmanship, or (c) any portions of the work or materials are damaged in any way whatsoever by other work or activities in the vicinity over which I (we) have direct or indirect responsibility or authority, I (we) shall, as soon as possible after receipt of written notice from the WWTA Executive Director or authorized representative, and at no cost to the WWTA, repair or cause to be repaired such defective equipment, materials or products, or replace such defective equipment, materials or products.

In the event of multiple equipment failures of major consequence prior to the expiration of the warranty described above, the affected equipment shall be disassembled, inspected, and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered nonserviceable as a consequence of the equipment failure shall be replaced. A twelve (12) month extension to the warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item of equipment is reassembled and placed back into operation and accepted by the WWTA.

As used herein, multiple equipment failures shall be interpreted to mean two (2) or more successive failures of the same kind in the same item of equipment or failures of the same kind in two (2) or more items of equipment. Major equipment failures may include, but are not limited to: cracked or broken housings, piping, or vessels, excessive deflections, bent, or broken shafts or structural members, broken or chipped gear teeth, overheating, premature bearing failure, excessive wear, or excessive leakage around seals.

Equipment failures which are directly and clearly traceable to operator abuse, such as operating the equipment in conflict with published operating procedures, or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant

Warranties

over-or-under-lubrication, and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the warranty.

Should multiple equipment failures occur in a given item or type of equipment, all equipment of the same size and type shall be disassembled, inspected, modified or replaced, as necessary, and rewarranted for an additional year.

This warranty commences on the date of acceptance of the above referenced project by the Hamilton County WWTA, and expiration occurs in the specified year from said date, for the type of work as specified herein.

Signature: _____
(Applicant)

Date: _____

NOTARY:

On this _____ day of _____, 20____, before me personally appeared _____ and _____, to me known to be the person(s) described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHERETO, I have hereunto set my hand and Notarial Seal.

NOTARY PUBLIC

My Commission Expires: _____

**CONTRACTOR'S
GUARANTEES AND WARRANTIES**

In accordance with Section VII (B), Paragraph 16 of the "WWTA Sewer Use Rules and Regulations for Wastewater Collection Systems", the applicant for a public sewer extension, or the Contractor working for the WWTA, shall provide an agreement to repair or cause to be repaired at no cost to the WWTA any defects in the work, including but not limited to, defective equipment, materials, or supplies, breaks, leaks, and faulty construction or workmanship occurring within the time frame specified below after acceptance of the project from the Hamilton County WWTA.

The warranty for repair shall include all required parts, material, labor, equipment, as well as factory trained technician support on-site as required to make all necessary repairs. This form shall be completed by the contractor and submitted to the applicant.

WARRANTY PERIOD:

1. Gravity and Low Pressure Sewers: all materials and workmanship shall be covered by warranty for a period of one (1) year.

2. Pump Station and Force Mains:
 - a. Force main and all appurtenances: all materials and workmanship shall be covered by warranty for a period of one (1) year.

 - b. Pumps and motors: all materials and workmanship shall be covered by warranty for a period of seven (7) years.

 - c. Pump controllers: all materials and workmanship shall be covered by warranty for a period of two (2) years.

Project: _____

Location: _____

Applicant: _____

Contractor: _____

I (We), _____ do hereby warrant all

(Contractor)

equipment, materials, products, and workmanship provided in conjunction with the above referenced project from defects as described above occurring within the time frame specified from the date of acceptance of the project in writing by the Hamilton County WWTA.

If, during the warranty period (a) any equipment, materials, or products furnished and/or installed are found to be defective in service by reason of faulty construction process, structural and/or mechanical design or specifications, or (b) any equipment, materials, or products furnished and/or installed are found to be defective by reason of defects in material or workmanship, or (c) any portions of the work or materials are damaged in any way whatsoever by other work or activities in the vicinity over which I (we) have direct or indirect responsibility or authority, I (we) shall, as soon as possible after receipt of written notice from the WWTA Executive Director or authorized representative, and at no cost to the WWTA, repair or cause to be repaired such defective equipment, materials or products, or replace such defective equipment, materials or products.

In the event of multiple equipment failures of major consequence prior to the expiration of the warranty described above, the affected equipment shall be disassembled, inspected, and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the equipment failure shall be replaced. A twelve (12) month extension to the warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item of equipment is reassembled and placed back into operation and accepted by the WWTA.

As used herein, multiple equipment failures shall be interpreted to mean two (2) or more successive failures of the same kind in the same item of equipment or failures of the same kind in two (2) or more items of equipment. Major equipment failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts or structural members, broken or chipped gear teeth, overheating, premature bearing failure, excessive wear, or excessive leakage around seals.

Equipment failures which are directly and clearly traceable to operator abuse, such as operating the equipment in conflict with published operating procedures, or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over-or-under-lubrication, and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the warranty.

Should multiple equipment failures occur in a given item or type of equipment, all equipment of the same size and type shall be disassembled, inspected, modified or replaced, as necessary, and rewarranted for an additional year.

This warranty commences on the date of acceptance of the above referenced project by the Hamilton County WWTA, and expiration occurs in the specified year from said date, for the type of work as specified herein.

Signature: _____
(Contractor)

Date: _____

NOTARY:

On this _____ day of _____, 20____, before me personally appeared _____ and _____, to me known to be the person(s) described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHERETO, I have hereunto set my hand and Notarial Seal.

NOTARY PUBLIC

My Commission Expires: _____

Part 1 General

1.01 Scope

- A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording, and submitting of project record documents as herein specified.
- B. The CONTRACTOR shall maintain accurate record documents related to the furnishing and installation of equipment, materials, and products at the site of the Project during the course of the work.
- C. CONTRACTOR shall prepare and submit cut sheets for the ENGINEER's approval prior to starting construction. No separate payment is allowed for this item.
- D. Record documents include, but are not limited to:
 - 1. Contract Drawings;
 - 2. Specifications;
 - 3. Change Orders and other modifications to the Contract;
 - 4. ENGINEER field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums;
 - 5. Reviewed shop drawings, product data, and samples;
 - 6. Test records;
 - 7. Addenda.
- E. The CONTRACTOR shall maintain on the Project site throughout the Contract Time an up-to-date set of Record Drawings.

1.02 Maintenance of Documents and Samples

- A. Storage
 - 1. Store documents and samples in the CONTRACTOR's field office, apart from

documents used for construction.

2. Provide files and racks for storage of documents.
 3. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with format of these Specifications.
- C. Maintenance
1. Maintain documents in a clean, dry, legible condition, and in good order.
 2. Do not use record documents for construction purposes.
 3. Maintain at the site for the OWNER one (1) copy of all record documents.
- D. Make documents and samples available at all times for inspection by ENGINEER.
- E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.03 Quality Assurance

- A. Unless noted otherwise, Record Drawings shall provide dimensions, distances, and coordinates to the nearest 0.1 foot.
- B. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the CONTRACTOR.

1.04 Recording

- A. Label each document "Project Record" in neat, large printed letters. Record Documents shall be kept current and work shall not be permanently concealed until the required information had been recorded
- B. Recording
1. Record information concurrently with construction progress.
 2. Do not conceal any work until required information is recorded.

1.05 Record Drawings

- A. Record Drawings shall be reproducible, shall have a title block indicating that the drawings are Record Drawings, the name of the company preparing the Record Drawings, and the date the Record Drawings were prepared. The CONTRACTOR will be provided paper sepias of the Drawings, or it may elect to provide reproducible drawings via another method. Reproducible shall be defined as being translucent so as to allow a blueline print to be produced.
- B. Legibly mark drawings to record actual construction, including:
1. All Construction
 - a. Changes of dimension and detail.
 - b. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order.
 - c. Details not on original Drawings.
 2. Site Improvements, Including Underground Utilities
 - a. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements or mean sea level.
 - b. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - c. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.
 - d. The locations shall be referenced to at least two (2) easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.
 - e. Field changes of dimension and detail, including elevations of foundations.

- f. Changes made by Change Order or field order.
- g. Details not on original drawings.

1.06 Specifications

- A. Legibly mark each section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.
 - 3. Other matters not originally specified.

1.07 Submittal

- A. At the completion of the work and prior to final acceptance by the OWNER, the CONTRACTOR shall deliver the Project Record Documents to the ENGINEER for the OWNER. The Project Record Documents shall be acceptable to the ENGINEER before final payment is made.

With the submittal of the Project Record Documents, the CONTRACTOR shall submit a list of each document submitted and a certification that each document as submitted is complete and accurate.

- B. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date
 - 2. Project title and number
 - 3. CONTRACTOR's name and address
 - 4. Title and number of each record document
 - 5. Signature of CONTRACTOR or CONTRACTOR's authorized representative

Part 2 Products (Not Applicable)

Part 3 Execution (Not Applicable)

END OF SECTION

Part 1 General

1.01 Scope

- A. This Specification section prescribes materials and methods to be used in fabricating, erecting, and removing forms for cast-in-place concrete. The CONTRACTOR shall furnish all form design, forms, shoring, ties, form coating, and materials and all labor, equipment, and other items necessary or convenient to the CONTRACTOR for the fabrication, erection, and removal of formwork.
- B. Related Work:
 - 1. 033000 – Cast-in-Place Concrete

1.02 General

- A. Forms shall be fabricated, erected, and removed as specified herein, and shall be of a type, size, shape, quality and strength to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. The forms shall be true to line and grade in accordance with the tolerances as specified in *Section 033000 – Cast-in-Place Concrete*, shall be mortar tight, and sufficiently rigid to resist deflection during concrete placement. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes that would deface the finished surfaces.
- B. The responsibility for correctly assessing and analyzing the erection stresses induced upon the structure, its elements and supporting foundations during construction will be the total obligation of the CONTRACTOR. Since the ENGINEER does not dictate or determine the CONTRACTOR'S sequence of operations of construction, the ENGINEER cannot determine erection stresses and therefore assumes no responsibility or obligation to do so. The CONTRACTOR must employ or otherwise provide for adequate professional structural engineering supervision to determine erection stresses and notify the ENGINEER of the results of the study.
- C. The responsibility for adequate formwork design for construction of cast-in-place reinforced concrete will be the total obligation of the CONTRACTOR. The CONTRACTOR shall employ competent professional engineering services to design formwork and supervise the erection of all formwork needed for the job.
- D. Except as modified herein, form design, fabrication, and erection shall conform to the requirements of ACI 347 and ACI 318 and shall be acceptable to the ENGINEER. Design criteria for plywood shall conform to APA Form V345.
- E. Formwork shall comply with the requirements of ANSI A10.9 and the Occupational

Health and Safety Administration (OSHA) Construction Standards, Part 1926, "Subpart Q, Concrete, Concrete Forms, and Shoring."

1.03 Submittals

- A. When requested by the ENGINEER, the CONTRACTOR shall submit to the ENGINEER for review shop drawings and design calculations for formwork the CONTRACTOR intends to use in constructing the work. The CONTRACTOR shall furnish said shop drawings and design calculations at no additional cost to the OWNER.
- B. Prior to beginning concreting operations, the CONTRACTOR shall submit to the ENGINEER for approval engineering data and manufacturer's literature on all form ties, spreaders, bar supports, form coatings, and prefabricated steel forms intended for use in the work.

1.04 Storage

All form materials and accessories shall be stored above ground on framework or blocking and shall be covered with a suitable waterproof covering providing adequate air circulation and ventilation.

Part 2 Products

2.01 Forms

- A. Forms for surfaces which will be exposed to view when construction is completed shall be prefabricated plywood panel forms, job-built plywood forms, or forms that are lined with plywood or fiberboard.
- B. Plywood or lined forms will not be required for surfaces which are normally submerged or not ordinarily exposed to view, such as the insides of manholes or wetwells. Other types of forms, such as steel or unlined wooden forms, may be used for surfaces which are not restricted to plywood or lined forms, and may be used as backing for form linings. Forms are required above all extended footings.
- C. Forms for cast-in-place concrete shall conform with the following requirement:
 - 1. Prefabricated Steel Simplex "Industrial Steel Forms Frame Forms", Symons "Steel Ply", Universal "Uniform", or equal.
 - 2. Plywood Product Standard PSI, waterproof resin-bonded, exterior type Douglas Fir.

- a. Normal Face adjacent to concrete Grade B or better.
 - b. Architectural Face adjacent to concrete Grade B or better with plastic overlay.
3. Lumber - Straight, dressed all sides, uniform thickness, and free from knots, offsets, holes, dents, and other surface defects.
 4. Fiberboard Federal Specification LLL-B-810, Type IX, tempered, waterproof, screenback, concrete form hardboard.
 5. Chamfer Strips Clear white pine, surface against concrete planed.
- D. Reuse of job-built plywood forms shall be permitted only when specifically approved by the ENGINEER. Plywood shall be furnished and placed in forty-eight inch (48") widths and in uniform lengths of not less than ninety-six inches (96"), except where the dimension of the member is less. Where plywood is attached directly to studs or joists, the panels shall be not less five-eighths inch (5/8") thick. Studs shall be provided sufficiently sized and spaced to prevent bulging of the plywood sheeting.
- E. Where earth is too unstable to serve as a form for sides of footings and foundations, the sides against the earth may be formed with three-fourth inch (3/4") thick No. 2C Yellow Pine with tight butt joints, securely braced to hold a straight line.

2.02 Form Ties

Form ties shall be approved by the ENGINEER and shall be of the snap cone or she-bolt with cone type as manufactured by a recognized manufacturer of concrete forming accessories. Cones shall leave a hole or depression in the concrete no larger than seven-eighth inch (7/8") in diameter. Plain snap ties or flat bar ties, unless otherwise approved by the ENGINEER, shall not be used. Ties shall be of a type that will accurately tie, lock, and spread the forms.

Tie spacing shall be designed to withstand concrete pressures without bulging, spreading, or lifting of the forms. The tie shall be of such a design that when forms are removed no metal shall be within two inches (2") of any surface unless stainless steel ties are used, in which case no metal shall be within one inch (1") of any surface. Permanently embedded portions of form ties which are not provided with threaded ends shall be constructed so that the removable ends are readily broken off without damage to the concrete.

2.03 Form Coatings

Where specified herein, forms shall be coated with a nonstaining form release agent prior to

concrete placement. Form coatings shall be Industrial Lubricants "Nox-Crete Form Coating", L & M "Debond", Prater "Pro-Cote", Richmond "Rich Cote", or equal.

Part 3 Execution

3.01 Fabrication and Erection

- A. Forms shall be substantial and sufficiently tight to prevent leakage of mortar. Forms shall be braced or tied to maintain the desired position, shape, and alignment during and after concrete placement. Walers, studs, internal ties, and other form supports shall be sized and spaced so that proper working stresses are not exceeded. Joints in forms shall be bolted tightly and shall bear on solid construction. Forms shall be constructed so they can be removed without hammering, wedging, or prying against the concrete. Form ties in exposed surfaces shall be uniformly spaced and aligned in horizontal and vertical rows. The forms shall produce finished surfaces that are free from off-sets, ridges, waves, and concave or convex areas.
- B. Forms to be reused shall be thoroughly cleaned and repaired. Split, frayed, delaminated, or otherwise damaged forms shall not be used.
- C. All form panels shall be placed in a neat, symmetrical pattern with horizontal joints level and continuous. The CONTRACTOR shall place special attention on mating forms to previously placed walls so as to minimize steps or rough transitions. Form panels shall be of the largest practical size to minimize joints and to improve rigidity.
- D. Beams and slabs supported by concrete columns shall be formed so the column forms may be removed without disturbing the supports for the beams or slabs.
- E. Wherever the top of a wall will be exposed to weathering, the forms on at least one side shall not extend above the top of the wall and shall be brought to true line and grade. At other locations forms for concrete which is to be finished to a specified elevation, slope, or contour, shall be brought to a true line and grade, or a wooden guide strip shall be provided at the proper location on the forms so that the top surface can be finished with a screed or template. At horizontal construction joints in walls the forms on one side shall not extend more than two feet (2') above the joints.
- F. Temporary openings shall be provided at the bottom of column and wall forms and at other points where necessary to facilitate cleaning and inspection prior to concrete placement.
- G. Unless shown otherwise on the Drawings, all salient corners and edges of beams, columns, walls, slabs, and curbs shall be provided with a three-fourth inch by three-fourth inch ($3/4" \times 3/4"$) chamfer formed by a wood or metal chamfer strip.

- H. Forms for exposed surfaces and all steel forms shall be coated with nonstaining form release agent which shall be applied just prior to placement of steel reinforcement. After coating, any surplus form release coating on the form surface shall be removed. Wood forms for unexposed surfaces may be thoroughly wetted with water in lieu of coating immediately before concrete placement, except in freezing weather form release coating shall be used.
- I. Should misalignment of forms or screeds, excessive deflection of forms, or displacement of reinforcement occur during concrete placement, immediate corrective measure shall be taken to insure acceptable lines and surface to required dimensions and cross sections.
- J. If any forms bulge or show excessive deflection, in the opinion of the ENGINEER, the concrete shall be removed and the forms rebuilt and strengthened.

3.02 Form Removal

- A. Forms shall not be removed or disturbed until the concrete has attained sufficient strength to safely support all dead and live loads. Shoring beneath beams or slabs shall be left in place and reinforced as necessary to carry any construction equipment or materials placed thereon.
- B. No forms shall be removed without the approval of the ENGINEER. In general and under normal conditions, the ENGINEER will approve removal of forms after the following time has elapsed:

ITEM	TIME AFTER PLACEMENT
Elevated Slabs and Beams	14 days
Columns	7 days
Walls	3 days
Other Concrete	2 days

- C. When ambient air temperatures during the curing period fall below forty-five degrees Fahrenheit (45° F), form removal will take place based on job-cured test cylinder strength only.
- D. Care shall be taken in form removal to avoid surface gouging, corner or edge breakage, or other damage to the concrete. Immediately after form removal, any damaged or imperfect work shall be repaired as specified in *Section 033000 – Cast-in-Place Concrete* of these Specifications.

END OF SECTION

Part 1 General

1.01 Scope

- A. This specification section covers all materials, equipment, and methods to be used by the CONTRACTOR in mixing, placing, testing, finishing, and curing cast-in-place concrete. The CONTRACTOR shall furnish all cement, aggregate, water, admixtures, and other materials, and all labor, equipment, and supplies necessary or convenient to him for completing the work described in these Contract documents. Cast-in-place concrete reinforcement and form work shall be as specified in the sections entitled "Concrete Reinforcing" and "Concrete Forming" respectively of these Specifications.
- B. Related Work:
 - 1. 013000 – Administrative Requirements

1.02 Classification of Concrete

Concrete shall be either Class A or Class B, as indicated on the Drawings or specified in these Specifications. If the class is not otherwise specified, the CONTRACTOR shall furnish Class A concrete. In general, Class A concrete shall be used for reinforced concrete cast-in-place in forms for slabs, footings, foundations, manholes, and similar reinforced concrete structures coming under the scope of ACI 318. Class B concrete shall be plain concrete and shall be used for pipe cradles, pipe and conduit encasement, bedding, grade correction, anchors, collars, thrust blocks, massive sections, and other non-reinforced concrete.

1.03 General Requirements

All cast-in-place concrete shall be accurately formed and properly placed and finished as shown on the Drawings and specified herein. The materials, aggregate grading, cement content, and placement methods specified herein are intended to provide a concrete that satisfies the minimum strength requirements, exhibits sufficient plasticity and cohesiveness to facilitate placement and reduce honeycombing and porosity, and incorporate a minimum water-to-cement ratio to minimize bleeding and shrinkage and to provide maximum water tightness. However, the CONTRACTOR may submit to the ENGINEER for review and approval alternate material requirements and placement techniques for achieving the desired results. All Class A cast-in-place concrete shall be designed in accordance with the applicable requirements of ACI 318, latest edition.

1.04 Preliminary Mix Design

- A. Before starting any concreting operations, the CONTRACTOR shall submit to the ENGINEER for approval a preliminary mix design for each class of concrete and for each size and gradation of aggregate and each consistency within a given class of concrete intended for use in the work. The preliminary mix design submittals shall contain the following information for each (including those items listed in the latest ASTM designations, if different from those specified). Submit written report for each proposed concrete mix design to Engineer at least 15 days prior to start of concrete work. Do not begin concrete production until all concrete mix designs have been reviewed by and are acceptable to Engineer.

- B. FINE AGGREGATE (Sample per ASTM D 75)
 - 1. Source and type
 - 2. Sieve analysis per ASTM C 136
 - 3. Magnesium Sulfate soundness per ASTM C 88
 - 4. Deleterious substance per ASTM C 117, C 123, and C 142
 - 5. Saturated surface dry weight per cubic yard of concrete
 - 6. Bulk specific gravity per ASTM 127
 - 7. Fineness modulus as defined in ASTM C 125

- C. COARSE AGGREGATE (Sampled per ASTM D 75)
 - 1. Source and type
 - 2. Sieve analysis per ASTM C 136
 - 3. Abrasion loss per ASTM C 535
 - 4. Magnesium Sulfate soundness per ASTM C 88
 - 5. Deleterious substances per ASTM C 117, C 123, AND C 142

6. Saturated surface dry weight per cubic yard of concrete
 7. Bulk specific gravity per ASTM 128
- D. CEMENT (Sampled per ASTM C 183)
1. Manufacturer, type, and ASTM designation
 2. Sacks per cubic yard of concrete
 3. Total gallons of water per sack (or cubic foot) of cement
 4. Compressive strength at seven (7) days per ASTM C 109
 5. Chemical analysis per ASTM C 114
- E. SLUMP per ASTM C 143
- F. AIR CONTENT per ASTM C 231
- G. UNIT WEIGHT per ASTM C 138
- H. TIME TO INITIAL SET at 70 Degrees F. per ASTM C 403
- I. COMPRESSIVE STRENGTH at seven (7), fourteen (14), and twenty-eight (28) days ages per ASTM C 192, and C 39. A total of nine (9) standard test cylinders shall be prepared and cured in the laboratory for each preliminary mix design, three (3) of which shall be tested each at seven (7), fourteen (14), and twenty-eight (28) day ages.
- J. ADMIXTURES
1. Manufacturer, type, and ASTM designation
 2. Dosage and point of introduction into the mix.
- K. A preliminary mix design shall not be considered acceptable if the concrete resulting from that mix design does not produce an average twenty-eight (28) day compressive strength at least one-thousand-two-hundred pounds-per-square-inch (1,200 psi) higher than that required, unless a standard deviation for compressive strength testing has been established for the concrete supplier using the methods described

in ACI 214.

If a standard deviation has been established, the strength used as a basis for selecting concrete proportions shall exceed the required twenty-eight (28) day strength by the amounts given in ACI 318, Section 4.2.2.1, based on the appropriate value of the standard deviation. If a standard deviation is utilized, the CONTRACTOR or concrete supplier shall furnish written evidence to the ENGINEER that the standard deviation has been determined in accordance with the methods described in ACI 214. A written statement from an independent testing laboratory may be considered satisfactory evidence of compliance.

- L. Tests for compressive strength and all sampling and testing of aggregate and cement shall be conducted in accordance with the specified ASTM standards by an independent testing laboratory acceptable to the ENGINEER. Alternately, when approved by the ENGINEER, testing of cement and aggregate may be conducted at the point of manufacture by reputable cement and aggregate suppliers who regularly provide such testing services by experienced, competent personnel.
- M. Tests for slump, air content, unit weight, and time to initial set may be conducted by the concrete supplier, providing such tests are performed in accordance with the specified ASTM standards by experienced, competent personnel using proper equipment.
- N. The CONTRACTOR shall submit with each preliminary mix design four (4) copies of certified laboratory or mill test reports on all aggregate and cement incorporated in the preliminary mix design and four (4) copies of certified laboratory test reports on the compressive strength of the resulting concrete. Test reports on aggregate and cement shall contain written evidence that clearly indicates that all cement and aggregate covered by the test reports conform in all respects to the applicable material requirements of this specification section.

Approval of the preliminary mix designs shall in no way be interpreted to relieve the CONTRACTOR of any responsibilities, duties, or obligations for providing concrete conform in to the requirements of this specification section. If, during the course of concreting operations, the CONTRACTOR desires to use an alternate mix design differing from the approved mix design in order to obtain a desired workability, density, strength, or uniformity, he shall submit to the ENGINEER for approval the information specified herein on the proposed alternate mix design prior to its use.

If, based on the result of laboratory or field tests conducted during concreting operations, concrete prepared according to an approved mix design fails to satisfy

the requirements of this specification section, the ENGINEER shall have the right to require that the CONTRACTOR develop and submit in the manner specified an alternate mix design that will provide concrete conforming to the requirements of this section.

The need for a change in mix design will be based on the ENGINEER'S statistical analysis and interpretation of laboratory and field tests conducted during concreting operations. Statistical methods and interpretation of test results will be as described in ACI 214, and ACI 318, latest edition. Any increased material costs resulting from changes in mix designs during construction shall be paid for by the CONTRACTOR and no separate payment will be made.

- O. The cost of all materials, labor, equipment and all sampling and testing services required for the preliminary mix designs or for alternate mix designs during construction shall be paid for by the CONTRACTOR and no separate payment will be made.

1.05 Quality Control During Construction

- A. CERTIFICATION OF MATERIAL COMPLIANCE – During concreting operations, the CONTRACTOR shall furnish the ENGINEER written evidence that clearly indicates that the cement and aggregate used in each batch of concrete delivered to or mixed at the job site conforms in all respects to the applicable material requirements of this specification section. Satisfactory certified mill test reports from the cement or aggregate supplier may be considered as evidence of compliance provided that such testing is performed in accordance with the specified ASTM standards by experienced, competent personnel on a regular basis.

In case of doubt as to the adequacy or accuracy of mill tests, the ENGINEER may require that the CONTRACTOR furnish, at no additional cost to the OWNER, test reports on the cement and aggregate from an independent testing laboratory acceptable to the ENGINEER. Certified reports or certificates indicating compliance of cement and aggregate shall be submitted to the ENGINEER before such materials are incorporated into the work. The CONTRACTOR shall be responsible for any delays in the progress of the work due to delays in testing and reporting.

Certified reports submitted to the ENGINEER for laboratory or mill tests on cement and aggregate shall be based on tests conducted not earlier than ninety (90) days prior to incorporation of these materials into the work. The cost of all sampling and testing of cement and aggregate necessary to furnish satisfactory evidence of

compliance shall be borne by the CONTRACTOR and no separate payment will be made.

B. FIELD SAMPLING AND TESTING - During concreting operations, the ENGINEER will periodically require additional field inspection, sampling, and testing of cement, aggregate, and/or concrete by an independent testing laboratory in order to determine if the requirements of this specification section are being satisfied. Field sampling and testing of cement, aggregate, and concrete will be performed according to the following latest ASTM Standards at a frequency determined by the ENGINEER.

1. AGGREGATE

- a. Sampling - ASTM D 75
- b. Testing - Any test specified in ASTM C 33

2. CEMENT

- a. Sampling - ASTM C 183
- b. Testing - Any test specified in ASTM C 150

3. CONCRETE

- a. Sampling - ASTM C 172
- b. Slump Test - ASTM C 143
- c. Air Content Test - ASTM C 231
- d. Making and Curing Test Cylinders - ASTM C 31
- e. Compression Strength Tests - ASTM C 39

C. Compressive strength testing will consist of making, curing, and testing cylinders of concrete. A total of four (4) test cylinders will be prepared from each sample of concrete to be tested. Two (2) test cylinders will be broken at an age of seven (7) days; two (2) test cylinders will be broken at an age of twenty-eight (28) days. The minimum number of samples and test cylinders to be taken is as follows:

Concrete Class	Total Size of Pour	Number of Samples	Number of Cylinders
Class A	1 to 4 cu. yds.	1	4
Class A or B	4 to 100 cu. yds.	1	4
Class A or B	101 to 200 cu. yds.	2	8
Class A or B	201 to 300 cu. yds.	3	12
Class A or B	Over 300 cu. yds.	1/100 cu. yd.	4/100 cu. yd.

- D. Test cylinders will normally be laboratory-cured. However, the ENGINEER may require tests on field-cured specimens to check the adequacy of curing operations. A slump test and an air content test will be performed on each sample of concrete tested for compressive strength.
- E. Cement and aggregate will be subject to inspection, sampling, and field testing at the batching plant. Concrete will be subject to inspection, sampling, and field testing at the place of concrete placement. All field sampling, field testing, making, and curing of field test cylinders, and laboratory testing performed during concreting operations for the purpose of determining if the requirements of this specification section are being satisfied shall be conducted by an independent testing laboratory selected by the OWNER and paid for directly by the OWNER and not as a part of this Contract.
- F. The CONTRACTOR shall furnish the testing laboratory representative satisfactory samples of cement, aggregate, and concrete for inspection and testing purposes. The CONTRACTOR shall furnish any barrows, shovels, mixing boards, shaded area for preparing test cylinders, and similar equipment required by the testing laboratory representative for securing samples, making test cylinders, and conducting field tests. No materials or concrete which fail to conform to the requirements of this specification section shall be incorporated into the work.

1.06 Shop Drawings and Engineering Data

Complete ENGINEERING and product data shall be submitted to the ENGINEER on all admixtures, curing compounds, hardeners, sealers, and waterstops in accordance with the requirements of *Section 013000 – Administrative Requirements* of these Specifications.

Part 2 Products

2.01 General

- A. Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, admixtures as specified herein, and water, so proportioned and mixed as to produce a plastic, workable mixture meeting the requirements of this specification section. Materials and concrete not conforming to the requirements specified herein shall not be incorporated in the work.

2.02 Materials

- A. Cement shall be standard Portland Cement, of American manufacture, conforming to ASTM C 150, Type I. Only one brand of commercial Portland cement shall be used in the exposed concrete of the structure. Cement reclaimed by cleaning bags or from leaking containers shall not be used in this work. Each bag shall weigh approximately ninety-four pounds (94 lbs) and contain one cubic foot (1 ft³).

- B. Fine aggregate shall be natural siliceous river sand, consisting of hard, clean, sharp, strong, durable, and uncoated particles, conforming to the requirements of ASTM C 33. The mortar strength developed in such test shall be ninety percent (90%) of that developed by standard Ottawa sand tested under identical conditions. Fine aggregate shall be graded in conformance with the requirements of ASTM C 33, except that it shall have a fineness modulus of 2.40 minimum and 3.00 maximum and the material passing the No. 200 sieve shall not exceed 3.0 percent by weight of the total sample.

Coal and lignite shall not exceed 0.5 percent by weight of the total sample for all concrete. The fineness modulus of fine aggregate incorporated in the work shall not vary more than 0.10 plus or minus from the fineness modulus of the fine aggregate in the appropriate preliminary mix design approved by the ENGINEER. If the locally available sources of fine aggregate will not yield the required grading, the ENGINEER may approve alternate gradations if such deviations do not adversely affect the work. However, the amount retained on any individual sieve size shall not exceed thirty-five percent (35%) of the sample and the amount passing the No. 50 sieve shall not be less than fifteen percent (15%) of the sample.

- C. Coarse aggregate shall consist of clean, natural, washed gravel or crushed stone, suitably processed and conforming to the requirements of ASTM C 33, Class Designation 3S. Coarse aggregate as delivered to the mixing plant shall be graded, or individual sizes shall be so combined as to fall within the grading requirements corresponding to the following grading size numbers, as contained in Table 2 of ASTM C 33:

Maximum Aggregate Size (Inches)	Grading Size No.
3/4	67
1	57
1 - 1/2	467
2	357

The maximum size of aggregate shall be no larger than one-fifth (1/5) of the narrowest dimension between sides of forms within which concrete is to be cast nor larger than three-fourths of the minimum clear spacing between reinforcing bars, or between bars and forms. Coarse aggregate shall be limited to three-fourth inch (3/4") maximum size for pumped concrete.

- D. Water used in mixing concrete shall be fresh, clean, potable water free from injurious amounts of oil, acid, alkali, vegetable, sewage, and/or organic matter. Water shall be considered as weighing 8.36 pounds per gallon.
- E. Admixtures – All concrete shall contain an air entraining admixture conforming to ASTM C 260 in order to provide an entrained air content of five percent (5%) plus one percent (1%) by volume. Air entraining admixtures shall be W. R. Grace "Darex AEA", Master Builders "MB-VR", Protex "AES", Sika "AEA", or equal.

All concrete shall contain a chloride-free, water reducing admixture or plasticizer conforming to ASTM C 494, Type A. Water reducing admixtures shall be W. R. Grace "WRDA-HC", Sika "Plastocrete", Gifford-Hill "PSI Normal", Master Builders "Pozzoloth Normal", Chem-Masters "WR-77", or equal.

Accelerators and retarders may be used under adverse placement conditions when authorized in writing by the ENGINEER. Accelerators shall be Calcium Chloride conforming to ASTM D 98, dispensed as a solution. Calcium Chloride content shall not exceed one percent (1%) of the cement content by weight. Retarders shall be Chloride-free water reducing and retarding admixtures conforming to ASTM C 494, Type D. Retarders shall be W. R. Grace "Daratard-HC", Sika "Plastiment", Protex "Protard", Gifford-Hill "PSI Retarder", Master Builders "Pozzoloth Retarder", or equal.

The admixture content, batching method, and time of introduction into the mix shall be in strict accordance with the manufacturer's recommendations.

F. FORMING MATERIALS

Provide form materials with sufficient strength and stability to withstand the pressure of placed concrete without excessive bow or deflection.

1. Exposed Concrete Surfaces: Materials suitable to project conditions.

2.03 Membrane Curing Compound

Membrane curing compound shall have a one-hundred percent (100%) resin base and shall be of the colorless type with a fugitive dye added conforming to ASTM C 309, Type I, Class B. The membrane curing compound shall contain sufficient dye to produce a definite, distinguishing color. Curing compound shall be compatible with liquid hardeners and epoxy sealers. Membrane curing compound shall be Protex "LR-151", Sonneborn "Hydrocide-309", W. R. Grace "Horncure 30D", Chem-Masters "Kurex 3", or equal.

2.04 Polyethylene Film

Polyethylene film shall conform to Product Standard PS 17 and, unless otherwise specified or shown on the Drawings, shall have a thickness of six (6) mils.

2.05 Epoxy Bonding Agent

Epoxy bonding agents shall be specially formulated to bond fresh concrete to existing concrete. Epoxy bonding agents shall be two (2) component polysulfide or polyamide epoxies containing one-hundred percent (100%) solids. Epoxy bonding agents shall be insensitive to moisture during cure. When cured at a temperature of sixty-three degrees Fahrenheit (63° F), neat epoxy bonding agent shall have a one (1) day compressive strength of not less than five-thousand pounds-per-square-inch (5,000 psi) and a twenty-eight (28) day compressive strength of not less than twelve-thousand pounds-per-square-inch (12,000 psi), when tested in accordance with ASTM D 695, and shall have a twenty-eight (28) day tensile strength of not less than three-thousand-five-hundred pounds-per-square-inch (3,500 psi), when tested in accordance with ASTM D 638.

2.06 Waterstops

Waterstops shall be manufactured of polyvinyl chloride (PVC) and shall be of the ribbed type with center bulb. Waterstops shall have a nominal width of six inches (6") and shall be as manufactured by W. R. Meadows, Vulcan Metal Products, W. R. Grace, or equal. Waterstops

placed in concrete shall be continuous. Lapped joints shall not be permitted.

2.07 Chemical Hardener

Unless otherwise specified, all interior concrete floors of shops, garages, and vehicle service areas shall be treated with a liquid hardener composed of Magnesium and Zinc fluorosilicates, combined with an anionic surfactant for improved wetting penetration. Liquid hardener shall be colorless, nontoxic, nonflammable, and compatible with and providing good adhesion for subsequent toppings and/or coatings. Liquid hardener shall be suitable for use on new or old concrete floors and shall comply with Corps of Engineer Specification 204. Liquid hardener shall be Sonneborn "Lapidolith", Protex "Lithoplate", L & M "Fluo Hard", or equal.

2.08 Epoxy Floor Sealer

Epoxy floor sealer shall be a two (2) component, one-hundred percent (100%) solids, epoxy coating that provides a smooth, tough, flexible, wear abrasion, and chemical resistant surface. Epoxy floor sealer shall be applied only where shown on the Drawings. Sealer shall be U.S.D.A. approved for use in food processing plants. Unless otherwise specified, sealer shall be colored gray. Epoxy sealer shall be Chem-Masters "Durakote", Sonneborn "Sonoplex", L&M "Dynaflor", or equal.

2.10 Vapor Barrier

Unless otherwise specified, all interior concrete slabs on grade in buildings shall be furnished with an FHA approved vapor barrier under the concrete slab. Vapor barrier shall be constructed of a multi-ply lamination of polyethylene film and glass scrim reinforced paper to form a moisture, scuff, and puncture resistant membrane. Moisture permanence shall not exceed 0.10 perms in accordance with ASTM E96, Procedure A. Vapor barrier shall be St. Regis Paper Company "Moistop", Glas-Kraft "Plybar", or equal.

2.11 Strength

Concrete ingredients shall be selected, proportioned, and mixed in such a manner as will produce a watertight durable concrete that will develop the following minimum compressive strengths at an age of twenty-eight (28) days when sampled, cured, and tested in accordance with the procedures specified in ASTM C 31 and C 39:

Concrete Class	Age	Average of Three Consecutive Samples	Minimum Any One Specimen
Class A	28 days	4,000 psi	3,500 psi
Class B	28 days	2,500 psi	2,000 psi

Should the average compressive strength of three (3) consecutive specimens or the compressive strength of any single specimen fall below the minimum strengths specified above, the ENGINEER shall have the right to order a change in the mix design for the remaining portion of the work. The ENGINEER shall also have the right to order additional curing of the affected concrete followed by cores taken in accordance with ASTM C 42 and ACI 318, all at the expense of the CONTRACTOR.

If the additional curing does not bring the average compressive strength of three (3) cores taken in the affected area to at least the minimum strength specified, the ENGINEER may require that the CONTRACTOR strengthen the structure by means of additional concrete and steel or he may require that the CONTRACTOR replace the affected portions. The cost of all such changes in mix designs and any modifications to or replacement of deficient concrete shall be borne by the CONTRACTOR at no additional cost to the OWNER.

2.12 Consistency

Concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around the reinforcement without excessive spading and without permitting the materials to segregate or free water to collect on the surface. When dropped from the discharge chute, the concrete mass should flatten out at the center and spread out slowly at the edges.

The proportions shall be adjusted to secure the lowest water-cement ratio which is consistent with good workability, a plastic cohesive mixture, and one which is within the following slump range as determined in accordance with ASTM C143:

Concrete Use	Slump in Inches
Wall	2-1/2 to 4
Floors and Slab	2 to 3
Beams	2 to 3
Blocks and Footings	2 to 4

Concrete having a slump greater than one inch (1") over the specified maximum shall be rejected. In pumped concrete, the maximum slump of the concrete at the suction of the pump may be increased above the maximum specified slump by the amount of slump loss in the pumping system up to a maximum of one inch (1"). The amount of slump loss shall be the difference between slump tests made at both ends of pumping system, and shall be limited to a total loss of one inch (1").

If tests indicate a loss greater than one inch (1"), the CONTRACTOR shall take corrective measures acceptable to the ENGINEER. For thin sections and construction with limited clearance between reinforcing steel and when placement conditions preclude the use of vibrators, the ENGINEER may authorize the use of concrete having a slump of five inches (5").

Part 3 Execution

3.01 Storage of Materials

Cement shall be shipped to the site of the mixer plant in bulk or in paper or cloth bags, at the option of the CONTRACTOR. Upon arrival, it shall be stored immediately in a thoroughly dry, weather-tight, and properly ventilated building or enclosure with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment. If cement is to be stored at the job site, storage facilities shall be provided by and at the expense of the CONTRACTOR and approved by the ENGINEER, prior to arrival of the first shipment. Cement which has become caked or lumpy shall not be used.

Sand and coarse aggregates shall be stored in separate stockpiles at points selected to provide maximum drainage and to prevent the inclusion of a foreign material during re-handling. Stockpiles of coarse aggregates shall be built in horizontal layers to avoid segregation and breakage. Where concrete volumes require batching of various aggregate sizes, a separate stockpile for each size shall be maintained. The bottom six inches (6") of

aggregate piles shall not be used.

3.02 Proportioning

Concrete materials shall be accurately proportioned and mixed to produce a homogeneous and workable mixture having the consistency and minimum compressive strength specified herein. Concrete materials shall be proportioned by weight. The types of equipment and methods used for measuring ingredients shall be acceptable to the ENGINEER. The amount of water and cement used shall be the minimum amount necessary to produce a concrete mixture of the required strength and consistency, but in no case shall the water-to-cement ratio exceed that specified herein nor shall the cement content be less than that specified herein.

Compressive strength may not necessarily be the most critical factor in proportioning concrete mixes since other factors, such as durability and water tightness, may impose lower water-cement ratios than are required to meet strength requirements. In such cases compressive strength will, of necessity, be in excess of that specified. Minimum cement contents and maximum water-to-cement ratios shall be as follows:

Factor	Class of Concrete	Maximum Aggregate Size			
		2"	1-1/2"	1"	3/4"
Minimum Cement Factor, Sacks /cu yd	A	5.3	5.8	6.2	6.6
	B	5.0	5.5	5.9	6.3
Maximum Water-to-Cement Ratio, lb/lb	A	0.49	0.49	0.49	0.49
	B	0.62	0.62	0.62	0.62
Maximum Water-to-Cement Ratio, gal/sack	A	5.5	5.5	5.5	5.5
	B	7.0	7.0	7.0	7.0

The water content of the mix shall be based on the total amount of water in the mixture, including any free water in the aggregate or adhering to the surface of the aggregate, but not including water absorbed by the aggregate. The total volume of aggregate to be used in each cubic yard of concrete shall be determined by recognized standards for designing concrete mixes, utilizing the actual screen analysis of the aggregates. The proportion of fine and coarse aggregate shall be such that the ratio of the coarse to the fine based on weight shall not be less than 1.0 nor more than 2.0, nor shall the amount of coarse material be such as to produce harshness in placing or honeycombing in the structure.

Mix designs may be adjusted when material characteristics, job conditions, weather, test

results or other circumstances warrant. Any adjustment shall produce the lowest water-cement ratio which is consistent with good workability and produces a plastic cohesive mixture. Do not use revised mix designs until all revisions have been reviewed by and are acceptable to Engineer.

Use air-entraining admixtures in all concrete. Provide not less than four percent (4%) nor more than eight percent (8%) entrained air for all concrete exposed to freezing and thawing conditions; and, from two percent (2%) to four percent (4%) for all other concrete.

3.03 Mixing Concrete

The mixing equipment used by the CONTRACTOR shall be capable of combining the aggregates, cement, admixtures, and water within the time specified into a thoroughly mixed and uniform mass. Concrete shall be mixed by one of the three following methods: (1) by the operation of one or more batch-type mixing plants, each with a rated capacity of one-half cubic yard (1/2 CY) or more, installed at the site of the work; (2) by the operation of a proportioning plant installed in the vicinity of the work and the use of transit mixers for mixing concrete and transporting it to the forms; or (3) by the use of ready-mixed concrete from a central mixing and proportioning plant.

The method selected by the CONTRACTOR shall be subject to the approval of the ENGINEER. The mixing and proportioning plants shall be provided with adequate equipment and facilities for accurate measurement and control of the quantities of material and water used in the concrete and for readily changing the proportions to conform to the varying conditions and requirements of the work.

- A. STATIONARY MIXED CONCRETE - Stationary mixing shall be done in a batch mixer of approved type which will ensure a uniform distribution of the materials throughout the mass. The equipment at the mixing plant shall be so constructed that all materials including the water entering the drum can be accurately proportioned and be under control. The cement and aggregate shall be proportioned by weight. No volumetric batch shall be allowed.

The mixer shall be equipped with an automatic timing device made to lock the discharge level before aggregate and cement enter the drum, and to release such level only after the specified mixing time has elapsed. Stationary mixers shall be in accordance with the "Concrete Mixer Standards" adopted by the Mixer Manufacturer's of the Associated General CONTRACTORS of America and shall bear a plate giving the manufacturer's rated capacity of the mixer.

The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer. Mixing of each batch shall continue for the period indicated herein, during which time the drum shall rotate at a peripheral speed as recommended by the manufacturer.

The mixing time shall be as follows:

Capacity of Mixer	Mixing Time in Minutes
1/2 cubic yards	1-1/4
3/4 to 1-1/2 cubic yards	1-1/2
Larger than 1-1/2 cubic yards	2

The mixing time shall be measured from the time that all cement and aggregates and most of the water are in the mixer. Excessive over mixing, requiring additional water to preserve the required consistency will not be permitted. All of the mixing water shall be introduced before one-fourth (1/4) of the total mixing time has elapsed.

- B. TRANSIT MIXED CONCRETE - The type, capacity, and manner of operation of the mixing and transporting equipment for transit ready-mixed concrete shall conform to the current "Standards for Operation of Truck Mixers and Agitators of the National Ready-Mixed Concrete Association," the "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau," and ASTM C94.

Transit mix concrete trucks shall be equipped with an automatic device for recording the number of revolutions of the drum during the mixing period. Each mixer and agitator shall have attached thereto in a prominent place, a metal plate or plates, installed by the manufacturer, on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades. Each mixer shall have identification number painted on the truck in such a location that it can be easily read from the batching platform.

The total volume of materials introduced into the mixer shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this subsection, the amount of materials charged into the mixer shall be reduced. The drum of the mixer shall be completely emptied of any previously mixed load. The proper proportions of aggregate, cement, and water for each load of concrete shall be placed in the mixer and shall be mixed therein for not less than seventy (70) nor more than one-hundred (100) revolutions of the drum or

blades at the speed designated by the manufacturer of the equipment as the mixing speed. Additional revolutions of the drum shall be at the speed designated by the manufacturer of the equipment as the agitating speed; however, immediately prior to discharging the concrete, the drum shall be revolved at the mixing speed for a minimum of three (3) minutes.

The revolving of the drum shall be continuous until the concrete is completely emptied from the drum. When Class A concrete is being placed, all wash water shall be emptied from the mixer before any portion of the succeeding load is placed therein. For Class B concrete the mixer shall be empty or may carry no more than ten (10) gallons of water in the drum. Water added at the point of discharge shall only take place with the approval and in the presence of the ENGINEER. Water so added shall be mixed into the load for a minimum mixing time of three (3) minutes.

Water shall not be added to the load during the transit. The total elapsed time between the addition of water to the cement and aggregate or the addition of cement to the water and aggregate and the placement of the concrete in the forms shall not exceed ninety (90) minutes. During hot weather or conditions contributing to quick setting, the total elapsed time permitted may be reduced at the direction of the ENGINEER to forty-five (45) minutes. When the concrete cannot be delivered to the forms within the time period specified, a water-reducing and retarding admixture may be used subject to the approval of the ENGINEER. Such use of a water reducing retarder will be permitted only as necessary to supplement (not to replace) other acceptable hot weather procedures.

The retarding admixture used shall not interfere with strength development and other properties of the concrete and its use shall be carefully controlled by the concrete supplier. Before any such admixture is permitted, it shall be tested with job site materials under job conditions to determine its compatibility with the other materials and its ability under these conditions to produce the desired properties.

Addition of water at the job site to offset evaporation of mixing water shall be done with the ENGINEER'S approval and in his presence using water in the form of a cement paste having the same water-to-cement ratio as the batch in the transit mixer. Following addition of the cement paste, the mixer drum or blades shall be rotated a minimum of seventy (70) revolutions. Addition of water during transit to offset evaporation losses shall not be permitted.

Prolonged mixing, even at agitating speed, shall be avoided where feasible by stopping the mixer and then agitating intermittently. A legible certified weigh master's certificate shall be prepared for each load of ready-mixed concrete. A legible copy of

the certified weigh master's certificate shall be submitted to the ENGINEER by the truck operator at the time of delivery. The weigh master's certificate shall contain the following information:

1. Name of Vendor
 2. Name of CONTRACTOR
 3. Number of cubic yards in the load
 4. Actual weights of cement and of each size of aggregate in the load
 5. Amount of water added at the plant
 6. Amount of free water in the aggregate
 7. Brand and type of cement
 8. Brand and amount of admixture
 9. Time and date of batching
- C. When mix proportions have been approved for a project and are identified by a mix number, the ENGINEER may waive the foregoing and accept a legible certified weigh master's certificate which shall contain the following information:
1. Name of Vendor
 2. Name of CONTRACTOR
 3. Number of cubic yards in the load
 4. Mix designation number
 5. Amount of water added at the plant (including free water in aggregate)
 6. Time and date of batching.

Space shall be provided on the certificate so that amount of water and cement added on the job may be indicated.

3.04 Conveying Concrete

- A. Concrete shall be conveyed from mixer to place of final placement by methods which will prevent separation or loss of the material.
- B. If the concrete is to be transported more than fifty feet (50') in carts or buggies, they shall be equipped with pneumatic tires.
- C. Concrete delivered to the carts, buggies or conveyors from spouts, troughs, or mixer trucks shall not have a free fall of more than three feet (3'). Separation or loss of ingredients shall be prevented while transporting the concrete.
- D. Delivery carts, buggies, conveyor trucks or barrows shall be kept on temporary runways built over the floor system. Runway supports shall not bear upon reinforcing steel or fresh concrete.

3.05 Placing Concrete

- A. GENERAL – Prior to placing concrete, the CONTRACTOR shall ensure that all reinforcement is securely and properly fastened in position and protected against displacement, that all items to be embedded in the concrete are in place and securely anchored in position, that all forms have been thoroughly coated or wetted, that all form ties at construction joints have been retightened, that concrete surfaces to be covered have had all free water, form coating, loose concrete, and debris removed, and that all conveyances, buggies, and barrows are clean and wetted.

The CONTRACTOR shall inform the ENGINEER at least twenty-four (24) hours in advance of the times and places at which he intends to place concrete. The ENGINEER will make a final inspection of forms, reinforcing steel, screeds, construction joints, openings, anchors, pipe sleeves, conduit, and inserts. No concrete pour shall be started until the condition of the forms and place of pouring has been inspected and approved by the ENGINEER.

Accurately position, support and secure reinforcing against displacement. Support reinforcing with non-corrosive or plastic coated metal chairs, runners, bolsters, spacers and hangers located at sufficient frequency to limit reinforcing deflection between supports to a maximum of three-eighth inches (3/8").

Install welded wire fabric in as long lengths as practicable, lapping at least eight inches (8") with transverse wires overlapping by at least two inches (2").

Concrete shall not be placed when the sun, wind, heat, or humidity prevents proper placement and consolidation. No water or cement shall be added to the mix without the ENGINEER'S approval or in his absence. No partially hardened concrete shall be deposited.

- B. PLACING CONCRETE – Comply with ACI 318, placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.

Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, in continuous vertical motions, so that concrete is worked around reinforcing and other embedded items and into forms.

Do not transport any concrete within forms by using vibration equipment. Transport of concrete within forms shall be performed only by hand spading as necessary.

Protect concrete from physical damage or reduced strength due to hot or cold weather extremes during mixing, placement and curing.

Unless otherwise specified, all concrete shall be placed upon clean, damp surfaces, free from water, and never upon soft mud, dry absorbent earth or rock, or upon fills that have not been subjected to approved tamping to provide ultimate settlement. Groundwater shall be kept below subgrade until the concrete has set. When subgrade is dry earth, it shall be thoroughly dampened with water to ensure that no moisture will be absorbed from fresh concrete.

Where concrete is placed against gravel or crushed rock which does not contain at least twenty-five percent (25%) of the material passing a No. 4 sieve or where shown on the Drawings or directed by the ENGINEER, surfaces against which concrete is cast shall be covered with polyethylene film to protect the concrete from loss of water. Joints in the film shall be lapped at least twelve inches (12") and taped. The polyethylene film shall be protected against puncture from the underlying crushed rock by a cushion of natural or imported sand meeting the requirements of ASTM D 1073 placed on top of the crushed rock. Where concrete is placed against rock, all loose pieces of rock shall be removed and the exposed surface cleaned with a high pressure hose.

Place vapor barrier under designated interior concrete slabs on grade. Sheeting shall extend the full area of the slab and shall be turned up or down to footings as indicated. Lap all seams at least twelve inches (12") and seal per manufacturer's instructions.

Install reinforcement with care so as not to puncture vapor barrier. Tape all cuts, tears, punctures, and pipe penetrations before pouring concrete.

To prevent segregation of the mix, concrete shall be deposited in its final position in batches without being moved laterally in the forms more than five feet (5'). A crane and a bottom dump concrete bucket shall be used wherever possible. Unless authorized by the ENGINEER, no concrete shall be dropped freely into place from a height of greater than five feet (5'). Concrete shall be deposited in walls by means of prefabricated, rectangular tremies, constructed in short sections and spaced laterally not over five feet (5') apart.

Special care shall be observed to avoid slopping concrete over forms when placing. The limits of each concrete pour shall be predetermined by the CONTRACTOR and shall be acceptable to the ENGINEER. All concrete within such limits shall be placed in one continuous operation. After the concrete has been deposited, it shall be distributed over the entire area within the forms in approximately horizontal layers of not more than eighteen inches (18") in depth and shall be brought up evenly in all parts of the form.

Each layer of concrete shall be plastic when covered with the following layer and the forms shall be filled at a rate of vertical rise of not less than two feet per hour (2'/hr) nor more than six feet per hour (6'/hr). Should a layer of concrete reach its initial set before the next lift can be placed or should more than sixty (60) minutes elapse between placement of successive concrete lifts, the CONTRACTOR shall cease placement of concrete until the surface of the previous lift is prepared in accordance with the procedures specified in Part 3.08, Construction Joints, of this specification section.

Workmen shall not walk on concrete during placing or finishing with any earth or foreign matter on footgear. Hand spreading shall be done with forks and shovels, not rakes. Concrete shall be placed and compacted in wall or column forms before any reinforcing steel is placed in the structural system to be supported by such walls or columns. The portion of any wall or column placed monolithically with a floor or roof slab shall not exceed six feet (6') of vertical height. Concrete in walls or columns shall set at least two (2) hours before concrete is placed in the structural systems to be supported by such walls or columns. Brackets, haunches and fillets shall be poured monolithic with the floor or roof slab system.

- C. **COMPACTION** - During and immediately after placement, concrete shall be thoroughly compacted and worked into all corners and angles, and around reinforcement and embedded fixtures in a manner to fill all voids, prevent

honeycombing against the forms and avoid segregation of coarse aggregate. This operation shall be performed by the use of spades or forks and internal vibrators. Vibration shall be transmitted directly to the concrete and in no case shall it be transmitted through the forms. Vibrator driving mechanisms shall revolve at not less than seven-thousand revolutions-per-minute (7,000 rpm).

The vibration shall be sufficiently intense to cause the concrete to flow and settle readily into place and to visibly affect the concrete over a radius of at least eighteen inches (18"). Vibration shall be supplemented by manual forking or spading adjacent to the forms on exposed faces in order to secure smooth, dense surfaces. Special care shall be taken to ensure consolidation around reinforcement, pipes and other shapes built into the work. Vibrators shall be kept in motion at all times to prevent excessive vibration in one spot. The operation shall be continuous and all concrete shall be in final position before initial set has started. In addition to the vibrators in actual use while concrete is being placed, the CONTRACTOR shall have on hand at least one operable vibrator as a spare in case of equipment failure.

No concrete shall be placed until all vibrating equipment, including spares, is at the placement site. Concrete shall be thoroughly compacted prior to top finishing. All laitance, debris, and surplus water shall be removed from concrete surfaces at tops of forms by screeding, scraping, or other effective means. Wherever the top of a wall will be exposed to weathering, the forms shall be overfilled and after the concrete has been compacted, the excess shall be screeded off.

- D. PLACEMENT SEQUENCE - Unless otherwise indicated on the Drawings or directed by the ENGINEER, the following placement sequence shall be followed to reduce the effect of shrinkage in producing cracking:
1. BOTTOM SLAB - A center section (as outlined by the construction joints shown on the Drawings) shall be placed first. Not less than seventy-two (72) hours after the center section has been placed, the Contractor may proceed with the placement of an adjoining section. Sections shall be placed alternately, first on one side and then on the other side of previously placed sections. Pours shall be scheduled so that two (2) adjacent sides of each section are free, except at closures.
 2. WALLS - Walls shall be divided into sections by the construction joints shown on the Drawings. A section near the center of each wall shall be placed first. Sections shall be placed alternately, first on one side and then on the other side of the previously placed section. Pours shall be schedule so that one (1) end of each section is free, except at corner closures.

3. FOOTINGS - Footings, except for wall footings, shall be poured in one operation with no joints.

- E. REQUIREMENTS DUE TO ADVERSE WEATHER CONDITIONS – No concrete shall be placed during rain. No concrete shall be placed if rain is forecast, unless there is sufficient time to complete the placement and finishing. All concrete placed prior to rain shall be protected by whatever means necessary to prevent damage to finish or water entering the mix. Protection equipment and materials shall be on hand prior to placement operations.

Freshly placed concrete shall be protected from scour by flowing water and from mud deposits or other injurious conditions. Except as modified herein, cold weather concreting shall comply with ACI 306. The temperature of concrete at the time of placing shall be not less than shown in the following table for the corresponding ambient outdoor air temperature (in shade) existing at the time of placement:

Ambient Outdoor Air Temperature	Minimum Concrete Temperature
Below 35 Degrees F.	70 Degrees F.
Between 35 and 45 Degrees F.	60 Degrees F.
Above 45 Degrees F.	45 Degrees F.

Placing of concrete when the ambient air temperature at the time of placement is forty-five degrees Fahrenheit (45° F) or less shall be done only when specifically authorized by the ENGINEER using concrete heated in a manner acceptable to the ENGINEER. If the use of heated concrete is authorized, the temperature of the concrete at the time of placement shall not exceed eighty degrees Fahrenheit (80° F). Adequate means shall be provided for maintaining the temperature of the air surrounding the concrete at seventy degrees Fahrenheit (70° F) for three (3) days, or fifty degrees Fahrenheit (50° F) for five (5) days, or for as long as is necessary to ensure proper curing of the concrete.

Rapid cooling of the concrete shall be prevented. Housing or covering or other protection used in connection with heating shall remain in place and intact at least twenty-four (24) hours after the artificial heat is discontinued. The use of Calcium Chloride or other chemicals to prevent freezing shall not be permitted. Except as modified herein, hot weather concreting shall comply with the requirements of ACI 305. Hot weather precautions shall be taken whenever the maximum ambient outdoor air temperature (in shade) during the day exceeds eighty-five degrees

Fahrenheit (85° F).

When rapid mixing water evaporation in transit causes the concrete to be delivered in an unworkable condition, initial correction may be made at the job site, provided that water added is in the form of cement paste having the same water-to-cement ratio as the batch in the truck, and provided that the drum or mixer blades be operated at mixing speed for at least seventy (70) revolutions after the paste addition. Once need for water has been observed, subsequent additions shall be at the batching plant until the need has passed.

Correction shall consist of a simultaneous and proportionate increase of water and cement, up to ten percent (10%) of the stated quantity of each material in the batch. Such increases in cement shall not constitute grounds for an increase in the Contract Price. The temperature of concrete at the time of placement shall not exceed eighty-five degrees Fahrenheit (85° F).

During hot weather, extra caution shall be taken to prevent rapid evaporation of water. Forms shall be kept cool by frequent wettings. Flat work shall be protected from drying winds, direct sun, and high temperatures whenever conditions of temperature and humidity are such as to cause plastic shrinkage cracking. In order to prevent plastic shrinkage cracking due to rapid evaporation of moisture, no concrete shall be placed when the rate of evaporation, determined by using Figure 2.1.4 in ACI 305, equals or exceeds 0.2 pounds per square foot per hour (0.2 lbs/ft²/hr).

3.06 Finishing

- A. FINISHING FORMED SURFACES – All permanently exposed surfaces shall be expected to be smooth and of uniform texture and appearance. Surfaces to be rubbed shall include all submerged concrete surfaces that can be seen when water is drained. Rubbing may be omitted for minor blemishes on buried surfaces or on exposed surfaces that cannot normally be seen, such as inside covered tanks. Final determination for which surfaces are to be rubbed is to be the decision of the ENGINEER.

All holes, pits, or imperfections in the surface of the concrete shall be cleaned with a wire brush, thoroughly wetted and completely filled with damp cement mortar composed of (one) 1 part Portland Cement to two (2) parts fine aggregate. The entire surface shall be left smooth and all lines or markings shall be smoothed over to obtain uniform appearance.

In the event the CONTRACTOR fails to obtain a satisfactory appearance of the concrete in the opinion of the ENGINEER, the entire surface shall be thoroughly wetted down, kept wet continuously, and rubbed with a No. 20 Carborundum stone until all lines, markings, and surplus materials have been removed from the surface, and until the surface shows a uniform smooth finish. After rubbing is completed, the concrete surface shall be washed clean with water. Rubbing may be done either by hand or with power tools.

B. FINISHING UNFORMED SURFACES – No surface treatment will be required for buried or permanently submerged concrete not forming an integral part of a structure, except that required to obtain the surface elevations or contours and surfaces free of laitance. The unformed surfaces of all other concrete shall be screeded and given an initial float finish followed by additional floating followed by troweling where required. Care shall be taken that no excess water is present when the finish is made. No special concrete or cement mortar topping course shall be used unless so shown on the Drawing.

1. SCREEDING – All slabs shall be screeded to an even surface by the use of a straight edge and screeding strips accurately and securely set to the proper level. Screeds shall be such type and so arranged so as not to interfere with the top bar reinforcement. Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in mortar. All screeded surfaces shall be free of surface irregularities with a height or depth in excess of one-fourth inch (1/4") as measured from a ten-foot (10') straight edge.

2. FLOATING – Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface.

Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color. Unless additional finishing is specifically required, the completed finish for unformed surfaces shall be the float finish produced by the second floating. Floating shall be performed with hand floats or suitable mechanical compactor floats.

3. BROOMING – Surfaces of equipment bases and curbs and sidewalks shall be given a light broom finish providing a nonslip surface. Brooming shall be

done after the second floating and for traffic areas shall be at right angles to the normal traffic direction.

4. TROWELING Surfaces to be covered with resilient floor coverings and other surfaces designated on the Drawings to be troweled shall be steel trowel finished. Trowel finishing will not be required for floors which are normally submerged. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.
5. EDGING - All permanently exposed edges of unformed surfaces shall be chamfered with a three-fourth inch (3/4") approved edging tool unless other edge treatment is indicated on the Drawings.

3.07 Curing

All concrete shall be protected from loss of moisture by curing for at least fourteen (14) days following placement. Curing operations shall take place immediately after concrete finishing is complete or forms are removed. Breaking of form ties or otherwise breaking the seal between the concrete surface and the form shall be considered form removal.

Curing shall be accomplished by water curing, membrane curing, film curing, or any other curing method acceptable to the ENGINEER which does not injure or discolor exposed surfaces nor destroy the bond on surfaces to receive subsequent concrete pours or protective coatings.

- A. WATER CURING – Concrete surfaces being water-cured shall be kept constantly and visibly wet for a period of not less than fourteen (14) days. Water saturation of concrete surfaces shall begin as quickly as possible after the initial set of the concrete. The rate of water application shall be regulated to provide complete surface saturation with a minimum of runoff.

Slabs poured on grade and decks may be water-cured by ponding or by covering with wet burlap sacks, sand, or sawdust and keeping this covering continually and visibly wet during this period. Standard canvas seep hose placed in parallel runs on eight-foot (8') centers is recommended for ponding. Walls may be cured by leaving the forms tied in place and keeping the forms and all exposed surfaces of the concrete continually and visibly wet for the duration of the curing period.

- B. MEMBRANE CURING – Membrane-curing compound may be used in lieu of water curing on Class B concrete and on concrete which will not be covered later with mortar, liquid hardener, or additional concrete. Except as modified herein, membrane-curing compounds shall be applied in strict accordance with the manufacturer's recommendations. Membrane-curing compounds shall conform to the requirements of Part 2.04, Membrane Curing Compound, of this specification section.

Membrane-curing compound shall be spray applied in two (2) separate coats, each having a surface coverage of not more than three-hundred square feet per gallon (300 ft²/gal). Unformed surfaces shall be covered with curing compound within thirty (30) minutes after final finishing. If forms are removed before the end of the specified curing period, curing compound shall be immediately applied to the formed surface before they dry out.

Curing compound shall be suitably protected against abrasion during the curing period. Whenever the membrane will be subject to damage from traffic or other cause, it shall be protected after drying for twenty-four (24) hours by a layer of sand or fine earth not less than one inch (1") thick or by other means acceptable to the ENGINEER. Compound applied improperly or compound applied without sufficient dye to produce a distinguishing color shall be reapplied to the satisfaction of the ENGINEER.

- C. FILM CURING – Film curing with polyethylene sheeting may be used in lieu of water curing on concrete which will be covered later with mortar or additional concrete or will otherwise be covered or hidden from view. Film curing shall begin as quickly as possible after initial set of the concrete. Polyethylene sheeting shall completely cover the surfaces. Sheeting shall overlap the edges sufficiently for proper sealing and anchorage. Joints between sheets shall be overlapped a minimum of twelve inches (12") and sealed. All tears, holes, and other damage shall be promptly repaired. Covering shall be anchored continuously at edges and shall be anchored on the surface as necessary to prevent billowing.

3.08 Construction Joints

Construction joints shall be made only at locations indicated on the Drawings or specified herein. Construction joints shall not be made at other locations without the concurrence of the ENGINEER. No vertical construction joints shall be used in walls unless specifically approved by the ENGINEER. The work shall be laid out and conducted so as to minimize the number of construction joints.

All construction joints shall be keyed. Keys shall be continuous and shall have a width equal to one-third (1/3) of the thickness of the wall and a depth equal to one-sixth (1/6) of the thickness of the wall. Unless indicated otherwise on the Drawings, no keys smaller than three inches (3") in width and 1-1/2 inches in depth shall be used.

Waterstops of the type specified shall be installed where indicated on the Drawings and in all construction joints in concrete walls and slabs having one face exposed in a dry pit or room and having the other face in contact with backfill, sub grade, groundwater, or other liquid. A jet of air and water shall be applied to the surface of horizontal construction joints to remove all laitance when the concrete has set sufficiently for the jet to expose the coarse aggregate without loosening same.

Immediately prior to placing another lift, the surface shall be thoroughly cleaned and washed by water jet followed by air jet to remove standing water. The surface of the concrete shall then be covered by a uniform, evenly distributed layer of cement-sand mortar to a thickness of one inch (1"). The cement-sand mortar shall be composed of a mixture of 1.3 parts by volume Portland Cement and one (1) part by volume fine aggregate, and shall have a water-to-cement ratio equal to that of the concrete to follow.

3.09 Expansion Joints

Expansion joints shall be provided as shown on the Drawings. Details of the expansion joints and materials of construction shall be as shown on the Drawings and specified in these Contract Documents. If not shown on the Drawings, expansion joints shall consist of full-depth, pre-formed, one-half inch (1/2") asphalt plank material conforming to ASTM D 994.

3.10 Bonding New Concrete to Existing Concrete

Where new concrete is to be cast against and permanently bonded to an existing concrete surface, the existing concrete shall be chipped or cut back from the surface a minimum distance of 1-1/2 inches or as necessary to expose sound concrete, remove loose or weathered concrete, and provide a roughened surface for bonding to the new concrete. Edges shall be cut square and feathered edges will not be permitted. All loose material remaining after chipping or cutting operations shall be removed by sandblasting and/or stiff wire brushing.

Where chipping back of existing concrete is not possible and where approved by the ENGINEER, the surface of existing concrete may be prepared by sandblasting or acid etching. If sandblasting or etching is used, the surface of the existing concrete shall be bare,

clean, dry, and structurally sound. All grease, oil, wax, or other residue shall be removed by scraping, followed by washing with a nonionic detergent or a suitable solvent compatible with the epoxy bonding agent to be used. Animal fats may be removed by scrubbing with a ten percent (10%) solution of caustic soda to saponify them.

After all loose material, grease, etc., have been removed, the surface of the existing concrete shall be etched by either sandblasting or scrubbing with a ten to twenty percent (10% to 20%) solution of hydrochloric acid in water applied at a rate of one quart per square yard (1 qt/yd²) followed by a thorough rinsing with clean water. The surface shall then be allowed to dry completely before application of the epoxy bonding agent. Goggles, rubber boots, and rubber gloves shall be worn by workmen when applying caustic soda or acids.

When the surface is dry and just prior to placing the new concrete, an epoxy bonding agent shall be applied to the surface of the existing concrete with a whitewash brush or stiff broom. The epoxy bonding agent shall be spread evenly over the surface to be bonded, avoiding skips and holidays, to wet film thickness of forty (40) to sixty (60) mils. The new concrete shall be placed as soon as the epoxy bonding agent becomes tacky.

In the event that the epoxy bonding agent is allowed to dry before placement of the new concrete, the surface shall be recoated with epoxy. The epoxy bonding agent shall comply with the material requirements of Part 2.06, Epoxy Bonding Agents, of this specification section and shall be applied in strict conformance to the manufacturer's recommendations. Adequate safety precautions shall be taken during the handling and use of the epoxy bonding agent.

3.11 Embedded Items

- A. Wherever steel, wrought or cast iron piping, fittings, valves, collars, sleeves, structural steel, electrical conduits, appurtenances and fixtures, equipment, anchorages, or castings are shown for embedment in the concrete, such items must be on hand before concrete is poured. They shall be set in place accurately and firmly braced before concrete is poured around them. No cutouts for future installation of these items shall be permitted.

Before placing concrete, the CONTRACTOR shall see that all embedded parts are accurately positioned and firmly and securely fastened in place. They shall be thoroughly clean and free from any coating, rust, scale, oil, or other foreign matter. The embedding of wood in concrete shall be avoided whenever possible. If wood is to be embedded, it shall be thoroughly wetted before the concrete is placed. After placement, surfaces not in contact with concrete shall be cleaned of concrete spatter

and other foreign substances.

Conduit shall be installed between the reinforcing steel in walls or slabs which have reinforcement in both faces. In slabs which have only a single layer of reinforcing steel, conduit shall be placed under the reinforcement. Unless installed in pipe sleeves, anchor bolts shall have sufficient threads to permit a nut and washer to be installed on the concrete side of the form or template. A second nut and washer shall be installed on the other side of the form or template and the two nuts shall be adjusted so that the bolt will be held rigidly in proper position.

The CONTRACTOR shall be responsible for coordinating all work and ensuring that all embedded items or openings to be built into the concrete are placed in the forms before concrete is placed. The contractor shall be responsible for conferring with his subcontractors and suppliers regarding their requirements for embedments and openings. Forms, sleeves, and inserts shall be set, and concrete shall be cast to the lines and grades indicated on the Drawings and as detailed in these Contract Documents. The maximum deviation from true line and grade shall not exceed the tolerance listed below. Deviation in alignment of slabs or wall shall not exceed a rate of one-eighth inch (1/8") in ten feet (10') within the tolerances specified.

Item	Maximum Tolerances	
Sleeves and Inserts	+1/8"	-1/8"
Projected ends of anchor bolts	+1/4"	-0.0"
Anchor bolt setting	+1/16"	-1/16"
Concrete Forms	+1/8"	-1/8"

- B. All slabs shall be carefully finished true to grade such that the surface is free draining and contains no depressions which can hold or collect water.
- C. Regardless of the tolerances listed herein, it shall be the responsibility of the CONTRACTOR to limit deviations in line and grade to tolerance which will permit proper installation and operation of mechanical equipment and piping.

3.12 Water Tightness

It is the intention of this specification section to provide impervious concrete. All pits below groundwater level and all structures for holding or carrying water shall be watertight. A loss of not more than one-fourth inch (1/4") depth in twenty-four (24) hours will be permitted when

water-holding structures are filled. All exposed surfaces of water-holding structures and interior surfaces of pits below groundwater level shall be free from visible damp spots or seepage before acceptance.

Repeated tests and repairs may be required by the ENGINEER to obtain watertight structures. All structure shall be drained at the completion of tests unless otherwise directed by the ENGINEER. The cost and expense of all testing for water tightness and of providing a watertight structure shall be borne by the CONTRACTOR. Methods of repair shall be acceptable to the ENGINEER. The use of special admixtures or integral waterproofing compounds in concrete required to be watertight is not required but may be permitted, provided the materials and methods are approved in writing by the ENGINEER.

3.13 Concrete Embedment and Encasement of Pipe

- A. Concrete for embedment and encasement shall be installed where and as indicated on the Drawings and at such locations where installation conditions require such pipe reinforcement because of unforeseen conditions encountered in the work, as determined by the ENGINEER. Embedment and encasement of pipe shall be preceded by the following preliminary steps:
1. All loose material shall be removed from the trench prior to placing concrete. All concrete shall have a continuous contact with undisturbed soil on sides and bottom of trench.
 2. A base course of concrete shall be accurately screeded to such grade and elevation that the pipe will be at specified grade when pipe bells are supported on, and in contact with, the top surface of such base course.
 3. Each length of pipe shall be rigidly held in alignment and anchored, to prevent flotation, in a manner acceptable to the ENGINEER.

3.14 Pile Driving and Concrete Work

The Contractor shall not drive foundation piling which may damage freshly placed or existing concrete structures. Minimum distance between concrete less than seven (7) days old and pile driving operations shall be one-hundred feet (100'). Any damage made to concrete structures from pile driving operations shall be repaired by the Contractor at his expense.

3.15 Defective Work and Methods of Repair

- A. All defective or damaged work shall be removed and replaced or repaired as directed by the ENGINEER. Any work which has not been constructed in accordance with these Contract Documents shall be considered defective. No defective or damaged work shall be patched, repaired, or covered without prior inspection and approval of the ENGINEER. Defects in formed concrete surfaces shall be repaired within twenty-four (24) hours of placement, to the satisfaction of the ENGINEER, and defective concrete shall be replaced within forty-eight (48) hours after the adjacent forms have been removed.

All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges square cut to avoid feathering. Except as modified herein, concrete repair work shall conform to Chapter 9 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. All repair work shall be adequately cured. Where authorized by the ENGINEER, repair may be accomplished by patching conducted as specified herein. However, permission to patch shall not waive the ENGINEER's right to have the defective work completely removed if the patch or repairs do not, in the ENGINEER's opinion; satisfactorily restore the quality and appearance of the work. Patching shall be conducted as follows:

1. Chip away defective areas at least 1-1/2 inches deep perpendicular to the surface, wet the area and six inches (6") around it to prevent absorption of water from patching mortar, and brush a sand-cement grout consisting of one part fine aggregate to one part Portland Cement into the surface, following with patching mortar.
2. Patching mortar shall be no richer than one (1) part Portland Cement to three (3) parts fine aggregate using white Portland Cement to replace a portion of the gray cement as determined by a trial patch and shall contain only the minimum mixing water required for placing. Re-temper the mortar if necessary without the addition of water by allowing it to stand for one hour during which time it shall be mixed with a trowel to prevent setting.
3. Mortar shall be compacted into place and screeded to leave the patch higher than the surrounding surface, then left undisturbed for one or two hours to permit initial shrinkage before being finally finished to match the adjoining surface. Cure patch in accordance with the requirements of Part 3.07, Curing, of this specification section.

3.16 Loads Applied to New Concrete

- A. Loads including, but not limited to, earth loads, loads exerted from bracing or shoring, wind loads, hydrostatic or hydraulic loads, equipment or vehicle loads, or loads exerted by stacked materials, shall not be permitted until the concrete has reached its specified twenty-eight (28) day strength. Concrete which has cracked due to overloading, loading before required strength has developed, or otherwise damaged shall be repaired or replaced as determined by the ENGINEER.

3.17 Testing Laboratory

- A. The testing laboratory shall have access to all places where concrete materials and concretes are manufactured, stored, proportioned, mixed, placed, and tested. Duties shall include, but not necessarily be limited to the following:
1. Make, store, transport, cure, and test compression specimens made during placing of concrete. Compression test specimens shall be tested in accordance with ASTM C 39. Test reports shall show all pertinent data, such as class of concrete, exact location of pour, air temperature, date of pour, time of pour, truck number for ready-mixed concrete, date on which specimen was broken, age of specimen, compressive strength of specimen, concrete slump test results and air content of concrete from which the specimen was made. One (1) copy each of all tests shall be sent to the Contractor and two (2) copies each to the Engineer.
 2. Each strength test requires four (4) standard test cylinders.
 3. Samples for strength tests of each class of concrete placed each day shall be taken not less than one (1) time per day, nor less than one (1) time for each one-hundred cubic yards (100 CY) of concrete, nor less than once for each five-thousand square feet (5,000 ft²) of surface area for slabs or walls.
 4. Each class of concrete shall be tested with at least five (5) strength tests.
 5. From each set of four (4) cylinders, two (2) shall be tested at twenty-eight (28) days and shall comprise a strength test under the definition of these Specifications. One cylinder shall be broken at seven (7) days and will be used as an aid in determining the early strength of the concrete and the twenty-eight (28) day strength, and one (1) cylinder retained in reserve for later testing if required.

6. Test for unit weight of concrete when the first load of each class of concrete is delivered and thereafter at the discretion of the testing laboratory.
-
- B. Periodically inspect the batching plant and file a report with the Engineer stating whether the supplier's equipment and methods meet the requirements of these Specifications.
 - C. Temperature and Placing Record: Temperature record shall be made each day during the concreting operations. Records shall also include location, quantity, and starting and finishing time of placement for all concrete work. Copy distribution shall be as specified above for test reports.

END OF SECTION

CONCRETE PREPLACEMENT SIGN-OFF CARD

Project: _____

Inspection Date: _____ Concrete Placement Date: _____

Expected Time of Concrete Placement: _____

Estimated Quantity: _____

Mix Design Strength: _____

Location of Structure: _____

Member (walls, beams, etc.): _____

Weather Conditions: _____

Method of Pour: Chute _____ Bucket _____ Pump _____

Conveyor _____ Other _____

Work	Status	Signature	Date
Formwork			
Reinforcing			
Mechanical			
Electrical			
Instrumentation			
Plumbing			
Process			
Metal Embeds			
Miscellaneous Specialties			
Clean-Up/OK to Place			

The Contractor certifies that the above work to be cast is prepared in accordance with the Contract Documents.

Contractor (Superintendent): _____

Date: _____

Resident Inspector: _____

Date: _____

Part 1 General

1.1 Section Includes

- A. Methods, procedures, materials and equipment required for repair and rehabilitation of sanitary sewer structures by lining.

1.2 References

- A. American Society for Testing and Materials (ASTM)
 - 1. D7234 – Adhesion
 - 2. D412 – Tensile Strength (PSI)
 - 3. D412 - Elongation (%)
 - 4. D624 – Tear Strength (PLI)
 - 5. D2240 – Hardness
 - 6. D522 – Flexibility (1/8" mandrel)
 - 7. D4060 – Taber Abrasion (mg loss)

1.3 Submittals

- A. The following shall be submitted in accordance with Section 01 33 00 - Submittal Procedures:
 - 1. Product Data:
 - a. Technical Data Sheet
 - b. Manufacturer and local distributor
 - c. Manufacturer procedures for repairs
 - d. Manufacturer procedure for maintenance and cleaning

1.4 Delivery, Storage, and Handling

- A. Delivery
 - 1. Packages showing damage that may affect condition of contents are not acceptable.
- B. Storage
 - 1. Store in original packaging under protective cover and protect from damage. Stack and store at temperatures recommended by the manufacture.

C. Handling

1. Prevent handling in a way that causes damage to products or finishes.

1.5 Job Conditions

- A. Maintain proper substrate and air temperature before, during and after installation as required by Manufacturer and detailed in Manufacturer's technical data sheets and installation instructions or in writing from the Manufacturer. Provide adequate ventilation during application and curing periods.

Part 2 Products

2.1 Materials and Equipment

- A. The materials to be utilized in the lining of wastewater structures shall be designed and manufactured to withstand the severe effects a wastewater environment. The manufacturer of the corrosion protection products shall have at least 10 years of experience in the production of the lining products utilized, and the products shall have satisfactory installation record.
- B. Equipment for installation of lining materials shall be of high quality and as recommended by the manufacturer.
- C. The lining system to be utilized for wastewater structures shall be a multi-layer liner system that at minimum acts as a:
1. Moisture Barrier
 2. Substrate Repair
 3. Corrosion Barrier

2.2 Products

- A. Acceptable products are:
1. SpectraShield, Total Lining System for Wastewater Structures,
 2. SprayRoq
 3. Or Equal

Part 3 Execution

3.1 Preparation

- A. Surface preparation shall be performed in accordance with the standard specifications.
- B. Contractor shall remove existing linings in their entirety prior to performing concrete rehabilitation and new lining application.
- C. New and existing concrete structures to receive protective coating system must be capable of withstanding imposed loads. All oil, grease and chemical contaminants must be removed from the surface. Surfaces must be firm, free of standing water, form release agents and existing coating. Suitable surface preparation methods include abrasive blasting, hydro blasting, mechanical scrapping and hand tool grinding to remove surface contaminants.
- D. Conduct a thorough inspection for defects like cracks and exposed rebar. Repair all severe defects with approved chemical grout, or other approved methods.

3.2 Material Installation.

- A. Prevent water from entering into the space between the host pipe and the liner.
- B. Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment.
- C. Spray equipment shall be specifically designed to accurately ratio and apply the liner system.
- D. Application of multi-component liner system shall be in strict accordance with manufacturer's recommendation. Final installation minimum total thickness shall be 500 mils. A permanent identification and date of work performed shall be affixed to the structure in a readily visible location.
- E. If requested a final written report may be provided to the owner/engineer detailing the location, date of work and description of the work.

3.3 Adjustments and Cleaning

- A. At the completion of the Work, contractor shall remove all materials and debris associated with the Work of this Section.
- B. Clean all surfaces not designated to receive protective coating. Restore all other work in a manner acceptable to engineer.
- C. All finished protective coating shall be protected from damage until Final Acceptance of the Work. Protective coating damaged in any manner shall be repaired or replaced at the discretion of Inspector. All costs shall be borne by the contractor.
- D. Clean all protective coating as recommended by the manufacturer to provide finished Work acceptable to agency, just prior to Final Acceptance.

3.4 Temporary Flow Through Plug or Bypass System

- A. The contractor shall provide, install, maintain, and remove all temporary flow bypassing equipment and materials needed to complete the manhole rehabilitation work in accordance with the Contract Documents and the standard specifications. The contractor shall be responsible for selection of all means and methods to bypass flows as necessary to perform the work. The contractor shall also install a temporary rack at the manhole directly downstream of the manhole that the temporary bypass equipment is being used to prohibit the passage of any loose or unanchored equipment from entering the downstream sewer system.

- B. The contractor shall submit a plan to the agency for approval before beginning work describing the flow bypassing equipment to be used, how it is to be installed, maintained, and removed, including any precautionary measures. Submittal shall show how the contractor will monitor and prevent the obstruction of flow in the flow bypass equipment and shall also include the equipment and procedures that will be used to prohibit the passage of any loose or unanchored equipment from entering the sewer system. All products, equipment, and materials used to complete the Work shall be able to withstand the active sewer conditions and shall be able to handle flows specified in the Contract Drawings.

END OF SECTION

Part 1 General

1.01 Scope

- A. Clearing and grubbing includes, but is not limited to, removing from the Project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the construction area, and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain are part of the work.
- B. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.
- C. All earthwork operations shall comply with the requirements of Occupational Safety and Health Administration (OSHA) Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations.

1.02 Quality Assurance

- A. The CONTRACTOR shall comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state, or federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the CONTRACTOR.
- B. Open burning is not allowed.

Part 2 Products

2.01 Equipment

The CONTRACTOR shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks, and loaders.

Part 3 Execution

3.01 Scheduling of Clearing

- A. The CONTRACTOR shall clear at each construction site only that length of the right-of-way, permanent, or construction easement which would be the equivalent of one (1) month's pipe laying. This length shall be determined from the CONTRACTOR's Progress Schedule.
- B. The ENGINEER may permit clearing for additional lengths of the pipe line, provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.
- C. A satisfactory stand of grass shall have no bare spots larger than one square yard (1 yd²). Bare spots shall be scattered and the bare area shall not comprise more than one percent (1%) of any given area.

3.02 Clearing and Grubbing

- A. Clear and grub, as required, on each side of the pipeline before excavating. Remove all trees, growth, debris, stumps, and other objectionable matter. Clear the construction easement or road right-of-way only if necessary.
- B. Materials to be cleared, grubbed, and removed from the Project site include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, houses, debris, and abandoned utilities.
- C. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.
- D. All stumps, roots, foundations, and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet (2') below the limits of excavation for structures, trenches, and roadways, or two feet (2') below finish grade, whichever is lower.
- E. Landscaping features shall include, but are not necessarily limited to, fences, mailboxes, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision, and other signs within the right-of-way and easement. The CONTRACTOR shall take extreme care in moving landscape features and promptly re-establishing these features.

- F. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as riprap.
- G. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.
- H. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.
- I. All fences adjoining any excavation or embankment that, in the CONTRACTOR's opinion, may be damaged or buried, shall be carefully removed, stored, and replaced. Any fencing that, in the ENGINEER's opinion, is significantly damaged shall be replaced with new fence material.
- J. The CONTRACTOR shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc., situated within the limits of the construction area, but not directly within excavation and/or fill limits. The CONTRACTOR shall be held liable for any damage the CONTRACTOR's operations have inflicted on such property.
- K. The CONTRACTOR shall be responsible for all damages to existing improvements resulting from CONTRACTOR's operations.

3.03 Disposal of Debris

The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the CONTRACTOR, and shall be disposed of in accordance with all requirements of federal, state, county, and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property, except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties, or buried on the Project.

END OF SECTION

Part 1 General

1.1 Scope

- A. This Section includes earthwork and related operations, including, but not limited to, excavating all classes of material, handling, storage, transportation and disposal of all excavated and unsuitable or excess material, construction of fill material areas, placing and replacing fill materials around structures and pipe, placing and replacing fill materials for all trenches and pits, compacting, all sheeting, shoring and bracing, preparation of subgrades, finished grading, and any other similar, incidental, or appurtenant earthwork operations which may be necessary to properly complete the work.
- B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations, necessary or convenient to the Contractor, for furnishing complete work as shown on the Drawings or specified in these Contract Documents.
- C. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition of the material.

1.2 Existing Information

- A. The elevations shown on the Drawings as existing are taken from GIS contour data and are intended to give reasonably accurate information about the existing elevations. They are not precise and the Contractor shall become satisfied as to the exact quantities of excavation and fill required.
- B. Known subsurface conditions as described in the Supplementary Conditions of these Specifications.

1.3 Quality Assurance

- A. Approval Required: All earthwork materials shall be subject to the approval of the Engineer.
- B. Tests for compaction and density shall be conducted in accordance with Section 01 45 29 of these Specifications.
 - 1. The soils testing laboratory is responsible for the following:
 - a. Field compaction testing shall be based on using the maximum dry density determined by the Standard Proctor Compaction Test in accordance with ASTM D 698.

- b. Maximum dry density for non-cohesive materials shall mean the maximum index density as determined by the "Maximum Index Density of Soils Using a Vibratory Table", ASTM D 4253.
 - c. Determination of in-place fill material density shall be done in accordance with ASTM D 1556, "Density of Soil in Place by the Sand Core Method", ASTM D 2937, "Density of Soil in Place by the Drive-Cylinder Method" or ASTM D 6938, "In-Place Density/Water Content of Soil/Soil Aggregate by Nuclear Methods Shallow Depth".
 - d. Field density tests for each two feet of vertical fill material; with at least one test for each 5,000 square feet of fill material.
 - e. Inspecting and testing of stripped site, subgrades and proposed fill materials.
2. Contractor's duties relative to testing include:
- a. Notifying laboratory of conditions requiring testing.
 - b. Coordinating with laboratory for field testing.
 - c. Providing representative fill material soil samples to the laboratory for test purposes. Provide 50-pound samples of each fill soil.
3. Inspection
- a. Earthwork operations, suitability of excavated fill materials, and placing and compaction of fill materials are subject to inspection by the Geotechnical Engineer.
 - b. Foundations and shallow spread footing foundations are required to be reviewed by the Geotechnical Engineer to verify suitable bearing and construction.
- C. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.
- D. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels, or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment, and materials necessary or convenient to the Contractor for completing the work within the time specified in these Contract Documents.

Part 2 Products

2.1 Fill Materials

A. Fill Material, General

1. Approval Required: All fill material shall be subject to the approval of the Engineer.
2. Notification: For approval of imported fill material, notify the Engineer and testing laboratory at least one week in advance of intention to import material, designate the proposed borrow area, and permit testing as necessary to prove the quality of the material.

B. On-Site Fill Material

1. On-site fill material shall be soil exclusive of organic matter, frozen lumps, or other deleterious substances which may be compressible, or which cannot be properly compacted.
2. On-site fill material shall contain no rocks or lumps over 3-inches maximum in dimension.

C. Imported Fill Materials: All imported fill material shall meet the requirements of on-site fill material.

D. Structural Fill Material shall consist of soil exclusive of organic matter, frozen lumps, or other deleterious substances which may be compressible, or which cannot be properly compacted.

2.2 Aggregate

A. Coarse Aggregate or Crushed Stone: Coarse aggregate shall conform to the Tennessee Department of Transportation Standard Specifications for Construction of Road and Bridges.

B. Fine Aggregate: All fine aggregate shall conform to the Tennessee Department of Transportation Standard Specifications for Construction of Road and Bridges.

C. Graded Aggregate (GAB): Graded Aggregate shall conform to the Tennessee Department of Transportation Standard Specifications for Construction of Roads and Bridges.

D. Pea Gravel: Pea gravel shall be clean, naturally rounded aggregate, 1/8 to 3/4-inch in diameter per ASTM C 33.

2.3 Topsoil

A. Topsoil is defined as the top layer of soil and should consist of dark organic weed free loam, free of muck.

2.4 Construction Materials

- A. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures, or utilities outside of the trench or pit.
1. General
 - a. Cofferdams and bracing design, including computations, shall be prepared before commencing construction operations. Drawings and design computations shall be signed and sealed by a registered professional engineer licensed in the state in which the Project is located. The Drawings and design computations shall not be submitted to the Engineer.
 - b. Sheeting, bracing and timbering shall be so placed as to allow the work to be constructed to the lines and grades shown on the Drawings and as ordered by the Engineer.
 - c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe, the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety.
 - d. All sheeting in contact with the concrete or masonry shall be cut off as directed by the Engineer and left in place.
 2. Timber: Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots, and in good condition. Size and spacing shall be in accordance with OSHA regulations.
 3. Steel Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth, and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and/or live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities. Steel piling within three feet of an existing building, structure or pipeline shall remain in place, unless otherwise directed by the Engineer.
 4. Remove bracing and sheeting in units when fill material reaches the point necessary to protect the structures and adjacent property. Leave sheeting in place when, in the opinion of the Engineer, it cannot be safely removed. Cut off sheeting left in place at least two feet below the surface.

2.5 Other Materials

- A. All other materials not specifically described but required for proper completion of the work of this Section shall be as selected by the Contractor subject to the approval of the Engineer.

Part 3 Execution

3.1 General

- A. Safety: Comply with local regulations and with the provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of America, Inc., Occupational Safety and Health Act and all other applicable safety regulations.
- B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.
- C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments, and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.
- D. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water flow can be uninterrupted in existing gutters, other surface drains, or temporary drains. Free access must be provided to all fire hydrants, meters, and other areas and utilities that may need to be accessed.
- E. Topsoil
 1. Remove all topsoil to the full layer depth and at which depth the subsoil is encountered, from all areas under buildings, pavements, and from all areas which are to be cut to lower grades or filled.
 2. With the Engineer's approval, topsoil to be used for finish grading may be stored on the site.
 3. Other topsoil may be used for fill in non-critical areas with approval of the Engineer.
 4. Properly dispose of all excess topsoil off site.
- F. Bracing and Sheeting
 1. Furnish, put in place, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth which could in any way injure the work, adjacent property or workers.

2. Properly support all excavations in locations indicated on the Drawings and where necessary to conform to all pertinent rules and regulations and these Specifications, even though such locations are not indicated on the Drawings.
3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.
4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved by the Engineer.

G. Obstructions

1. Remove and dispose of all trees, stumps, roots, boulders, sidewalks, driveways, pavement, pipes, and the like, as required for the performance of the work.
2. Exercise care in excavating around catch basins, inlets and manholes so as to not disturb or damage these structures.
3. Avoid removing or loosening castings or pushing dirt into catch basins, inlets and manholes.
4. Damaged or displaced structures or castings shall be repaired or replaced and dirt entering the structures during the performance of the work shall be removed at no additional cost to the Owner.

H. Utilities to be Abandoned or Removed

1. When pipes, conduits, sewers, or other structures are removed from the trench, leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and non-shrink grout.
2. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.
3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Owner.

I. All salvageable materials will remain the property of the Owner unless otherwise indicated by the Owner.

J. Stockpile Area: The stockpile area location shall be approved by the owner and shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

3.2 Excavation

A. Method

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.
2. All excavations for pipe appurtenances and structures shall be made in such a manner, and to such depth and width, as will give ample room for building the structures, and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater which may be encountered, and for the removal from the excavation of all materials excavated.
3. Take special care so that the soil below the bottom of the structure to be built is left undisturbed.

B. Grades: Excavate to grades indicated on the Drawings. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material

1. Remove and properly dispose of all excavated material not needed to complete filling, backfilling and grading.

D. Dispose of excess excavated fill material, as defined in Part 2 of this Section, at off-site locations secured by the Contractor and in accordance with all requirements of federal, state, county, and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property, except by written consent of the property owner. In no case shall any debris material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

E. Dispose of excess excavated rock material weighing less than 500 pounds at off-site locations secured by the Contractor and in accordance with all requirements of federal, state, county, and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property, except by written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

F. Dispose of all other excavated materials including but not limited to soil that does not meet the requirements of this Section and rock material weighing greater than 500 pounds, at off-site locations secured by the Contractor and in accordance with all requirements of federal, state, county, and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property, except by written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

G. Extra Earth Excavation

1. If soft or excessively wet material which, in the opinion of the Engineer is not suitable for construction, is encountered below the final subgrade elevation of an excavation or underneath a structure, the Engineer may order the removal of this material and its replacement with crushed stone or other suitable material in order to make a suitable foundation for the construction of the structure.

3.3 Excavating for Structures

- A. Earth Excavation: Earth excavation shall include all substances to be excavated other than rock. Earth excavation for structures shall be to limits not less than two feet outside wall lines, to allow for formwork and inspection, and further as necessary to permit the trades to install their work. All materials loosened or disturbed by excavation shall be removed from surfaces to receive concrete or graded aggregate.
- B. Rock Excavation
 1. Definition of Rock: Any material which cannot be excavated with conventional excavating equipment, and must be removed by drilling and blasting, and occupies an original volume of at least one-half cubic yard.
 2. Excavation: Where rock is encountered within excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings, or as otherwise directed by the Engineer. The Contractor shall be responsible for obtaining any blasting permits required.
 3. Blasting: Blasting operations shall be conducted in accordance with all existing ordinances and regulations. All structures shall be protected from the effects of the blast. The blasting shall be done by licensed experienced workers. Dispose of excavated rock in accordance with applicable federal, state, county, and local regulations and in accordance with this Section.
 - a. If, in the sole opinion of the Engineer, the Contractor persistently uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer will direct the Contractor to employ an independent, qualified blasting consultant, approved by the Engineer, to supervise the preparation for each blast and approve the quantity of each charge.
 - b. The Contractor will notify the Engineer before any charge is set and prior to blasting. Following review by the Engineer regarding the proximity (normally within 300 linear feet) of permanent structures to the blasting site, the Engineer may direct the Contractor to employ an independent qualified specialty subcontractor, approved by the Engineer, to monitor the blasting by use of seismograph, identify areas where light charges must be used, conduct pre-event and post-event inspections of all structures, including photographs or videos, and maintain a detailed written log.
 - c. Any damage caused as a result of blasting operations shall be promptly repaired by the Contractor at the Contractor's own expense.
 4. No allowance shall be made for overcutting or for excavation below the required elevations. The Engineer must be given reasonable notice to measure all rock.

- C. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with 3,000 psi concrete in accordance with Section 03 30 00 of these Specifications. As an alternate to concrete, structural fill may be used if approved by the Engineer
- D. Excavation for Foundations: Foundations and slabs-on-grade shall rest on undisturbed earth, rock or compacted materials to ensure proper bearing.
- E. Unsuitable Foundation Material: Any material, in the opinion of the Engineer, which is unsuitable for foundation shall be removed and replaced with compacted graded aggregate, with 3,000 psi concrete or with compacted fill material as directed by the Engineer. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.
- F. Foundation in Rock: Foundations for a structure shall be on similar materials. Should excavation for a foundation bearing on earth be partially in rock, the Contractor shall undercut that portion of the rock 24-inches and bring the excavation to bearing elevation with compacted graded aggregate or fill material.
- G. Pipe Trenches Beneath Structures: Where piping or conduit passes beneath footings or slabs resting on grade, trenches shall be excavated to provide a minimum 6-inch clearance from all surfaces of the pipe or conduit. The trench shall be backfilled to the base of the structure with crushed stone or as shown on the Drawings.
- H. Unauthorized Excavation: Care shall be taken that excavation does not extend below bottom levels of foundations or slabs on earth or rock. Should the excavation be carried below such levels, the Contractor shall fill in the resulting excess excavation with concrete under foundations and compacted graded aggregate or other material approved by the Engineer under slabs-on-grade. Should excavation be carried beyond outside lines of footings, such excess excavation shall be filled with concrete, or formwork shall be provided, as directed by the Engineer.
- I. Unsuitable Bearing
 - 1. If suitable bearings for foundations as directed by the Engineer are not encountered at the elevations indicated on the Drawings, immediately notify the Engineer.
 - 2. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.

3.4 Compaction

- A. Fill materials supporting roadways, parking areas, sidewalks, structures, and buildings and placed around structures above undisturbed earth shall be compacted to 95 percent of the maximum dry density. The top 12-inches of fill materials supporting structures and the top 24-inches of fill materials supporting pavement shall be compacted to 100 percent of the maximum dry density. The edge of the compacted fill should extend at least 10 feet beyond the outside building edge, and at least 5 feet beyond the outside

edge of pavements before sloping. Fill materials placed for general site grading shall be compacted to 95 percent of the maximum dry density.

- B. Compaction of fill materials on slopes steeper than 6 feet horizontal to 1-foot vertical shall be by sheepsfoot rollers with staggered, uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to ensure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer shaping the face of the slope.
- C. Compaction of fill materials around structures shall be accomplished by heavy power tamping equipment.
- D. If tests indicate that density of fill material is less than that specified, the area shall be either recompacted or undercut, replaced with fill material, and compacted until specified density is achieved.

3.5 Placing Fill Materials

- A. Controlled Fill
 - 1. The fill material placed for roadways, parking areas, walks, structures, and building slabs-on-grade shall be known as controlled fill material.
 - 2. After the existing ground or excavated area has been proofrolled and examined by the Engineer, all holes and other irregularities shall be filled and compacted before the main fill material is placed.
- B. The fill material shall be placed in even layers not exceeding 8-inches in depth and shall be thoroughly compacted as herein specified.
- C. If an analysis of the soil being placed shows a marked difference from one location to another, the fill being placed shall not be made up of a mixture of these materials.
- D. Each different type of material shall be handled continuously so that field control of moisture and density may be based upon a known type of material.
- E. No fill shall be placed following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.
- F. Proofrolling
 - 1. All areas where roadways, parking areas, sidewalks, structures, and buildings are to be constructed on cut areas, compacted fill material areas, and other areas where indicated on the Drawings, shall be proofrolled to detect soft spots prior to and following placement of fill materials.
- G. Proofrolling shall consist of the moving of a 20-30 ton loaded dump truck or other pneumatic tire roller over the specified areas prior to and following placement of fill

materials. The proofrolling operation should traffic the site with parallel passes of the vehicle starting at one side of the building pad and continuing to the other. Each pass should overlap the preceding pass to ensure complete coverage.

- H. Proofrolling shall be witnessed by the Geotechnical Engineer.
- I. Subgrade shall be proofrolled with six passes of the truck or roller. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with six passes of the roller. If, after having been filled and proofrolled, the subgrade still contains depressions, the area shall be undercut to the full depth of the soft material, backfilled, recompact, and rolled to achieve a subgrade acceptable to the Engineer.
- J. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 1/4-inch at every point.
- K. Conduits, pipes, culverts, and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than five feet to, conduits, pipes, culverts, and underdrains unless the tops of those utilities are deeper than three feet.
- L. Placement
 - 1. Prior to placement of any material on slopes steeper than 6 feet horizontal to 1 foot vertical, the area within the slope limits shall then be scarified to a depth of at least 6-inches.
 - 2. Fill materials shall be placed in continuous, approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practical and having a net compacted thickness of not over 6-inches.
 - 3. Place fill material carefully to restore the ground surface to its original condition. Dispose of excess material in accordance with this Section.
- M. Placement Around Structures
 - 1. Remove debris from excavations before placement.
 - 2. Do not place fill materials against walls until so directed by the Engineer nor until all indicated perimeter insulation and/or waterproofing is in place.
 - 3. Protect such insulation and/or waterproofing during filling operations.
 - 4. Wherever possible, placement shall be simultaneous on both sides of walls to equalize lateral pressures.
 - 5. Do not place fill materials against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.

6. Placement against walls shall take place only after all the concrete in the affected members has attained the specified strengths.
- N. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend into conformation with remaining ground surfaces. All surfaces shall be left smooth and free to drain.
- O. Excess Material: Surfaces and slopes of waste fills shall be left smooth and free to drain.
- P. Moisture
 1. Fill materials shall be placed at optimum moisture content within practicable limits, but not less or more than two percent of optimum. Optimum moisture shall be maintained by sprinkling the layers as placed or by allowing materials to dry before placement.
 2. If fill material is too wet, provide and operate means approved by the Engineer to assist the drying of the fill until suitable for compaction.
 3. If fill material is too dry, provide and operate means approved by the Engineer to add moisture to the fill layers.

3.6 Grading

- A. General: Perform all rough and finish grading required to attain the elevations indicated on the Drawings. Perform finish grading to an accuracy of 1/4-inch.
- B. Compact backfill underlying roadways, parking areas, sidewalks, structures and buildings in accordance with Article 3.4 of this Section.
- C. Backfilling around structures shall be performed in accordance with Article 3.5 of this Section.
- D. Treatment After Completion of Grading
 1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.
 2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.7 Surface Water Control

- A. Regulations and Permits: Obtain all necessary soil erosion control permits in accordance with the Tennessee Soil Erosion and Sedimentation Control Act and all pertinent rules, laws, and regulations of all applicable federal, state, county and municipal regulatory agencies.

- B. Unfavorable Weather: Do not place, spread or roll any fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.
- C. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.
- D. Pumping and Drainage
 - 1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.
 - 2. Dewater by means which will ensure dry excavations, preserve final lines and grades, do not disturb or displace adjacent soil.
 - 3. All pumping and drainage shall be performed with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances and regulations.
 - 4. Do not overload or obstruct existing drainage facilities.

3.8 Settlement

- A. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within one year after final acceptance of the work by the Owner.
- B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.9 Cleaning

- A. Upon completion of the work of this Section, remove all rubbish, trash, and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer, and in conformance with Section 01 74 00 of these Specifications.

END OF SECTION

Part 1 General

1.01 Scope

- A. The work under this Section consists of furnishing all labor, equipment, and materials, and performing all operations in connection with the trench excavation and backfill required to install the project as specified in the plans.
- B. This specification section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation, and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and pits, compacting, all sheeting, shoring and bracing, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.
- C. The CONTRACTOR shall provide all services, labor, materials and equipment required for all earthwork and related operations necessary or convenient to the CONTRACTOR for furnishing a complete work as shown on the Drawings or specified in these Contract Documents.
- D. Excavation shall include the removal of any trees, stumps, brush, debris, or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock, or other materials to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown in the specified plans.
- E. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.
- F. The trench is divided into five (5) specific areas:
 - 1. Foundation: The area beneath the bedding, sometimes also referenced as trench stabilization.
 - 2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
 4. Initial Backfill: The area above the haunching material and below a plane eighteen inches (18") above the top of the barrel of the pipe.
 5. Final Backfill: The area above a plane eighteen inches (18") above the top of the barrel of the pipe.
- G. The choice of method, means, techniques, and equipment rests with the CONTRACTOR. The CONTRACTOR shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way, and prevailing practice in the area.

1.02 Quality Assurance

- A. Density: All references to "maximum dry density" shall mean the maximum dry density defined by the "Maximum Density-Optimum Moisture Test", ASTM D 698. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D 1556, "Standard Test Method for Density and Unit weight of Soil In Place by the Sand Cone Method", ASTM D 2937, "Density of Soil In Place by the Drive-Cylinder Method" or ASTM D 2922, "Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)".
- B. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory at no cost to the OWNER. The CONTRACTOR's testing laboratory shall perform tests, at no cost to the OWNER, upon change of source and at sufficient intervals during the work to certify conformance of all select material furnished for use on this Project.

1.03 Safety

Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The CONTRACTOR shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavation, Trenching & Shoring" as described in Occupational Safety and Health Administration (OSHA) publication 2226. All trench safety is the responsibility of the CONTRACTOR.

Part 2 Products

2.01 Trench Foundation Materials

- A. Crushed stone or surge stone shall be utilized for trench foundation (trench stabilization).
- B. Crushed stone shall be crushed limestone and shall meet the requirements of the Tennessee Department of Transportation (TDOT) Specification 903.11. Stone size shall be between No. 57 and No. 4, inclusive, as determined by the TDOT Specification 903.22.
- C. Surge stone shall be crushed limestone and shall meet the requirements of the TDOT Specification 903.11. Stone size shall be No. 1, inclusive, as determined by the TDOT Specification 903.22.

2.02 Bedding and Haunching Materials

- A. Bedding, haunching, and backfill materials shall be crushed stone under all pavement areas or if the trench is within three feet (3') of the pavement edge. Otherwise, bedding and haunching materials shall be crushed stone or earth materials as specified below.
- B. Crushed stone utilized for bedding and haunching shall meet the requirements of the Tennessee Department of Transportation (TDOT) Specification 903.11. Stone size shall be No. 57, as determined by the TDOT Specification 903.22.
- C. Earth materials utilized for bedding and haunching shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than two inches (2") at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, earth bedding and haunching materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as bedding or haunching material, provide select material conforming to the requirements of this Section at no additional cost to the Owner.

D. Filter Fabric

1. Filter fabric associated with bedding shall be a polypropylene woven fabric. The fabric shall be a high modulus type with good separation capabilities. The fabric shall be inert to biological degradation and naturally occurring chemicals, alkalis, and acids.
2. The fabric shall have an equivalent opening size (EOS or AOS) of 20 to 45. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Method	Minimum Value
Grab Tensile Strength	lbs.	ASTM D 4632	200
Grab Tensile Elongation	%	ASTM D 4632	30 (max.)
Mullen Burst Strength	psi	ASTM D 3786	400
Trapezoid Tear Strength	lbs.	ASTM D 4533	75
Puncture Strength	lbs.	ASTM D 3787	75

3. If ordered by the ENGINEER, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of ten (10) days during initial pipe installation.
4. Filter fabric shall be Propex Geotex 104F, Mirafi 500X, Amoco 2002 or Exxon GTF-200.

2.03 Initial Backfill

Unless shown on Drawings or specified otherwise, initial backfill material shall be crushed stone as specified for bedding and haunching materials.

2.04 Final Backfill

Final backfill material shall be general excavated earth materials, shall not contain rock larger than three inches (3") at its greatest diameter, cinders, stumps, limbs, man-made wastes, and other unsuitable materials. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.05 Select Backfill

Select backfill shall be materials which meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 Concrete

Concrete for bedding, haunching, initial backfill, or encasement shall have a compressive strength of not less than three thousand pounds-per-square-inch (3,000 psi), with not less than 5.5 bags of cement per cubic yard (CY) and a slump between three inches (3") and five inches (5"). Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

2.07 Flowable Fill

Flowable for final backfill shall not have a compressive strength exceeding one-hundred-fifty pounds-per-square-inch (150 psi), with not less than one-hundred pounds of cement per cubic yard (100 lbs/CY), and a minimum of two-hundred-fifty pounds per cubic yard (250 lbs/CY) of Class C or F Fly Ash Flowable Fill shall be mixed and transported in accordance with ASTM C 94.

Part 3 Execution

3.01 Trench Excavation

- A. Topsoil and grass shall be stripped a minimum of six inches (6") over the trench excavation site and stockpiled separately for replacement over the finished grading areas.
- B. Trenches shall be excavated to the lines and grades shown in the plans, with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.
- C. Trench Width for Pipelines
 - 1. The sides of all trenches shall be vertical to a minimum of one foot (1') above the top of the pipe. Unless otherwise indicated in the plans, the minimum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet (2'), or the minimum width required for proper trenching and shoring.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of twelve inches (12") clearance between the rock and the side of the pipe barrel or manhole.
4. Wherever the prescribed maximum trench width is exceeded, the CONTRACTOR shall use the next higher Class or Type of bedding and haunching as shown in the plans for the full trench width as actually cut. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the CONTRACTOR's tamping and compaction equipment, intentional over-excavation due to the size of the CONTRACTOR's excavation equipment, or other reasons beyond the control of the ENGINEER or OWNER.

D. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions shown in the plans.
2. Where rock is encountered in trenches for pipelines, provide a minimum of six inches (6") clearance between the bottom of the trench and the bottom of the pipe or accessory for pipe twenty-one inches (21") in diameter and smaller and twelve inches (12") for larger pipe, and manholes.

E. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.
2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems. Excavated material shall be placed so as not to damage existing landscape features or man-made

improvements.

3.02 Sheeting, Bracing, and Shoring

- A. Sheeting, bracing, and shoring shall be performed in the following instances:
1. Where sloping of the trench wall does not adequately protect persons within the trench from slides or cave-ins.
 2. In caving ground.
 3. In wet, saturated, flowing or otherwise unstable materials. The sides of all trenches and excavations shall be adequately sheeted, braced, and shored.
 4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees, or private properties which are required to remain.
 5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.
- B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act (OSHA) of 1970, as amended.
- C. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.
- D. Steel Sheeting and Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth, and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The CONTRACTOR shall provide closure and sealing between sheet piling and existing facilities.
- E. Trench Shield: A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield

is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in six inch (6") increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe or utility.

- F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the ENGINEER it cannot be safely removed or is within three feet (3') of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet (2') below the surface.
- G. The sides of all excavations shall be sufficiently sheeted, shored, and braced as necessary to prevent slides, cave-ins, settlement or movement of the banks, to maintain the excavation clear of all obstructions, and to provide safe working conditions. Wood or steel sheeting of approved design and type shall be used in wet, saturated or flowing ground. All sheeting, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.
- H. The responsibility for correctly assessing the need for sheeting and analyzing the stresses induced shall be the total responsibility of the CONTRACTOR. Since the ENGINEER does not dictate or determine the CONTRACTOR's sequence or limits of excavation, the ENGINEER assumes no responsibility for sheeting and shoring. The CONTRACTOR must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Results of sheeting and shoring analysis and design shall be submitted to the ENGINEER on request.
- I. Excavations adjacent to existing or proposed buildings and structures or in paved streets or alleys shall be sheeted, shored, and braced adequately to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. Any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes; due to failure or lack of sheeting or bracing, or due to improper bracing; or occurring through negligence or fault of the CONTRACTOR in any other manner shall be repaired by the CONTRACTOR at his own expense.
- J. Sheeting, shoring, or bracing materials shall not be left in place unless otherwise specified or shown on the Drawings or ordered by the ENGINEER in writing. Such materials shall be removed in such manner that no danger or damage will occur to

new or existing structures or property, public or private, and so that cave-ins or slides will not take place. Trench sheeting shall be left in place until backfill has been brought to a level 12 inches above the top of the pipe. It shall then be cut off and the upper portion removed. Sheeting for structures shall be left in place until backfill has been brought to a level of 12 inches above the top of the bottom footing. It shall then be cut off and the upper portion removed.

- K. All holes and voids left in the work by the removal of sheeting, shoring, or bracing shall be filled and thoroughly compacted.

3.03 Rock Excavation

- A. Definition of Rock: Any material which cannot be excavated with conventional excavating equipment, is removed by drilling and blasting, and occupies an original volume of at least one-half cubic yard (CY).
- B. When rock is encountered near existing concrete or other structures, excavation methods that protect the existing structures should be performed to ensure the structure's integrity is maintained throughout all construction.
- C. Blasting: Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the CONTRACTOR repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the ENGINEER may direct the CONTRACTOR to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

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 care to avoid damage. Injury or damage to other structures and properties shall be promptly repaired to the satisfaction of the OWNER by the CONTRACTOR at his own expense.

- D. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as riprap or backfill.
- E. The CONTRACTOR shall notify the ENGINEER prior to any blasting. Additionally, the CONTRACTOR shall notify the ENGINEER before any charge is set.

- F. Following review by the ENGINEER regarding the proximity of permanent buildings and structures to the blasting site, the ENGINEER may direct the CONTRACTOR to employ an independent, qualified specialty sub-CONTRACTOR, approved by the ENGINEER, to monitor the blasting by use of seismograph, identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 Dewatering Excavations

- A. The CONTRACTOR, at his own expense, shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or sub-grades.

Shallow excavations may be dewatered using open ditches provided such ditches are kept open and free-draining at all times. The actual dewatering methods used shall be acceptable to the ENGINEER. Dewater the excavation continuously to maintain a water level two feet (2') below the bottom of the trench.

- B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.
- C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.
- D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.
- E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet (2') below the bottom of the trench. Pumping equipment shall be

of sufficient quantity and/or capacity to maintain the water level in the sump two feet (2') below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged.

- F. A minimum of one (1) standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation. A standby unit (a minimum of one [1] for each ten [10], in the event well points are used), shall be available for immediate installation should any pumping unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the work. Drawings or diagrams on proposed well point or deep well dewatering systems shall be submitted to the ENGINEER for review.
- G. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet (2') below the trench bottom. Where soil conditions dictate, the CONTRACTOR shall construct well points cased in sand wicks. The casing, six inches (6") to ten inches (10") in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.05 Trench Foundation and Stabilization

- A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.
- B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the ENGINEER shall then authorize payment for trench stabilization.
- C. Should the undisturbed material encountered at the trench bottom constitute, in the opinion of the ENGINEER, an unstable foundation for the pipe, the CONTRACTOR shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed stone or class "C" concrete as directed by the ENGINEER.

3.06 Bedding and Haunching

- A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders, or large dirt clods.

- B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated in the plans. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe.

Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

- C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.
- D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, vigorously chinked, or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.
- E. Gravity Sewers and Accessories: Lay polyvinyl chloride (PVC) pipe with minimum Class "B" bedding. Lay all other pipe with Class "C" bedding, unless shown or specified otherwise.
1. Class "A" (Bedding Factor – 2.8): Excavate the bottom of the trench flat at a minimum depth as shown in plans, below the bottom of the pipe barrel. Lay pipe to line and grade on concrete block. Place concrete to the full width of the trench and to a height of one-fourth (1/4) of the outside diameter (O.D.) of the pipe above the invert.
 2. Class "B" (Bedding Factor – 1.9): Excavate the bottom of the trench flat at a minimum depth as shown in plans, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to the centerline of the pipe.
 3. Class "C" (Bedding Factor – 1.5): Excavate the bottom of the trench flat at a minimum depth as shown in the plans, below the bottom of the pipe barrel.

Place and compact bedding material to the proper grade. Haunching material shall then be carefully placed by hand and compacted to provide full support under and up to a height of one-fourth the outside diameter of the pipe above the bottom of the pipe barrel.

- F. Manholes: Excavate to a minimum of twelve inches (12") below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before constructing the manhole.
- G. Excessive Width and Depth
 - 1. Gravity Sewers: If the trench is excavated to excess width, provide the bedding class with the next higher bedding factor. Crushed stone haunching and initial backfill may be used in lieu of Class "A" bedding, where Class "A" bedding is necessitated by excessive trench width.
 - 2. Water Mains: If the trench is excavated to excess width, provide the next higher type or class of pipe bedding, but a minimum of Type 4, as detailed on the Drawings
 - 3. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.
- H. Compaction: Bedding and haunching materials under pipe, manholes, and accessories shall be compacted to a minimum of ninety percent (90%) of the maximum dry density, unless shown or specified otherwise.

3.07 Initial Backfill

- A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill, and ensure the uniform distribution of the loads over the top of the pipe.
- B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least eighteen inches (18") above the pipe barrel. Layer depths shall be a maximum of six inches (6") for pipe eighteen inches (18") in diameter and smaller and a maximum of twelve inches (12") for pipe larger than eighteen inches (18") in diameter.
- C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

- D. Compact each layer thoroughly with suitable hand tools or tamping equipment.
- E. Initial backfill shall be compacted to a minimum ninety percent (90%) of the maximum dry density, unless shown or specified otherwise.
- F. In areas where the trench is cut into rock or where suitable backfill is unavailable, crushed stone shall be used for initial backfill up to twelve inches (12") above the pipe barrel.
- G. Crushed stone shall be used for initial backfill up to twelve inches (12") above the pipe barrel for all pipe material for gravity sewers.

3.08 Concrete Encasement for Pipelines and Casings

Where concrete encasement is shown in the plans for pipelines, excavate the trench to provide a minimum of six inches (6") clearance from the bell of the pipe. Lay the pipe to line and grade on concrete blocks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than six inches (6") above the pipe bell. Do not backfill the trench for a period of at least twenty-four (24) hours after concrete is placed.

3.09 Final Backfill

- A. Backfill carefully to restore the ground surface to its original condition.
- B. The top six inches (6") shall be topsoil obtained as specified in "Trench Excavation" of this Section.
- C. Excavated material which is unsuitable for backfilling and excess material, shall be disposed of, at no additional cost to the OWNER, in a manner approved by the ENGINEER. Surplus soil may be distributed and spread over the site if approved by the ENGINEER. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.
- D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.
- E. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly

as follows:

1. In six inch (6") layers, if using light power tamping equipment, such as a "jumping jack".
 2. In twelve inch (12") layers, if using heavy tamping equipment, such as hammer with tamping feet.
 3. In twenty-four inch (24") layers, if using a hydra-hammer.
- F. Settlement: If trench settles, re-fill and grade the surface to conform to the adjacent surfaces.
- G. Final backfill shall be compacted to a minimum ninety percent (90%) of the maximum dry density, unless specified otherwise.

3.10 Backfill Under Roads

- A. Crushed stone shall be used as bedding, haunching, initial and final backfill for all pipe materials. If Flowable Fill is used, it shall be used as final backfill up to the top of the asphalt or concrete pavement. Steel plate shall cover the patch until the fill has cured. Once the Flowable Fill has cured, the required thickness can be removed and appropriate materials can be used to repair the road.
- B. When required by OWNER one-half (1/2) of the road crossing shall be excavated, then temporary bridges consisting of steel plate shall be placed over the excavation for use by the traveling public; then the remainder of the excavation can be carried out.

3.11 Backfill Within Tennessee DOT Right-of-Way

Backfill within the Tennessee Department of Transportation (TDOT) right-of-way shall meet all requirements, standards, and specifications stipulated by TDOT.

3.12 Testing and Inspection

- A. The soils testing laboratory is responsible for the following:
1. Compaction tests in accordance with Article 1.02 of this Section.

2. Field density tests for each two feet (2') of lift, one (1) test for each two-thousand feet (2,000') of pipe installed, or more frequently if ordered by the ENGINEER.
 3. Inspecting and testing stripped site, subgrades and proposed fill materials.
- B. The CONTRACTOR's duties relative to testing include:
1. Notifying laboratory of conditions requiring testing.
 2. Coordinating with laboratory for field testing.
 3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.
 4. Providing excavation as necessary for laboratory personnel to conduct tests.
- C. Inspection
1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the ENGINEER.
 2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical ENGINEER, who shall verify suitable bearing and construction.
- D. Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state, or federal authorities having jurisdiction.

END OF SECTION

Part 1 General

1.01 Scope

- A. The work to be performed under this section shall include replacing existing sidewalks and pavement in paved streets, driveways, and parking areas where such sidewalks and pavement have been removed for constructing water pipelines, fire hydrants, sewers, manholes, and all other water and sewer appurtenances and structures. It shall also include temporary paving, and new sidewalks and pavements where applicable. Dirt shoulders, roads, streets, drives, curbs, and walks are to be restored to their original condition as an incidental part of the installation of utilities.

- B. These specifications and the drawings make reference to the current edition of the standard specifications of the Tennessee Department of Transportation (TDOT). Even though the weather limitations, constructions methods, and materials requirements contained in the TDOT specifications may not be explicitly repeated in these specifications, they shall, wherever applicable to the work called for by this section, be considered as implied and therefore adhered to. However, the various subsections "Basis for Payment" contained in the TDOT specifications shall not be considered applicable.

- C. Related Work:
 - 1. Section 312300 – Excavation and Fill
 - 2. Section 033000 – Cast-in-Place Concrete

Part 2 Products

2.01 Types of Pavement

- A. All references to the Tennessee Department of Transportation (TDOT) specifications shall refer to "Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction", 1981 or latest edition.
 - 1. Mineral Aggregate Base: Class A, Grading D crush stone (TDOT specs, Section 303, Subsection 903.05)

2. Bituminous Prime Coats: cutback asphalt, Grade RD-250, or emulsified asphalt, Grade AE-P (TDOT specs, Section 402, Subsections 904.02 and 904.03)
 3. Crushed Stone Chips: Size 6 or Size 7 (TDOT specs, Subsection 903.14)
 4. Double Bituminous Surface: for both courses, either cutback asphalt, Grade RC-800 or RC-3000, or emulsified asphalt, Grade RS-2 (TDOT specs, Subsections 904.02 and 904.03)
 5. Asphaltic Concrete Binder: Grading B or C, as directed by the ENGINEER (TDOT specs, Section 307)
 6. Bituminous Tack Coat: Grade AE-3 (TDOT specs, Section 403, Subsection 904.03)
 7. Asphaltic Concrete Surface: Grading E (TDOT specs, Section 411)
 8. Quick Dry Traffic Marking Paint (White and Yellow): (TDOT specs, Subsection 910.05)
 9. Concrete: Class A (TDOT specs, Sections 604 and 703)
- B. All existing pavement in streets, driveways, or parking areas which is removed, destroyed, or damaged by construction of sewage or water works shall be replaced per local requirements or as specified below, and as shown on the Drawings. If a conflict is discovered, local ordinances and specifications will govern. Unless otherwise shown or specified, all paved surfaces shall be replaced using the applicable pavement replacement Type 1 through 5 as shown on the Drawings. Pavement shown or specified to be replaced for the full width of the street shall be Types 6, 7, or 8 as applicable and as shown on the Drawings. Materials, equipment, and construction methods used for paving work shall conform to the Specifications applicable to the particular type required for replacement, repair, or new pavements.
1. Type 1 – Portland Cement concrete pavement shall be Class "A" concrete conforming to the *Section 033000 – Cast-In-Place Concrete* of these Specifications, having minimum compressive strength of three-thousand-five-hundred pounds-per-square-inch (3,500 psi). The surface shall conform to the grade and elevation of the surrounding pavement. The slab shall be of a depth of eight (8) inches as shown on the drawings.

2. Type 2 – Not used.
3. Type 3 – Asphaltic concrete pavement for heavy-duty use shall have a maximum thickness of six inches (6") placed in two (2) equal layers. Type 3 pavement shall be composed of four inches (4") of plant mix binder and a two inch (2") topping of asphaltic concrete Grading E conforming to "Asphaltic Concrete Surface (Hot Mix)," Section 411, Tennessee Department of Transportation (TDOT), *Standard Specifications for Road and Bridge Construction*, latest edition. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry, and the tack coat has been applied.
4. Type 4 – Not used.
5. Type 5 – Bituminous penetration pavement shall conform to Section 404, "Double Bituminous Surface Treatment," TDOT, *Standard Specification for Road and Bridge Construction*, latest edition.
6. Replacement of Portland Cement concrete driveways shall be Class "A" concrete conforming to *Section 033000 – Cast-In-Place Concrete* of these Specifications. The surface finish of the concrete pavement shall conform to that of the existing pavement. The slab shall be of depth equivalent to the existing concrete pavement, but in no case less than six inches (6") thick. Expansion joints removed shall be replaced.
7. Replacement of Portland Cement concrete sidewalks shall be Class "A" concrete conforming to *Section 033000 – Cast-In-Place Concrete* of these Specifications. The surface finish of the concrete sidewalk shall conform to that of the existing sidewalk. The slab shall be of depth equivalent to the existing concrete sidewalk but in no case less than four inches (4") thick. Expansion joints removed shall be replaced.
8. Where sewerage or water lines and appurtenances are constructed in or across unpaved, chert, or crushed stone surfaced streets, roadways, driveways, or parking areas, the surface removed or damaged shall be repaired or replaced with a minimum of six inches (6") of crushed stone in accordance with Section 401, "Mineral Aggregate Surface," of the TDOT, *Standard Specifications for Road and Bridge Construction*, latest edition.
9. Unless permanent replacement can be made on the same day as the removal of the surface, and traffic is to be reinstated, holes shall be plated, or

temporary pavement repairs shall consist of a single application of bituminous surface treatment, and be made with two (2) inches of cold mix or hot bituminous seal coat, as directed by OWNER or ENGINEER. The bituminous surface treatment shall conform to TDOT specifications except the second application of bituminous material and mineral aggregate shall be eliminated. Permanent repair MUST be made within ten (10) working days from date of pavement cut.

C. With the prior approval of the ENGINEER, pavement restoration may be performed utilizing an infrared pavement restoration method. This method shall consist of the following:

1. Materials – A one-component emulsified maltenes recycling agent (rejuvenator) is to be applied to the restored area in a ratio of one-to-one (1:1) with water. This solution shall be well dispersed with a commercial grade sprayer at a rate of eight ounces per square yard (8 oz/yd²) of heated area. This application area shall include both the area under repair as well as the area heated, but left undisturbed around the perimeter of the repair.

The application shall take place after the area has been scarified and just prior to the addition of new asphalt. The Infrared repair CONTRACTOR shall provide TDOT 411E or D mix at plant mix temperature of two-hundred-seventy-five degrees Fahrenheit to three-hundred-twenty-five degrees Fahrenheit (275° F to 325° F) to be added to the repair to bring the area up to grade with the existing road.

2. Equipment – The infrared restoration equipment shall consist of a truck-mounted self-contained asphalt restoration system. The CONTRACTOR shall have a minimum of two (2) years' experience with this equipment. The infrared heating unit shall have a heating chamber consisting of fourteen 75,000 BTU high Intensity infrared heaters with Venturi type gas mixing.

The heat area shall be a minimum of six foot by twelve foot (6' x 12') to provide a minimum twelve foot (12') lane width repair area per heat. The chamber shall consume no more than fifteen-thousand British Thermal Units per square foot (15,000 BTU/ ft²) of heated area. This rate of consumption shall translate into the ability of the heater to soften asphalt to a depth of 1.5-inches to 2.5- inches in a timeframe of eight (8) to ten (10) minutes without burning the surface.

The infrared heat chamber shall be fueled by liquid propane using a high capacity Compressed Gas Association (CGA) approved vaporizer at forty United States Gallons at minus-forty degrees Fahrenheit (40 USG @ -40° F) to convert the liquid propane to vapor and provide full pressure to the heaters until the propane cylinders are empty. The truck unit shall contain at least four (4) cylinders of propane to provide enough fuel to operate heater chamber and re-claimer for two (2) days.

The heat system shall utilize an Intelligent Control Station with human-machine interface (HMI) and programmable logic controller (PLC) functions to monitor heat timing for quality control of infrared system. The asphalt storage unit shall consist of a thermostatically controlled storage unit that will be utilized to insure that sufficient hot virgin asphalt is on hand. The re-claimer/storage unit shall contain two (2) thirty-seven-thousand British Thermal Units (37,000 BTU) atmospheric infrared heaters. The thermostats shall work in conjunction with timers to insure proper temperature is maintained without harming the asphalt.

An electronic ignition shall be standard on this unit. An automatic switchover regulator shall be used to reduce the tank pressure to an eleven inch (11") water column. Compaction equipment consisting of a compactor/roller unit shall be used and should be capable of generating at least two-thousand pounds (2,000 lbs) of applied force per square inch (in²) through a vibratory unit. A steel rake shall be used to delineate the repair area along the marked chalk line and to scarify the heated area of the patch inside the chalk line to a depth of at least two inches (2"). A thirty-six inch (36") wide asphalt lute shall be used to distribute the added asphalt and to establish the proper grade.

3. The CONTRACTOR performing this work shall possess a State of Tennessee CONTRACTOR's license with a Highway, Railroad, and Airport (HRA) classification for roadway work.
- D. In no case shall paving repair be commenced without prior approval of the ENGINEER of the type pavement, the equipment to be used, and the method or procedure to be used.

Part 3 Execution

3.01 Replacing Pavement

- A. Pavements removed or damaged shall be replaced in accordance with the

following procedures:

1. The existing street pavement or surface shall be removed along the line of the work for the allowable width specified for the trench or structure. All edges of the existing pavement shall be cut to a straight, vertical edge, and care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Cement concrete slabs, cement concrete base slabs, and crushed stone bases, if required, shall be placed and the concrete allowed to cure for three (3) days before asphaltic concrete surface courses are applied. Expansion joints where applicable shall be replaced in a manner equal to the original joint.
2. After the installation of the sewer or water lines, the trench shall be backfilled with thoroughly compacted crushed stone from the top of bedding to finished grade unless otherwise specified on the Drawings or by local specifications. Backfill shall be placed as specified in *Section 312300 – Excavation and Fill* of these Specifications.
3. Trench backfill along streets shall be covered with permanent paving or with a temporary paving as specified above. The temporary paving shall be applied level with the existing paved surface at a time directed by the ENGINEER. Prior to the application of the temporary paving the crushed stone backfill shall be maintained carefully at grade and dust free. Additionally, immediately prior to application of permanent paving by CONTRACTOR or acceptance by the ENGINEER, CONTRACTOR shall again compact the top of all trench backfill in the streets with a hydrotamper and add sufficient crushed stone to bring surface back to bottom of permanent paving as shown on Drawings.
4. Unless otherwise shown or specified, all paved surfaces shall be replaced with pavement of like kind as specified in Paragraph 2.01. The pavement shall be either specified trench width or the full width of the street as shown in the Bid Schedule.
5. Where pavement is specified for trench width only, the temporary surface or sub-base for permanent paving shall be compacted and finished to the base grade compatible with the type of pavement to be applied before pavement is placed. Additional width of pavement to be removed, if any, as shown on the drawings shall be done immediately prior to replacing the pavement. Any additional pavement or street surface removed or damaged beyond the limits shown on the Drawings shall be replaced or repaired by

the CONTRACTOR at the CONTRACTOR's expense.

6. Where the pavement is for the complete width of the street, the following procedures shall be used;
 - a. After the crushed stone backfill and temporary surface have settled thoroughly, the entire width of the street to be paved shall be cleaned of loose materials as specified in Section 407, "Bituminous Plant Mix Pavements," Tennessee Department of Transportation (TDOT), *Standard Specifications for Road and Bridge Construction*, latest edition.

All areas which have settled shall be filled and leveled as described above in Paragraph 3. Manholes shall be raised to match finished grade using precast concrete rings. Before paving a tack coat shall be applied to the full width of the street, as specified in Section 403 "Tack Coat," TDOT, *Standard Specifications for Road and Bridge Construction*, latest edition.
 - b. During the time that the full width of the street is being paved, the CONTRACTOR shall extend the paving from the street into existing paved driveways in order to provide a smooth transition from the street to the existing driveway grade. This work shall be completed to the satisfaction of the ENGINEER with no separate payment being allowed.
7. Wherever sewer or water lines are constructed across state highways, the CONTRACTOR shall comply with all requirements and provisions of the Standard Method of the TDOT for opening trenches through highways and replacing pavements as shown on the Drawings and specified herein. All such work shall be subject to inspection and approval by the TDOT.
8. Whenever sewer or water lines are constructed across streets, roads, or highways that are not under the jurisdiction of the TDOT, the CONTRACTOR shall comply with all requirements set forth by the governing body for opening trenches through highways and replacing pavements as specified herein. All such work shall be subject to inspection and approval by the governing body that has jurisdiction over the highway.
9. CONTRACTOR shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway, or sidewalk surfacing to its original condition. This work shall be considered

as cleanup and no separate payment will be made for this item.

3.02 New Pavements

- A. Access roads, parking areas, and other roadways shall be surfaced as shown on the Contract Drawings. The material shall be placed sufficiently thick to produce, after compaction, a uniform surface with a minimum thickness as shown on the drawings and shall be shaped to the required line and grade. Materials, equipment, and construction methods used for paving work shall conform to the Specifications for the particular surface required.
- B. Bituminous penetration pavement, Portland Cement Concrete base course or pavement, and bituminous concrete pavement shall include a base course constructed in accordance with the requirements of Section 303, "Mineral Aggregate Base," Tennessee Department of Transportation (TDOT), *Standard Specifications for Road and Bridge Construction*, latest edition. The completed crushed stone road base shall be maintained by the CONTRACTOR in a smooth, first-class condition to required line, grade, and cross section until the entire surface area has become stabilized and compacted. Roadway materials shall not be placed on soft, wet, or frozen sub-grade.
- C. After the base has become stabilized, the entire surface shall be covered with the surface course called for on the Drawings. The surface course shall not be placed until all other items of work are completed.
- D. Portland Cement Concrete base course or pavement shall be placed as herein specified in this Section. Asphaltic concrete pavement shall be placed as herein specified in Paragraph 2.01. Bituminous penetration surface shall be constructed in accordance with Section 404, "Double Bituminous Surface Treatment," TDOT, *Standard Specifications for Road and Bridge Construction*, latest edition.
- E. Crushed stone surface shall be placed as herein specified in this section, Paragraph 2.01.

3.03. Subgrade

- A. Before any base material is installed, compact the subgrade of the area to be paved to ninety-five percent (95%) of optimum density as determined by ASTM D698 (Standard Proctor).

- B. The backfill material shall be thoroughly compacted crushed stone from the top of bedding to finished grade unless otherwise specified on the Drawings. For all areas where subgrade has been prepared, test for uniformity of support by driving a loaded dump truck at a speed of two to three miles-per-hour (2 to 3 mph) over the entire surface. Make further improvements on all areas that show a deflection of one inch (1") or more. When completed, the finished subgrade shall be hard, smooth, stable, and constructed in reasonably close conformance with the lines and grades that existed prior to beginning construction.
- C. For tennis courts, the finished surface of the leveling course shall not vary from the specified grade more than one-fourth inch (1/4") in ten feet (10') when measured in any direction. The finished surface of the surface course shall not vary from the specified grade more than one-eighth inch (1/8") in ten feet (10') when measured in any direction.

3.04 Base

- A. Install a mineral aggregate base of the type specified above in accordance with the requirements of Section 303, "Mineral Aggregate Base," Tennessee Department of Transportation (TDOT), *Standard Specifications for Road and Bridge Construction*, latest edition. The mineral aggregate layer shall be six inches (6"), and the total thickness of the base shall be that indicated by the standard drawings or as shown on the plans.
- B. When a base course is compacted, cut back the surface course of the existing pavement a minimum of twelve inches (12") beyond the limit of the joint between the old and new base course or as shown on the standard drawings. Take special care to ensure good compaction of the new base course at the joint. Apply and compact the surface to conform to the existing pavement so that it will have no surface irregularity.

3.05 Chip Seal Surface

Uniformly apply a bituminous prime coat of either emulsified asphalt, Grade AE-P, Grade RC-250, over the entire width of the area to be surfaced at a rate of 0.3 gallon per square yard. Immediately after application, uniformly cover the entire area with Size 7 crushed stone chips at a rate of twelve pounds per square yard (12 lbs/yd²).

3.06 Double Bituminous Surface

- A. Apply the first course at a rate of 0.38 to 0.42 gallon per square yard with either emulsified asphalt, Grade RS-2, Grade RC-800, or RC-3000, and then immediately cover with Size 6 crushed stone chips at a rate of thirty-three to thirty-seven pounds per square yard (33 lbs/yd² to 37 lbs/yd²). After this is rolled, apply the second course at a rate of 0.30 to 0.35 gallon per square yard, and at once uniformly cover them with Size 7 chips at a rate of twenty to twenty-five pounds per square yard (20 lbs/yd² to 25 lbs/yd²), and then roll the entire area.
- B. After the application of the cover aggregate, lightly broom or otherwise maintain the surface for a period of four (4) days. Maintenance of the surface shall include the distribution of cover aggregate over the surface to absorb any free bitumen and cover any areas deficient in aggregate. Sweep excess material from the entire surface.

3.07 Asphaltic Concrete Binder

- A. Apply a bituminous prime coat of emulsified asphalt, Grade AE-P, Grade RC-250, at a rate of 0.38 to 0.42 gallon per square yard. Take care to prevent the bituminous material's splashing on exposed faces of curbs and gutters, walls, walks, trees, etc. If such splashing does occur, remove it immediately. After the prime coat has been properly cured, apply an asphaltic concrete binder to the thickness shown on the standard drawings or the plans.
- B. Carefully place the material to avoid segregation of the mix. Broadcasting of the material will not be permitted. Remove any lumps that do not readily break down.

3.08 Asphaltic Concrete Surface

If the asphaltic concrete surface course is to be placed directly on the mineral aggregate base, place a bituminous prime coat as described above. If, however, the surface course is to be placed on a binder course, then apply a bituminous tack coat of the sort specified above under PRODUCTS at a rate of 0.05 to 0.10 gallon per square yard. Take care to prevent the bituminous material's splashing on exposed faces of curbs and gutters, walls, walks, trees, etc. If such splashing does occur, remove it immediately after the prime coat has been properly cured, apply an asphaltic concrete binder to the thickness shown on the standard drawings or the plans.

3.09 Smoothness

The finished surfaces shall conform to the lines and grades that existed prior to construction. No deviations, variations, or irregularities exceeding one-fourth inch (1/4") in any direction when tested with a twelve foot (12') straightedge will be permitted in the finished work, nor will any depressions that will not drain. Correct all such defects.

3.10 Sampling and Testing

- A. Submit to the ENGINEER test reports made by an independent testing laboratory on the crushed stone aggregate, bituminous materials, and asphaltic concrete design mixes, and obtain his/her approval of these reports before starting paving operations.
- B. Tests shall be made by OWNER on the completed elements of the pavement to ascertain the compacted thickness of the base and surface courses. If sections with deficient thicknesses are found, the full section for a reasonable distance on each side of the deficiency shall be refused. All such sections shall be removed and reinstalled at the CONTRACTOR's expense. Patch all test holes in connection with thickness tests.

3.11 Maintenance

The CONTRACTOR shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the project. Maintenance shall include such dragging, reshaping, refilling, wetting, rerolling, and reapplication of the temporary paving surface as are necessary to prevent raveling of the road material, the preservation of reasonably smooth surface and repair of damaged or unsatisfactory surfaces to the satisfaction of the ENGINEER. Maintenance shall also include sprinkling as may be necessary to abate dust.

3.12 Sidewalk Replacement

- A. Materials
 - 1. All concrete sidewalks shall be built and/or replaced with Class "A" concrete which shall conform to *Section 033000– Cast-in-Place Concrete* of these Specifications.
 - 2. Preformed joints shall be 1/2-inch thick conforming to the latest edition of AASHTO Standard Specifications, M59, for preformed bituminous fiber

joints.

3. Concrete forms shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength when in place to hold the concrete true to line and grade without springing or distortion.
- B. When a section of sidewalk is removed, the existing sidewalk shall be cut to a neat line perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing contraction joints unless such joints do not exist in which case the cut shall be made at minimum distances shown on the Drawings.
 - C. Existing concrete sidewalks that have been cut and removed for construction purposes shall be replaced with sidewalks of the same width and surface as the portion removed and shall have a minimum uniform thickness of four inches (4"). The new work shall be neatly joined to the old concrete so that the surface of the new work shall form an even unbroken plane with the old sidewalk.
 - D. The subgrade for concrete sidewalks shall be formed by excavating to a depth equal to the thickness of the concrete plus two inches (2"). Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrade shall be compacted by hand tamping or rolling. Soft, yielding, or unstable material shall be removed and backfilled with satisfactory material. Two inches (2") of porous compacted crushed stone shall be placed and shall be compacted thoroughly and finished to a smooth, unyielding surface at proper line, grade, and cross section.
 - E. Expansion joints shall be required to replace any existing expansion joints that are removed with the sidewalk or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within one-half inch (1/2") of the top of finished concrete surface.
 - F. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured.

3.13 Replacing Curbs

- A. All existing curbs which are removed, damaged, or destroyed during construction of sewerage or water works shall be replaced in accordance with the following:

1. Asphaltic concrete curbs shall be constructed with the same dimensions as the existing curb using asphaltic concrete pavement Grading E, conforming to the section entitled "Asphalt Paving." Prior to constructing curbs on pavement, the pavement shall be dry and cleaned of loose material and a tack coat of RS-2 asphalt shall be applied to the curb area of the pavement at the rate of 0.08 to 0.20 gallons per fifteen linear feet (15 LF) of curb area.
2. Portland Cement Concrete curbs shall be constructed with the same dimensions as the existing curb using Class A concrete in accordance with *Section 033000 – Cast-In-Place Concrete* and with Section 702, "Cement Concrete Curb," Tennessee Department of Transportation (TDOT), *Standard Specifications for Road and Bridge Construction*, latest edition.

3.14 Infrared Pavement Restoration

- A. All Proper safety precautions shall be taken including traffic cones, signage, and flagmen to insure a safe workplace for workers, pedestrians and automobile traffic. All Traffic Control shall be in accordance with current Manual on Uniform Traffic Control Devices (MUTCD) standards.
- B. Defining and Preparing the Work Area:
 1. The area shall be swept clean of dirt, loose aggregate or standing water.
 2. A chalk line shall be drawn six to twelve inches (6" to 12") back from the damage.
- C. Heating the Repair Area:
 1. The infrared chamber shall be lowered over the repair being sure to allow at least twelve to eighteen inches (12" to 18") of heated area beyond the perimeter of the original opening.
 2. To insure the proper heating time, the CONTRACTOR shall check the surface temperature of the asphalt at seven minutes and every minute thereafter using an infrared thermometer so as not to allow the surface temperature to exceed three-hundred-fifty degrees Fahrenheit (350° F).
 3. After the appropriate heating time, typically eight (8) to ten (10) minutes, the asphalt surface will be softened to a depth of two inches (2") to 2.5- inches.

D. Raking Heated Area:

1. Once the asphalt surface is softened, the infrared chamber will be removed from the heated area.
2. The backside of the steel rake will then be used to neatly square off the repair, cutting six inches (6") to twelve inches (12") back from the damaged area along the chalk line.
3. The area inside the repair will then be deeply scarified, taking special care to eliminate the original seam between the repair and the road surface.
4. The maltenes rejuvenator shall be applied to the repair and the surrounding heated asphalt surface.

E. Adding Plant Mix Asphalt:

TDOT 411E or D mix, one-fourth inch (1/4") to one-half inch (1/2") aggregate will then be added to the area to bring it up to the proper grade. The repair will then be luted smooth.

F. Compaction:

1. The area shall be properly compacted while ensuring that the edges are rolled first to fuse the hot repair to the heated but untouched surrounding pavement.
2. A light coating of stone dust will then be spread over the repair area to remove the tackiness.
3. The total time for a single heat restoration shall not exceed more than thirty (30) minutes to ensure that both the heated pavement and the added asphalt have not been allowed to cool.

END OF SECTION

Part 1 General

1.1 Section Includes

- A. Small portland cement concrete paving jobs such as access roads, driveways, sidewalks, and parking lots, complete including materials, formwork, and finishing.

1.2 Design

- A. This materials and construction specification is intended to be used on projects where the design was completed using UFC 3-250-01FA Pavement Design for Roads, Streets, Walks, and Open Storage Areas, ACI 330R, Guide for the Design and Construction of Concrete Parking Lots or ACI 325.12R, Guide for Design of Jointed Concrete Pavements for Streets and Local Roads, or equivalent.

1.3 Submittals

- A. Submit the following in accordance with Section 01 33 00 Submittal Procedures:
- B. Action Submittals:
 - 1. Product Data:
 - a. Curing materials.
 - b. Admixture.
 - c. Dowels and reinforcement: Submit a complete list of materials including type, brand and applicable reference specifications.
 - 2. Design Data:
 - a. Concrete Mix Design: Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

C. Informational Submittals

1. Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cementitious materials, aggregates, and admixtures. Provide maximum nominal aggregate size, combined aggregate gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size. Test reports shall be submitted along with the concrete mix design.
2. Test Reports:
 - a. Aggregate Tests.
 - b. Concrete Slump Tests.
 - c. Air Content Tests.
 - d. Compressive Strength Tests.
 - e. Certificates.
 - f. Ready-Mixed Concrete Plant.
 - g. Batch Tickets.
 - h. Cementitious Materials.

1.4 Delivery, Storage, and Handling

- A. In accordance with AASHTO M 157.

1.5 Quality Assurance

- A. Ready-mixed Concrete Plant Certification: Unless otherwise approved by the Engineer, ready mixed concrete shall be produced and provided by a National Ready-Mix Concrete Association (NRMCA) certified plant.
- B. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to TDOT requirements.

Part 2 Products

2.1 Materials

A. Cementitious Materials

1. Cementitious materials in concrete mix shall be 20 to 50 percent non-portland cement pozzolanic materials by weight. Substitutions shall be in accordance with applicable TDOT requirements.
2. Cement: AASHTO M 85, Type I or II, except that alkali content shall not exceed 0.60 percent.
3. Fly Ash: AASHTO M 295 and complying with TDOT Standard Specifications.
4. Slag: AASHTO M302, Ground Granulated Blast Furnace Slag, Grade 100 or 120 and conforming to TDOT Standard Specifications.

B. Water: Potable water, complying with ASTM C1602.

C. Aggregate:

1. Coarse aggregate shall consist of crushed or uncrushed gravel, crushed stone, or a combination thereof. Aggregates, as delivered to the mixers, shall consist of clean, hard, uncoated particles. Coarse aggregate shall be washed. Washing shall be sufficient to remove dust and other coatings. Coarse aggregate shall conform to TDOT Standard Specifications.
2. Fine aggregate shall consist of natural sand, manufactured sand, or a combination of the two, and shall be composed of clean, hard, durable particles. Fine aggregate shall conform to TDOT Standard Specifications.
3. Both coarse and fine aggregates shall meet the requirements of ASTM C33.

D. Admixtures: In accordance with TDOT Standard Specifications.

E. Reinforcement

1. Dowel Bars: Bars shall conform to AASHTO M 31 for Grade 40 or 60 for plain billet-steel bars of the size and length indicated. Remove all burrs and projections from the bars. The bars shall have a corrosion resistant coating conforming to the requirements of AASHTO M 254 for a Type A or Type B coating. One end of each dowel used in an expansion assembly shall be provided with an approved tight fitting non-collapsible expansion cap.
2. Tie Bars: Bars shall be billet or axle steel deformed bars and conform to AASHTO M 31 for Grade 40 or 60.

F. Curing Materials

1. White-Burlap-Polyethylene Sheet: AASHTO M 171, 0.004-inch thick white opaque polyethylene bonded to 10 oz./linear yard (40 inch) wide burlap.
2. Liquid Membrane-Forming Compound: AASHTO M 148, Class A, white pigmented, Type 2, Class B, free of paraffin or petroleum.

- G. Joint Fillers and Sealants: Provide as specified in TDOT Standard Specifications. New joints shall match existing alignment.

2.2 Concrete Pavement

A. Joint Layout Drawings

1. The contractor shall submit a joint layout plan shop drawing to the Engineer for approval. No work shall be allowed to start until the joint layout plan is approved. The joint layout plan shall indicate and describe in the detail the proposed jointing plan for contraction joints, expansion joints, and construction joints, in accordance with the following:
2. Indicate locations of contraction joints, construction joints, and expansion joints. Spacing between contraction joints shall not exceed 2.5 times the depth in feet of pavement thickness unless noted otherwise or approved by the Engineer.
3. The larger dimension of a panel shall not be greater than 125% of the smaller dimension.
4. The minimum angle between two intersecting joints shall be 80 degrees, unless noted otherwise or approved by the Engineer.
5. Joints shall intersect pavement-free edges at a 90-degree angle to the pavement edge and shall extend straight for a minimum of 1.5 feet from the pavement edge, where possible.
6. Align joints of adjacent panels.
7. Align joints in attached curbs with joints in pavement when possible. Ensure joint depth, widths, and dimensions are specified.
8. Minimum contraction joint depth shall be 1/4 of the pavement thickness. The minimum joint width shall be 1/8 inch.
9. Use expansion joints only where pavement abuts buildings, foundations, manholes, and other fixed objects.

2.3 Contractor-Furnished Mix Design

- A. Contractor-furnished mix design concrete shall be designed in accordance with TDOT requirements except as modified herein, and the mix design shall be as specified herein. The concrete shall have a minimum compressive strength of 3000 pounds

per square inch at 28 days. The concrete may be air entrained. If air entrainment is used the air content shall be between 2.5 and 6.0 percent. Maximum size aggregate for slip forming shall be 1.5 inches. The slump shall be 2 inches or less. For slip-formed pavement, at the start of the project, select a maximum allowable slump which will produce in-place pavement meeting the specified tolerances for control of edge slump.

Part 3 Execution

3.1 Forms

- A. Construction: Construct forms to be removable without damaging the concrete.
- B. Coating: Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bondbreaker before concrete is placed.
- C. Grade and Alignment: Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

3.2 Reinforcement

- A. Dowel Bars
 - 1. Install bars accurately aligned, vertically and horizontally, at indicated locations and to the dimensions and tolerances indicated. Before installation thoroughly grease the sliding portion of each dowel. Dowels must remain in position during concrete placement and curing.
- B. Tie Bars
 - 1. Install bars, accurately aligned horizontally and vertically, at indicated locations.
- C. Setting Slab Reinforcement
 - 1. Reinforcement shall be positioned on suitable chairs prior to concrete placement. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. The laps at splices shall be 12 inches minimum and the distances from ends and sides of slabs and joints shall be as indicated.

3.3 Measuring, Mixing, Conveying, and Placing Concrete

- A. Measuring: AASHTO M 157.

- B. Mixing: AASHTO M 157, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, place concrete within 60 minutes.
- C. Conveying: AASHTO M 157.
- D. Placing: Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 5 feet from the point of discharge. Deposit concrete either directly from the transporting equipment or by conveyor on to the pre-wetted subgrade or subbase, unless otherwise specified. Do not place concrete on frozen subgrade or subbase. Deposit the concrete between the forms to an approximately uniform height. Place concrete continuously at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.
- E. Vibration
 1. Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Engineer may be used to consolidate concrete in unreinforced pavement slabs less than 6 inches thick.
 2. Vibrating Equipment: Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount units on a frame that is capable of vertical movement and, when necessary, radial movement, so vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. Clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. Distance between end of vibrating tube and side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches from subbase, and top of vibrator a few mm inches below pavement surface. Vibrators may be pneumatic, gas driven, or electric, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. Amplitude of vibration shall be such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified.
- F. Cold Weather: Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 72 hours. When authorized, when concrete is likely to

be subjected to freezing within 72 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval of the Engineer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

- G. Hot Weather: If there is a possibility that ambient temperatures will be above 90 degrees F during the placement of the concrete, conduct operations in accordance with TDOT Standard Specifications.

3.4 Paving

- A. Underlying layer shall be preconditioned prior to placement of concrete in accordance with TDOT Standard Specifications.
- B. Pavement shall be constructed with paving and finishing equipment utilizing fixed forms.
- C. Consolidation: The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.
- D. Operation: When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of any debris, and placing rubber mats beneath the paver tracks. Transversely oscillating screeds and extrusion plates shall overlap the existing pavement the minimum possible, but in no case more than 8 inches.
- E. Required Results: The paver-finisher shall be operated to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. It shall produce only a very minimum of paste at the surface. Multiple passes of the paver-finisher shall not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.
- F. Fixed Form Paving: Forms shall be steel, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in

contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.

- G. Slip-form Paving: The slipform paver shall shape the concrete to the specified and indicated cross section in one pass and shall finish the surface and edges so that only a very minimum amount of hand finishing is required. Dowels shall not be installed by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete.
- H. Placing Reinforcing Steel: Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement.
- I. Placing Dowels and Tie Bars
 - 1. Dowels shall be installed with alignment not greater than 1/8 inch per ft. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 5/8 inch and a vertical tolerance of plus or minus 3/16 inch. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels in joints shall be omitted when the center of the dowel is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness.
 - 2. Contraction Joints: Dowels in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal basket assemblies. The dowels shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by means of suitable anchors.
 - 3. Construction Joints-Fixed Form Paving: Installation of dowels shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.
 - 4. Dowels Installed in Hardened Concrete: Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel.

5. Expansion Joints: Dowels in expansion joints shall be installed by the bonded-in-place method or by bonding into holes drilled in hardened concrete, using procedures specified above.

3.5 Finishing Concrete

- A. Start finishing operations immediately after placement and consolidation of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.
- B. Side Form Finishing: Strike off and screed concrete to the required slope and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Engineer. Elevation of concrete shall be such that, when consolidated and finished, pavement surface will be adequately consolidated and at the required grade. Equip finishing machine with two screeds which are readily and accurately adjustable for changes in pavement slope and compensation for wear and other causes. Make as many passes over each area of pavement and at such intervals as necessary to give proper compaction, retention of coarse aggregate near the finished surface, and a surface of uniform texture, true to grade and slope. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.
 1. Equipment Operation: Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screed for its entire length.
 2. Joint Finish: Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 1/4 inch. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.
- C. Hand Finishing: Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished, pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.
- D. Longitudinal Floating: After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.
- E. Texturing
 1. Burlap Drag Finish: Before concrete becomes non-plastic, finish the surface of the slab by dragging on the surface a strip of clean, wet burlap measuring from 3 to 10 feet long and 2 feet wider than the width of the pavement. Select

dimension of burlap drag so that at least 3 feet of the material is in contact with the pavement. Drag the surface so as to produce a finished surface with a fine granular or sandy texture without leaving disfiguring marks.

- F. Edging: At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.
- G. Repair of Surface Defects Follow guidance of ACI 301.

3.6 Curing and Protection

- A. Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use White-Burlap-Polyethylene Sheet or liquid membrane-forming compound, except as specified otherwise herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.
- B. White-Burlap-Polyethylene Sheet: Wet entire exposed surface thoroughly with a fine spray of water, saturate burlap but do not have excessive water dripping off the burlap and then cover concrete with White-Burlap-Polyethylene Sheet, burlap side down. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure burlap has not lost all moisture. If moisture evaporates, resaturate burlap and replace on pavement (re-saturation and re-placing shall take no longer than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for at least 7 days.
- C. Liquid Membrane-Forming Compound Curing: Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound continuously by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. Total coverage for the two coats shall be at least one gallon of undiluted compound per 100 square feet. Compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of compound immediately to areas where film is defective. Respray concrete surfaces that are subject to heavy rainfall within 3 hours after curing compound has been applied in the same manner.
- D. Protection of Treated Surfaces: Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24

hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.7 Field Quality Control

- A. Sampling: The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with AASHTO T 141 during each working day as required to perform tests specified herein. Make test specimens in accordance with AASHTO T 23.
- B. Consistency Tests: The Contractor's approved laboratory shall perform concrete slump tests in accordance with AASHTO T 119. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and for each batch (minimum) or every 50 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams and cylinders are made.
- C. Compressive Strength Tests: The Contractor's approved laboratory shall test for compressive strength in accordance with AASHTO T 22. Make four test specimens for each set of tests. Test two specimens at 7 days, and the other two at 28 days. Concrete strength will be considered satisfactory when the minimum of the 28-day test results equals or exceeds the specified 28-day compressive strength, and no individual strength test is less than 3000 pounds per square inch. Concrete which is determined to be defective, based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.
- D. Air Content Tests: Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with AASHTO T 152 on samples taken during placement of concrete in forms.
- E. Surface Testing
 - 1. Surface Smoothness Requirements: Surface smoothness shall be measured every 120 square feet. The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified when checked as below:
 - a. 1/4 inch longitudinal from a 16-foot straightedge.
 - b. 1/4 inch with a 10-foot straightedge when measured perpendicular to the centerline.
 - c. 3/8 inch in any 25-foot section from a taut string applied parallel to the surface.
 - 2. Plan Grade Testing and Conformance:
 - a. The surfaces shall vary not more than 1/2 inch in 100 feet from designated grade.

- b. The surfaces shall not vary by more than 0.20% from the required cross slope in any 10-foot distance.
- F. Test for Pavement Thickness: Full depth cores in accordance with AASHTO T 24 shall be taken a minimum of every 250 square feet to measure thickness.
- G. Reinforcement: Inspect reinforcement prior to installation to assure it is free of loose flaky rust, loose scale, oil, mud, or other objectionable material.
- H. Dowels: Inspect dowel placement prior to placing concrete to assure that dowels are of the size indicated, and are spaced, aligned and painted and oiled as specified. Dowels shall not deviate from vertical or horizontal alignment after concrete has been placed by more than 1/8 inch per foot.

END OF SECTION

Part 1 General

1.01 Scope

- A. The work covered by this Section consists of furnishing all labor, equipment, and material required to place topsoil, seed, commercial fertilizer, agricultural limestone, and mulch material, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or shown on the Drawings.

In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement, or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

- B. Related Work:

1. Section 312300 – Excavation and Fill

- C. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the ENGINEER.
- D. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.

Part 2 Products

2.01 Acceptable Manufacturers

- A. All materials shall conform to the requirements and standards of this Section.
- B. Wood-cellulose fiber mulch shall be manufactured by Weyerhaeuser Company or Conway Corporation.

2.02 Topsoil

- A. Utilizing designated stockpiles or borrow areas on site, the CONTRACTOR shall place a minimum of four inches (4") of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the ENGINEER prior to disturbance. Importing topsoil from offsite sources shall be at the discretion of the ENGINEER and shall be justification for additional compensation to the CONTRACTOR. A change order properly authorized by the OWNER shall be agreed upon prior to importing offsite topsoil. No additional compensation will be allowed for spreading of topsoil.
- B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than one-half inch (1/2") in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen, or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements, or vegetable debris undesirable or harmful to plant life.
- C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than five percent (5%) nor more than twenty percent (20%), by weight, of organic matter as determined by loss on ignition of oven-dried samples to sixty-five degrees Celsius (65° C).
- D. Topsoil shall possess the following characteristics, shall be subject to testing as described above, and shall be subject to the approval of the ENGINEER:

20-60% sand (.075-2mm)
0-50% silt (.002-.075mm)
0-30% clay (.001-.002mm)
96% passing no. 10 sieve

2.03 Seed

- A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the United States Department of Agriculture (USDA) Federal Seed Act.

- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.
- C. Seed shall bear the growers analysis testing to ninety-eight percent (98%) for purity and ninety percent (90%) for germination. At the discretion of the ENGINEER, samples of seed may be taken for verification against the grower's analysis.
- D. Species, rate of seeding, fertilization, and other requirements as described herein and/or shown on the Drawings.
- E. Furnish in standard containers with seed name, lot number, net weight, percentages of purity, germination, and hard seed and maximum weed seed content, clearly marked for each container of seed.
- F. Keep dry during storage.

2.04 Fertilizer and Liming Materials

- A. Fertilizer and liming materials shall comply with applicable state, local, and federal laws concerned with their production and use.
- B. Commercial fertilizer shall be uniform in composition, free-flowing, and suitable for application with equipment designed for that purpose. It shall contain a minimum percentage of plant food by weight, with a ready mixed material equivalent to the grade or grades specified in the Seeding Schedule as described herein and/or shown on the Drawings. Container bags shall have the name and address of the manufacturer, the brand name, net weight, and chemical composition. Top Dress Type shall be as recommended by local soil service and standard practice.
- C. Mix:
 - 1. Nitrogen: 10
 - 2. Phosphoric Acid: 10
 - 3. Potash: 10
- D. Application Rate: One-thousand Pounds per Acre (1,000 lbs/ac)
- E. Agricultural limestone shall be a pulverized dolamitic limestone having a calcium

carbonate content of not less than eighty-five percent (85%) by weight. Agricultural limestone shall be crushed so that at least eighty-five percent (85%) of the material will pass a No. 10 mesh screen and fifty percent (50%) will pass a No. 40 mesh screen.

2.05 Sod

Strongly rooted pads, capable of supporting own weight and retaining size and shape when suspended vertically from a firm grasp on upper ten percent (10%) of the pad.

- A. Grass Height: Normal.
- B. Strip Size: Supplier's standard.
- C. Soil Thickness: Uniform; One inch plus (+1") or minus one-fourth inch (-1/4") at time of cutting.
- D. Age: Not less than ten (10) months or more than thirty (30) months.
- E. Condition: Healthy, green, moist; free of diseases, nematodes and insects, and of undesirable grassy and broadleaf weeds. Yellow sod, or broken pads, or torn or uneven ends will not be accepted.

2.06 Mulch Material

- A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
- B. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
- C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops. It shall be free from (i) seed of noxious weeds or (ii) clean salt hay.
- D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops.

2.07 Mulch Binder

- A. Mulch on slopes exceeding three-to-one (3:1) ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the ENGINEER.

- B. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.08 Hydroseeding Mulch

- A. Wood Cellulose Fiber Mulch:
 - 1. Specially processed wood fiber containing no growth or germination inhibiting factors.
 - 2. Dyed a suitable color to facilitate inspection of material placement.
 - 3. Manufactured such that after addition and agitation in slurry tanks with water, the material fibers will become uniformly suspended to form homogenous slurry.
 - 4. When hydraulically sprayed on ground, material will allow absorption and percolation of moisture.

2.09 Netting

- A. Jute: Heavy-duty, twisted, weighing one pound per square yard (1 lb/yd²)
 - 1. Openings Between Strands: Approximately one square inch (1 in²).
- B. Plastic:
 - 1. Extruded Polypropylene: twenty (20) mils.
 - 2. Opening Between Strands: One inch by two inches (1" x 2").
- C. Matting: Excelsior mat or straw blanket; staples as recommended by matting manufacturer

2.10 Tackifier

Derived from natural organic plant sources containing no growth or germination-inhibiting materials.

- A. Capable of hydrating in water, and to readily blend with other slurry materials.
- B. Wood Cellulose Fiber: Add as tracer, at rate of one-hundred pounds per acre (150 lbs/ac).

2.11 Innoculants for Legumes

All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.12 Water

Water shall be clean, clear water, free from any objectionable or harmful chemical qualities or organisms, and shall be furnished by the CONTRACTOR.

Part 3 Execution

3.01 Sodding

- A. Do not plant dormant sod, or when ground is frozen.
- B. Lay sod to form solid mass with tightly fitted joints, butt ends and sides. Do not overlap.
 - 1. Stagger strips to offset joints in adjacent courses.
 - 2. Work from boards to avoid damage to subgrade or sod.
 - 3. Tamp or roll lightly to ensure contact with subgrade; work sifted soil into minor cracks between pieces of sod, remove excess to avoid smothering adjacent grass.
 - 4. Complete sod surface true to finished grade, even, and firm.
- C. Fasten sod on slopes to prevent slippage with wooden pins six inches (6") long driven through sod into subgrade, until flush with top of sod. Install at sufficiently close intervals to securely hold sod.

- D. Water sod with fine spray immediately after planting. During first week, water daily or more frequently to maintain moist soil to depth of four inches (4”).
- E. Apply top dress fertilizer at rate of one pound per one-thousand square feet (1 lb/1,000 ft²).

3.02 Stripping Topsoil

- A. Strip any available topsoil to its full depth at all areas to be regarded, resurfaced, or paved within contract limit work area.
- B. Stockpile topsoil in a location acceptable to the OWNER, for use in finish grading.
 - 1. Stockpiled topsoil shall be free from trash, brush, stones over three inches (3”) diameter, and other extraneous matter.
 - 2. Grade and slope stockpiles for proper drainage and to prevent erosion.
 - 3. **No topsoil shall be removed from the site.** It is the property of the OWNER.
- C. Protect all areas which are not to be resurfaced or regraded, and adjacent areas outside of the contract limits from damage due to site preparation.
- D. Unless otherwise specified, topsoil, and other unsuitable materials at the site and at a minimum distance of five feet (5’) beyond the surfaced area, shall be removed in such a manner to minimize disturbance of the remaining subgrade soils, and to facilitate placement of embankment materials and/or base course materials.

3.08 Securing and Placing Topsoil

- A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the ENGINEER.
- B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications. On-site sources of topsoil shall be approved by the ENGINEER prior to disturbance. In securing topsoil from a designated pit, or

elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the ENGINEER, the pit shall be abandoned.

- C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of subgrades.
- D. Remove stones, roots, weeds, and debris while spreading topsoil materials. Rake surface clean of stones one inch (1") or larger in any dimension and all debris.
- E. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue, and any other refuse which will hinder or prevent growth.
- F. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the ENGINEER, the pit shall be abandoned.
- G. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the ENGINEER.
- H. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.09 Seedbed Preparation

- A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than three inches (3") in any dimension shall be removed from the soil.
- B. Not earlier than twenty-four (24) hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than four inches (4") with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth and in a condition acceptable to the ENGINEER.
- C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the ENGINEER.

3.10 Fertilization and Liming

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates as described herein and/or shown on the Drawings.
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of one inch (1”).
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than thirty (30) minutes when a hydraulic seeder is used.
- D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown in the Seeding Schedule as described herein and/or shown on the Drawings. The specified rate of application of limestone may be reduced by the ENGINEER if pH tests indicate this to be desirable. It is the responsibility of the CONTRACTOR to obtain such tests and submit the results to the ENGINEER for adjustment in rates.
- E. It is the responsibility of the CONTRACTOR to make one application of a maintenance fertilizer according to the recommendations listed in the Seeding Schedule shown in these Specifications.

3.11 Seeding

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates as described herein and/or shown on the Drawings unless otherwise approved by the ENGINEER. Seed mixtures may be sown together, provided they are kept in a thoroughly mixed condition during the seeding operation.
- B. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power drawn seed drills.

Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained.

Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of one-eighth inch (1/8") to three-eighth inch (3/8") by a cultipacker or suitable roller.
- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.
- E. Schedule – (See end of Section)

3.12 Mulching

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied evenly so as to permit sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture. Approximately forty-five percent (45%) of the ground shall be visible through the mulch blanket.
- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:
 - 1. Wood Cellulose Fiber: One-thousand pounds/acre (1,000 lbs/ac)
 - 2. Straw: Four-thousand pounds/acre (4,000 lbs/ac)
 - 3. Stalks: Four-thousand pounds/acre (4,000 lbs/ac)
 - 4. These rates may be adjusted at the discretion of the ENGINEER at no additional cost to the OWNER, depending on the texture and condition of the mulch material and the characteristics of the seeded area.
- C. Mulch on slopes greater than three-to-one (3:1) ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the

mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of five gallons per one-thousand square feet (5 gal/1,000 ft²) as required to hold the mulch in place.

- D. The CONTRACTOR shall cover structures, poles, fences, and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the ENGINEER.

3.13 Watering

- A. The CONTRACTOR shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank truck, or sprinklers in such a way to prevent erosion, excessive runoff, and over-watered spots.

3.15 Maintenance

- A. Upon completion of seeding operations, the CONTRACTOR shall clear the area of all equipment, debris, and excess material and the premises shall be left in a neat and orderly condition.
- B. The CONTRACTOR shall maintain all seeded areas without additional payment until final acceptance of the work by the OWNER, and any regrading, refertilizing, reliming, reseeding, or remulching shall be done at CONTRACTOR's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gulleys, washouts, or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at CONTRACTOR's expense.

END OF SECTION

SEEDING REQUIREMENTS TABLE

General Seeding Areas:	SOWING SEASON	SPECIES	RATES PER 1,000 SQUARE FEET			
			Seed (lbs)	Fertilizer	Pelletized Lime (lbs)	Maintenance **
Flat to rolling terrain <i>(With slopes less than 3:1)</i>	3/1 to 6/1	Kentucky 31 Fescue	4	30 lbs.	20	15 lbs.
		Ladino White Clover*	1/4	18-24-12		10-10-10
		Annual Ryegrass	2			
	8/1 to 11/1	Kentucky 31 Fescue	4	30 lbs.	20	15 lbs.
		Ladino White Clover*	1/4	6-12-12		10-10-10
		Annual Ryegrass	2			
Embankments <i>(Slopes greater than 3:1)</i>	1/1 to 6/1	Crownvetch*	1	30 lbs.	20	10 lbs.
		Kentucky 31 Fescue	2	18-24-12		0-20-20
		Weeping Lovegrass	1/4			
	8/1 to 11/1	Crownvetch*	1	30 lbs.	20	10 lbs.
		Kentucky 31 Fescue	2	6-12-12		0-20-20
		Annual Ryegrass	2			
Turf Seeding Areas:	1/1 to 6/1	Team-Mates***	7	4 lbs.	20	20 lbs.
		(or approved equal)		18-24-12		

* Requires inoculation.

** Maintenance fertilizer shall be applied in early spring following initial establishment of cover.

*** Team-Mates is a blend of Stetson, Bravo, Lancer, and All-Sport fescues, with an additional 20% perennial rye.

Part 1 General

1.01 Scope of Work

The work included in this Section consists of furnishing and installing bored and jacked pipeline casings, and installation of pipelines within the casings, through whatever material is encountered where cased pipelines are required.

1.02 Method of Construction

- A. All roadway crossings must conform to the requirements of the state or local Department of Transportation having jurisdiction in the project area.
- B. All railroad crossings shall conform to the requirements of the American Railway Engineering Association Manual for Railway Engineering, Part 5. The Contractor shall secure permission from the railroads to schedule the work so as not to interfere with the operation of the railroads. The Contractor shall be held responsible for any delays or damages occurring to the railroads. The Contractor will furnish the railroad with such additional insurance as may be required, cost of same to be included in the Contract Price, together with the costs for flagmen, watchmen, temporary work of any nature, safety devices and any other items that may be imposed by the railroad.
- C. Any change in the construction method during the work or increase in length of bore beyond that specified due to a selected construction method shall not result in additional payments to the Contractor.
- D. No payment will be made for incomplete or unacceptable casings and no extra payment will be made for realignment of casings.

1.03 Submittals

If requested, submit casing pipe manufacturer's certification stating the casing complies with the requirements of this Specification and submit product data for casing carrier spacers.

1.04 Job Conditions

- A. Protect and preserve benchmarks, monuments, and reference points provided.
- B. Conduct all work on Tennessee DOT right-of-way in strict conformance to Tennessee DOT rules and regulations. Coordinate and schedule the work with the local County DOT and/or Tennessee DOT, as appropriate. Provide traffic protection as required by the governing authority.

- C. Protect existing underground and overhead utility pipes, poles, lines, services, structures, etc., from damage or interruption of service by the conduct of construction operations. Location and protection of all underground utilities and structures in the path of construction is the responsibility of the Contractor.

Part 2 Products

2.01 Casing Pipe

- A. Casing pipe shall be welded steel, smooth wall pipe conforming to ASTM A139, except that the hydrostatic test is not required. The casing shall be fully coated on the exterior with a coal tar epoxy. Field connections between sections of pipe shall be continuous circumferential welded joints.
- B. The diameter of the casing pipe shall be as indicated on the Drawings. The wall thickness of the casing pipe shall be as follows:

<u>Nominal Diameter (inches) Wall Thickness (inches)</u>	
Under 14	0.188
14	0.219
16	0.219
18	0.250
20	0.281
22	0.312
24	0.344
26	0.375
28	0.406
30	0.406
32	0.438
34	0.469
36	0.469
42	0.500
48	0.625
54	0.700

2.02 Carrier Pipe

- A. The product transporting pipeline that is inserted through the casing pipe is referred to hereinafter as "carrier pipe". The pipe size, material and application (water supply, gravity sewer, sewage force main) shall be as indicated on the drawings.
- B. For installations involving water lines or sewage force mains, blocking or skids shall be placed under the carrier pipe prior to inserting pipe into the casing, as a minimum.

Skids shall be formed with pressure treated lumber and be attached to the pipe with metal bands. Skid spacing shall not exceed ten feet on center.

- C. For installations involving gravity sewer lines, manufactured casing spacers shall be used to maintain proper line and grade of the carrier pipe. Spacer spacing shall not exceed ten feet on center. Spacers shall be equal to Model 4810 stainless steel Casing Chocks as manufactured by Power Seal.

Part 3 Execution

3.01 Clearing

Clearing shall be done as required for completion of the work within the limits indicated in the CONTRACT Documents

3.02 Protection of Utilities

Locate and protect all existing overhead and underground utilities.

3.03 Excavation

Excavate suitable pits or trenches. Provide suitable sheeting and bracing where necessary. Keep the work dewatered at all times per Section 312300.

3.04 Alignment and Grade

Install casing pipe at the location and grade shown on the Drawings. Variation in the final position of the pipe from the line and grade shown on the Drawings will be permitted only if approved by the Owner. The Contractor shall be responsible for all costs of realignment, which result from unacceptable casings.

3.05 Installation of Casing Pipe

The diameter of the bored excavation shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation and which are to the work, shall be pressure grouted with an approved mix.

3.06 Installation of Carrier Pipe

- A. Install carrier pipe in casing utilizing adequate blocking, bracing and skids or casing spacers per the manufacturer's recommendations.
- B. When indicated in the Contract Documents, the annular space between the casing pipe and the carrier pipe shall be completely filled with an approved grout mix. Proper

precautions shall be taken to prevent floating and misalignment of the carrier pipe during grouting operations.

- C. Seal casing ends against entrance of foreign material by means of casing seals, grout, brick and mortar or steel plate.
- D. Backfilling: Backfill pits and trenches immediately after installation of the casing pipe and carrier pipe and approval by the Owner. Compaction of backfill shall follow appropriate provisions of Section 312000.

END OF SECTION

Part 1 General

1.1 Work Included

- A. Construction of gravity sanitary utility piping, including piping, manholes, and appurtenances
- B. Testing and inspection

1.2 Submittals

- A. Submit under provisions of Section 013000 – Administrative Requirements
- B. Shop Drawings
 - 1. Detailed pipe drawings showing pipe details, special fittings and bends, dimensions, coatings, and other pertinent information
- C. Product Data
 - 1. Pipe data, including pressure class, wall thickness, reinforcing, and strength calculations.
 - 2. Manufacturer's data for couplings, saddles, gaskets and other pipe accessories.

1.3 Quality Assurance

- A. Installer Qualifications: Install specified materials by a licensed underground utility Contractor licensed for such work in the state where the work is to be performed. Installing Contractor's License shall be current and be state certified or state registered.
- B. For ductile iron pipe, furnish a certificate from the pipe manufacturer indicating that the pipe meets all applicable requirements of these specifications.
- C. Drawings
 - 1. Submit Installation Drawings showing complete detail, both plan and side view details with proper layout and elevations.
 - 2. Submit As-Built Drawings for the complete sanitary sewer system showing complete detail with all dimensions, both above and below grade, including invert elevation.

1.4 Delivery, Storage, and Handling

- A. Delivery and Storage

1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
 2. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Handling: Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

Part 2 Products

2.1 Pipe

A. Ductile Iron

1. Ductile Iron Pipe shall be Pressure Class 250 with a minimum wall thickness of 0.31 inches. Ductile Iron Pipe shall be designed in accordance with ANSI A21.50, Thickness Design of Ductile Iron Pipe, using 60,000 psi tensile strength, 42,000 psi yield strength, and 10 percent elongation. Pipe and fittings shall be lined with Protecto 401, Tnemec Series 431, or Engineered-approved equal. The outside coating shall be manufacturer's standard asphaltic coating.
2. Fittings shall conform to AWWA C110/A21.10 or AWWA C153/A21.53. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved by the Engineer, for push-on joint. Fittings shall have strength at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the joints specified hereinafter. Pipe and fittings shall have cement-mortar lining conforming to AWWA C104/A21.4, standard thickness.
 - a. The length of each individual piece of ductile iron pipe shipped must be plainly marked on the piece of pipe.
3. Ductile Iron Gravity Joints and Jointing Materials: Pipe and fittings shall have push-on joints or mechanical joints, except as otherwise specified in this paragraph. Mechanical joints only shall be used where indicated. Push-on joint pipe ends and fitting ends, gaskets, and lubricant for joint assembly shall conform to AWWA C111/A21.11. Mechanical joint requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111/A21.11.
4. The pipe manufacturer is to furnish the Engineer a certificate of inspection, sworn to by the factory inspector in the presence of a notary public, stating that the pieces of pipe in the shipment were made and tested in accordance with ASTM A746. Each statement is to give the number of pieces of pipe in the shipment, the length of each piece of pipe, and the serial number of each piece of pipe making up the shipment. In addition, the weight of each individual piece of pipe making up the shipment is to be listed opposite the serial number of each pipe length and attached to the certificate of inspection.

2.2 Compression Couplings

- A. When dissimilar pipe materials like PVC and concrete pipe are joined, use compression couplings that are resistant to the corrosive action of soils and sewage and that will provide a permanent watertight joint. The compression couplings shall be of natural or synthetic rubber or rubber-like material and shall comply with the requirements and test methods specified in Table 2 of ASTM C425. The coupling shall meet the leak requirements specified in ASTM C425, and the bands for attaching the couplings to the dissimilar pipes shall be of stainless steel meeting ASTM A167 or A240. Each coupling shall bear the manufacturer's identifying mark and an indication of its size.

Part 3 Execution

3.1 Protection

- A. Carefully protect from damage all existing sewers, water lines, gas lines, sidewalks, curbs, gutters, pavements, electrical lines, and other utilities or structure in the vicinity of the work at all times. If it is necessary to repair, remove, and/or replace any such utility or structure in order to complete the work properly, do so in compliance with the provisions set forth in other sections of these specifications. Any such work shall be considered incidental to the construction of pipe sewers, and no additional payment will be allowed therefore.
- B. Water service connections that are damaged shall be repaired or replaced by the Contractor, in accordance with the Owner's Specifications.
- C. Service or house connections to existing sewers that are damaged or removed shall be repaired or replaced by the Contractor, in accordance with the Owner's Specifications.

3.2 Pipe Separation

- A. Lay sewers at least 10 feet horizontally from any existing or proposed water main. If this is not practical, the sewer may be laid closer than 10 feet to a water main provided it is laid in a separate trench and the elevation of the top of the sewer is at least 18 inches below the bottom of the water main.
- B. Where a sewer crosses under water mains, the top of the sewer shall be at least 18 inches below the bottom of the water main. If the elevation of the sewer cannot be varied to meet the above requirements, relocate the water main to provide this separation, or else reconstruct it with mechanical joint ductile iron pipe for a distance of 10 feet on each side of the sewer with a full joint of the water main centered over the sewer.
- C. If it is impossible to obtain proper horizontal and vertical separation as stipulated above, construct both the water main and the sewer of mechanical joint ductile iron pipe, and pressure test each.

3.3 Pipe Laying

- A. Lay no pipe except in the presence of Engineer or project representative representing the Owner.
- B. Before placing sewer pipe in position in the trench, carefully prepare the bottom and sides of the trench, and install any necessary bracing and sheeting or trench boxes as provided in Section 31 23 33 – Trenching and Backfilling.
- C. Wherever necessary to provide satisfactory bearing surface, place concrete cradles as shown on the Drawings. Cradles shall be of concrete and conform to the dimensions shown on the Drawings. Concrete placed outside the dimensions shown shall be at the Contractor's expense.
- D. Lasers shall be used to set line and grade, after the type and procedures are approved by the Engineer. Set reference points for both line and grade at each manhole. Where grades are 0.6 percent or less, check the elevation of the beam each 100 feet with an offset point or engineer's level.
- E. Do not allow water to run or stand in the trench while pipe laying is in progress or before the trench has been backfilled. Do not at any time open up more trench than the available pumping facilities are able to dewater.
- F. Correct trench bottoms found to be unsuitable for foundations after pipe laying operations have started, bringing them to exact line and grade with compacted earth or stone as necessary.
- G. Special Requirements:
 - 1. Installation of PVC Plastic Piping: Install pipe and fittings in accordance with this section and with the requirements of ASTM D2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
- H. Carefully inspect each piece of pipe and special fitting before it is placed, and lay no defective pipe in the trench. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells upgrade. When pipe laying is not in progress, keep the ends of the pipe tightly closed with an approved temporary plug.
- I. Bell holes shall be large enough to allow ample room for the pipe joints to be properly made. Cut out the bell holes no more than 2 joints ahead of the pipe laying. Carefully grade the bottom of the trench between bell holes so that each pipe barrel rests on a solid foundation for its entire length. Lay each pipe joint so as to form a close concentric joint with adjoining pipe and to avoid sudden offsets or inequalities in the flow line.

- J. As the work progresses, thoroughly clean the interior of the pipe in place. After each line of pipe has been laid, carefully inspect it, and remove all earth, trash, rags, and other foreign matter from its interior.
- K. After the joints have been completed, they shall be inspected, tested, and accepted by the Owner's Representative before being covered. The pipe shall meet the test requirements for watertightness; immediately repair any leak or defect discovered at any time after completion of the work. Any pipe that has been disturbed after joints were formed shall be taken up, the joints cleaned and remade, and the pipe relaid at the Contractor' expense. Carefully protect all pipe in place from damage until backfilling operations are completed.
- L. Do not begin the backfilling of trenches until the pipe in place has been reviewed and approved by the Owner's Representative.
- M. Make connections to all existing active sewer lines as shown on the Drawings. Make connections either by removing a section of the sewer from the existing line and inserting a wye or tee branch of the proper size or by constructing a manhole, junction box, regulator chamber, or other structure as shown on the Drawings.
- N. Make connections to existing manholes or inlets by cutting a hole in the wall of the existing structure, inserting a length of sewer pipe into the hole, filling around the pipe with concrete or mortar, and troweling the inside and outside surfaces of the joint to a neat finish. Shape or reshape the bottom of the manholes as necessary to fit the invert of the sewer pipe.
- O. Joint dissimilar pipe by using suitable compression couplings. If compression couplings are not available, make jointing with a special fabricated coupling approved by the Owner.
- P. Provide concrete protection or concrete cap as for pipe sewers that, when completed, have less than 2.5 feet of covering in nontraffic areas and 4 feet of cover in traffic areas.
- Q. Existing water service connections which are damaged by the Contractor will be repaired or replaced at his expense as an incidental part of the work.
- R. Existing service or house connections to existing sewers that are damaged or removed shall be repaired or replaced by the Contractor at his own expense as an incidental part of the work.

3.4 Concrete Work

- A. Cast-in-place concrete is included in Section 033000 – Cast In Place Concrete. The pipe shall be supported on a concrete cradle, or encased in concrete where indicated on the drawings or directed by the Engineer.

3.5 Manhole Construction – General

- A. Dewater sufficiently to maintain the ground water level at or below the bottom of the manhole foundation prior to and during placement of the foundation.

- B. Obtain an adequate foundation for all manhole structures by removing and replacing unsuitable material with well graded granular material, by tightening with coarse rock, or by such other means as provided for foundation preparation of the connected sewers or as directed by the Engineer. Wherever water is encountered at the site, place all cast-in-place bases on a one-piece waterproof membrane to prevent any movement of water into the fresh concrete.
- C. Carefully set the cast iron frame and cover at the required elevation, and properly bond it to the masonry with preformed plastic gasket or cement grout. Wherever manholes are constructed in paved areas, tilt the top surface of the frame and cover so as to conform to the exact slope, crown, and grade of the existing adjacent pavement. Wherever manholes are constructed in new subdivision streets, set the top surface of the frame and cover so as to conform to the exact slope, crown, and grade of the proposed finished surface.
- D. Where the difference in the invert elevation of two or more sewers intersecting in one manhole is 24 inches or more, construct a drop manhole. Drop manholes shall be similar in construction to standard manholes except that a drop connection of pipe and fittings of the proper sizes and materials shall be constructed outside the manhole and supported by 4,000 psi concrete as indicated by the Standard Drawing 110.

3.6 Concrete/precast Manhole Construction

- A. Construct base slab of cast-in-place concrete or use precast concrete base sections. For cast-in-place manhole bases, carefully block the lower barrel section above the prepared surface so that it is fully and uniformly supported in true alignment; make sure that all entering pipe can be inserted at proper grade. Then place the concrete foundation and invert under and upon this base section as shown in the standard drawings. For monolithic manhole bases, carefully level the base stone and place the base section on this prepared base so it is fully and uniformly supported in true alignment and elevation.
- B. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit.
- C. No parging will be permitted on interior manhole walls.
- D. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required for precast concrete manholes.
- E. Cast-in-place concrete work shall be in accordance with the requirements specified under paragraph entitled "Concrete Work" of this section.
- F. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer.

- G. Thoroughly wet and then completely fill all lift holes with mortar. Trim all protruding mastic between precast elements and between the manhole casting and the manhole riser on the inside of the manhole and smooth over these joints with mortar.
- H. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.
- I. Place backfill by hand around the manhole and to a distance of at least one pipe length into each trench, and tamp the downstream side with clean 1/2 inch to 3/4 inch crushed stone up to an elevation of 12 inches above the crown on all entering pipes. Continue backfilling in accordance with the requirements for trench backfilling.

3.7 Field Quality Control – Sewer Lines

- A. Before constructing or placing any joints, demonstrate to the Owner's Representative, by completing at least 1 sample joint, that the methods to be used conform to the specifications and will provide a watertight joint and further that the workmen to be involved in this phase of work are thoroughly familiar with experienced with the type of joint proposed.
- B. No other type of joint may be used unless authorized in writing by the Owner.
- C. Testing Of Gravity Sewers
 - 1. Visual Tests
 - a. Upon completion of the construction or earlier if the Owner's Representative deems advisable, the Owner's Representative will make a visual inspection of the sewer and construction site. Immediately repair all leaks and defects found by such inspection.
 - b. In addition to general cleanup and leakage, the following standard shall be used to determine failure or defects of this project. Sewers shall be built so as to remain true to line and grade. The inclining grade of the bottom of the sewer after completion shall be such that no remaining puddle of water is deeper than 1/2 inch on pipe 36 inches internal diameter or smaller and 3/4 inch on pipe larger than 36 inches internal diameter. Any section of pipe that does not comply with the specifications at any time previous to final acceptance of the work shall be replaced or relaid at the Contractor's expense.
 - c. The Contractor will be held strictly responsible that all parts of the work bear the load of the backfill. If defects develop in the pipe within 1 year from the date of final acceptance of the work, the Contractor will be required to replace, at his expense, all such cracked pipe. To this end, the Contractor is advised to purchase pipe under a guarantee from the manufacturer, guaranteeing proper service of sewer pipe under

- conditions established by the Drawings, specifications, and local conditioning at the site of the work.
2. Leakage Tests: Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.
 - a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C969. Make calculations in accordance with the Appendix to ASTM C969.
 - b. Low pressure air tests: Perform low pressure air testing as follows:
 - 1) Furnish all equipment, facilities, and personnel necessary to conduct the test. The test shall be observed by a representative of the Owner.
 - 2) Perform the first series of air tests after 2,000 LF but before 4,000 LF of sewer has been laid. The purpose of this first series of tests is to assure both the Contractor and the Owner that the materials and method of installation meet the intent of these specifications. Conduct the remainder of the tests after approximately each 10,000 LF has been laid.
 - 3) Plug all tees and ends of sewer services with flexible joint plugs or caps securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
 - 4) Prior to testing, check the pipe to see that it is clean. If not, clean it by passing a full-gauge squeegee through the pipe. It shall be the Contractor's responsibility to have the pipe cleaned.
 - 5) PVC plastic pipelines. Test in accordance with UBPPA Uni-B-6. Allowable pressure drop shall be as given in UBPPA Uni-B-6. Make calculations in accordance with the Appendix to UBPPA Uni-B-6.
 - c. ¹Water for testing shall be obtained from the fire hydrant depicted in Exhibit A and the water supply shall be protected as described in Section 01 35 00 – Unique Requirements. The cost of water for testing shall be borne by the Owner.
 3. Deflection Testing: Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including

leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads determined in accordance with ASTM D2412. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of the pipe. Determine whether the allowable deflection has been exceeded by the use of a pull-through device or a deflection measuring device.

- a. Pull-through device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a design promulgated by the Uni-Bell Plastic Pipe Association, provided the device meets the applicable requirements specified in this paragraph, including those for diameter of the device, and that the mandrel has a minimum of 9 arms. Ball, cylinder, or circular sections shall conform to the following:
 - 1) A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
 - 2) Homogeneous material throughout, shall have a density greater than 1.0 as related to water at 40 degrees F, and shall have a surface Brinell hardness of not less than 150.
 - 3) Center bored and through-bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of not less than 70,000 psi, with eyes or loops at each end for attaching pulling cables.
 - 4) Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.
- b. Deflection measuring device: Sensitive to 1.0 percent of the diameter of the pipe being tested and shall be accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved prior to use.
- c. Pull-through device procedure: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions.
- d. Deflection measuring device procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, replace pipe which has excessive deflection and completely retest in same manner and under same conditions.

- D. Visual Inspection Of Miscellaneous Materials: All material used on this project are subject to visual inspection by the Owner’s Representative at the site for conformance to the required specifications. When reasonable doubt exists that said material meets the specifications, the Owner’s Representative may require certified mill tests, samples, and/or tests by an independent laboratory or other suitable form of verification that the material meets the required specifications.
- E. Field Tests for Concrete: Field testing requirements are covered in Section 03 30 00 Cast-In-Place Concrete.

3.8 Field Quality Control - Manholes

- A. All manholes are to be vacuum tested immediately after assembly or construction and before backfilling. No standing water shall be allowed in the manhole excavation which may affect the accuracy of the test.
- B. All pipe and other openings into the manhole shall be suitably plugged in such a manner as to prevent displacement of the plugs while the vacuum is pulled. Service lines at manholes may be vacuum tested in lieu of air testing at the option of the Contractor.
- C. The Contractor is required to furnish all equipment necessary for these tests including the manhole sealing apparatus, gauges, pump plugs, and personnel shall be in accordance with equipment specifications and instructions provided by the manufacturer.
- D. The test head shall be placed in the cone section of the manhole.
- E. A vacuum of 10 inches of mercury shall be drawn. The time for the vacuum to drop to 9 inches of mercury shall be recorded.
- F. Acceptance for 4 foot diameter manholes shall be defined as when the time to drop to 9 inches of mercury meets or exceeds the following:

Manhole Depth	Diameter	Time to Drop 1” HG
1. 10 ft. or less	4 ft.	75 seconds
2. 10 ft. to 15 ft.	4 ft.	90 seconds
3. 15 ft. to 25 ft.	2 ft.	105 seconds
- G. For manholes 5 foot in diameter, add an additional 15 seconds and for manholes 6 foot in diameter, add an additional 30 seconds to the time requirements for 4 foot diameter manholes.
- H. If the manhole fails the test, necessary repairs shall be made and the vacuum test repeated until the manhole passes the test.
- I. If the manhole joint mastic is displaced enough to leave a void between the sections during the vacuum test, the manhole shall be disassembled and the seal replaced.

- J. A second vacuum test will be required after the manhole casting has been set and the binder placed around it.
- K. Regardless of the outcome of the vacuum tests, any visual or audio defects are to be repaired.

3.9 Cleanup

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

END OF SECTION

Part 1 General

1.01 Scope

- A. This Section describes products to be incorporated into sewers and accessories, and requirements for installation and use of these items. The work covered by this section includes furnishing all labor, equipment, and materials required to furnish, install, and test polyvinyl chloride (PVC) and ductile iron pressure pipe, including all fittings, valves, unions, couplings, adapters, and accessories, as specified herein and/or shown on the Drawings, and to furnish all products and perform labor necessary to fulfill the requirements of these Specifications.

Additionally, the work covered by this Section includes furnishing all labor, equipment, and materials required to install cast-in-place, and/or precast concrete manholes, and concrete junction chambers as described herein and/or shown on the Drawings.

- B. Related Work:
1. Section 013000 – Administrative Requirements
 2. Section 017836 – Warranties
 3. Section 032000 – Concrete Reinforcing
 4. Section 033000 – Cast-in-Place Concrete
 5. Section 312300 – Excavation and Fill
- C. The work performed under this Section of the Specifications is deemed to be Specialty Contractor Work and is subject to the provisions of the General Conditions.
- D. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 Qualifications

If requested by the ENGINEER, submit evidence that all manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two (2) years.

1.03 Submittals

- A. Complete shop drawings, product data, and engineering data shall be submitted to the ENGINEER in accordance with the requirements of Section 013000 – Administrative Requirements of these Specifications.

- B. Shop drawings shall indicate piping layout in plan and elevations as may be required and shall be completely dimensioned. The Drawings shall include a complete schedule of all pipe, fittings, specials, hangers, and supports. Special castings shall be clearly detailed showing all pertinent dimensions.
- C. The CONTRACTOR shall furnish the ENGINEER with lists, in duplicate, of all pieces of pipe and fittings in each shipment received. These lists shall give the serial or mark number, weight, class, size, and description of each item received.
- D. If required, Operating and Maintenance (O&M) data for all equipment shall be furnished in accordance with Section 01730 of these Specifications.

1.04 Transportation and Handling

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing, and storing pipe, fittings, valves, and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.
- B. Handling: Handle pipe, fittings, valves, and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.
- C. Lined pipe shall be handled and transported to prevent damage to linings.

1.05 Storage and Protection

- A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas. The CONTRACTOR shall be responsible for maintenance and protection of all equipment, materials, and products placed in storage and shall bear all costs of storage, preparation for transportation, rehandling, and preparation for installation.
- B. The CONTRACTOR shall be responsible for providing satisfactory storage facilities which are acceptable to the ENGINEER. In the event that satisfactory facilities cannot be provided on site, a satisfactory warehouse, acceptable to the ENGINEER, will be provided by the CONTRACTOR for such time until the equipment, materials, and products can be accommodated at the site.
- C. Stored materials shall be kept safe from damage. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times.
- D. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. Pipes shall be blocked and braced in order to prevent contact with each other and to prevent movement. There shall be no contact between the pipe in adjacent tiers. All pipe and accessories shall be stored aboveground and fully supported so as not to bend or deflect excessively under its own weight.
- E. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not

come in contact with petroleum products. Gaskets shall be used on a first in, first out basis.

- F. PVC pipe and fittings shall be stored under black plastic cover.

1.06 Quality Assurance

- A. Prior to delivery all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory or, if approved by the ENGINEER, certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable. All materials which fail to conform to these specifications shall be rejected.
- B. Product manufacturers shall provide the ENGINEER with written certification that all products furnished comply with all applicable provisions of these Specifications. All materials which fail to conform to these Specifications shall be rejected. Certified copies of independent laboratory test results or mill test results from the pipe supplier may be considered evidence of compliance provided such tests are performed in accordance with the appropriate ASTM or AWWA testing standards by experienced, competent personnel. In case of doubt as to the accuracy or adequacy of mill tests, the ENGINEER may require that the CONTRACTOR furnish test reports from an independent testing laboratory on samples of pipe materials
- C. If ordered by the ENGINEER, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five (5) days during initial pipe installation.
- D. After delivery to the site, any materials which have been damaged in transit or are unsuitable for use on the work shall be rejected and removed from site.
- E. The supplier must provide and deliver pipe manufactured by one (1) company per project/job only. The mixing of different pipe manufacturers is not acceptable.

1.07 Guarantee

Provide a guarantee against defective materials and workmanship in accordance with the requirements of Section 017836 – Warranties of these Specifications.

Part 2 Products

2.01 Material

- A. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- B. The manufacturer shall provide waterstops, acceptable to the Engineer, which shall be applied to the outside of the plastic pipe when the pipe is to be enclosed in any structure where concrete or mortar is used which will prevent leakage along the outer wall of the barrel of the pipe.

- C. No single piece of pipe shall be laid on any project covered by this specification unless it is found to be generally straight. Such pipe shall have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/16 inch per foot of length. If the deviation from straightness exceeds this requirement, then the particular piece of pipe shall be rejected for use until it can comply with this provision.

2.02 Pipe

A. Ductile Iron Piping

- 1. Ductile Iron Pipe shall be Pressure Class 250 with a minimum wall thickness of 0.31 inches. Ductile Iron Pipe shall be designed in accordance with ANSI A21.50, Thickness Design of Ductile Iron Pipe, using 60,000 psi tensile strength, 42,000 psi yield strength, and 10 percent elongation. Pipe and fittings shall be lined with Protecto 401, Tnemec Series 431, or Engineered-approved equal. The outside coating shall be manufacturer's standard asphaltic coating.
- 2. Fittings for Ductile iron pipe: Ductile iron, mechanical joint ANSI A21.10/AWWA C110, standard body, lined with the same material as pipe.
- 3. Joints: Joints for pipe and fittings shall be push-on joints unless otherwise indicated
- 4. Restrained Fitting Joints (where indicated on the drawings): Mechanical Joints with Ebaa Iron Megalug Series 1100 joint restraints, or approve equal.
- 5. Restrained Pipe Joints (where indicated on the drawings): push-on joints with American Ductile Iron Pipe Fast-Grip gaskets, Flex Ring, Lok-Ring, or approved equal.
- 6. Manufacturers:
 - a. Ductile Iron Pipe
 - i. American Cast Iron Pipe Company
 - ii. McWane Ductile
 - iii. U. S. Pipe and Foundry Company
 - b. Push-On Single Gasket Joints
 - i. "Fastite" by American Cast Iron Pipe Company
 - ii. "Tyton" by U. S. Pipe and Foundry Company
 - c. Ductile Iron Fittings, mechanical joint
 - i. American Cast Iron Pipe Company

ii. Tyler Union

iii. U. S. Pipe and Foundry Company

B. Polyethylene (PE) Plastic Piping

1. HDPE DIPS DR-11 pipe required.
2. Pipe, tubing, and heat-fusion fittings shall conform to AWWA C906. High Density Polyethylene Pipe (HDPE) and fittings shall be made of high density extra high molecular weight (EHMW) polyethylene with a standard thermoplastic material designation code of PE3408 and having a cell classification of 345464E per ASTM D3350. The molecular weight category shall be extra high (250,000 to 1,500,000) as per the Gel Permeation Chromatography determination procedure with a typical value of 300,000 to 330,000.
3. All HDPE piping must have identifiable green striping (dual) every 120°. The pipe will be color grey or black and shall meet the Utility Location and Coordination Council, "Uniform Color Code," for sewer lines per APWA/ULCC Standards Committee.
4. The pipe and fittings shall have product traceability. The manufacturer shall include a print line on the pipe. This shall notate the manufacturer's name, date of manufacture, the lot and supplier of raw material, plant location, and production shift. The ASTM standard shall also appear as ASTM F714 with the material designation as PE3408.
5. The polyethylene pipe manufacturer shall provide certification that the stress regression testing has been performed on the specific product. The said certification shall include a stress life curve per ASTM D2837. The stress regression testing shall have been performed in accordance with ASTM D2837, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi as determined by ASTM D2837.
6. The material shall be listed by the Plastics Pipe Institute (PPI), a division of The Society of the Plastics Industry in PPI TR-4. The pipe material shall have a Hydrostatic Design Basis of 1600 psi at 730F and 800 psi at 1400F. The PPI listing shall be in the name of the pipe manufacturer and testing and validation of samples of the pipe manufacturer's production pipe shall be based upon ASTM D2837 and PPI TR-3.
7. The manufacturer's certification shall state that the pipe was manufactured from one specific resin in compliance with these specifications and that the pipe complies with AWWA Standards and NSF Standard 61. The certificate shall state the specific resin used and its source.
8. HDPE pipe manufactured from materials meeting the specifications of this section shall have an Environmental Stress Crack Resistance of no failures in 10,000 hrs. (ESCR: FO>10,000) when tested in accordance with ASTM F1248.

9. Pipe and fittings shall be manufactured from material meeting the requirements of this section. Pipe supplied under this specification shall have a nominal DIP (Ductile Iron Pipe) outside diameter unless otherwise specified. The Dimension Ratio (DR) and pressure rating of the pipe shall be selected for 200 psi pressure rating.
- C. Tracer wire shall be a #12 AWG (minimum) copper conductor, insulated with a minimum 30 mil, high-density, high molecular weight polyethylene (HDPE) insulation, and rated for direct burial use. HDPE insulation shall be RoHS compliant and utilize virgin grade material. Insulation color shall meet APWA color code standard for buried utilities.

2.03 Appurtenances

- A. Joints shall be made with flexible elastomeric seals (gaskets) in accordance with ASTM D 3212 and capable of passing all tests specified in ASTM D3212.
- B. Fittings and plugs shall meet the testing requirements for the PVC pipe. Engineering data for the fittings shall be submitted and approved by the Engineer prior to their use.

2.04 Joints

- A. Push-On Joints
 1. The joints shall be designed so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be single rubber gasket joint designed to be assembled by the positioning of a continuous, molded, rubber ring gasket in an annular recess in the pipe or fitting entering pipe into the socket thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and the annular recess shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled. Details of the joint design and assembly shall be in accordance with the joint manufacturer's standard practice. The joints shall be designed so as to provide for the thermal expansion or contraction experienced with a total temperature change of at least 75 degrees F in each joint per length of pipe. The joint shall comply with ATM D 3139.
 2. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water. The lubricant containers shall be labeled with the manufacturer's name.
 3. Gaskets shall comply with ATM F 477 for high head applications and meet all applicable requirements of ANSI A21.11. Gasket dimensions shall be in accordance with the manufacturer's standard design dimensions and tolerances. The gasket shall be of such size and shape to provide adequate compressive forces against the spigot and socket after assembly to effect a possible seal under all combinations of joint and gasket tolerances. The trade name or trademark, size, mold numbering, gasket manufacturer's mark and year of manufacture shall be molded in the rubber on the back of the gaskets.

4. The gasket manufacturer shall set up such quality control procedures to insure the gasket's meeting the requirements of this standard. The manufacturer shall furnish a monthly report of representative quality control test results to the pipe manufacturer.

2.05 Gate Valves

- A. Gate valves sizes 2 through 24 inches for use in water and wastewater shall be of the ductile iron body, resilient seated type, manufactured in conformance with AWWA C509. Minimum working pressure shall be 200 psi when unbalanced pressure is applied to either side of the gate. Gate valves shall have a minimum of two O-ring stem seals; one above and one below the integral collar. The area between the O-rings shall be filled with permanent lubricant. Valve shall have no metal fasteners or screws exposed to wetted portions of the valve. All ferrous surfaces to be shot-blasted to a white metal finish. All interior and exterior valve surfaces, including the interior of the gate and bolt holes shall be coated with an epoxy coating in accordance with AWWA C550. Valve ends shall be of the type required for the installation as specified herein or shown on the Drawings.
- B. Furnish gate valves with nut, wrench, chain or handwheel operators as shown the Drawings.

2.06 Air Vacuum Valves

- A. Air-vacuum valves shall have stainless steel body and cover. All other attaching parts or internal parts shall be non-corrosive.
- B. Valve shall be designed for working pressure of 3 to 150 psi unless otherwise shown or specified and shall be equipped with an orifice appropriate to the venting needs of the pipeline.
- C. Sewage valves shall be equipped with a conical body, a 2-inch NPT inlet connection, and a ½ inch NPT outlet connection and shall be provided with 2- inch inlet shut-off valve, 1-inch blow-off valve, and ½-inch back-flush valve with quick-disconnect coupling and flushing hose with quick-disconnect connections.

2.07 Manual Valve Operators

- A. All gate valves shall be furnished with Extension stem where required, a valve box with standard operating nut, and a T-handle operating wrench.

2.08 Valve Boxes

- A. All buried iron-body gate valves shall be provided with three-piece, cast iron, extension sleeve-type valve boxes suitable for the dept of cover show on the Drawings.
- B. Valve boxes shall be note less than 5 inches in diameter, shall have a minimum thickness of 3/16 inch at any point, and shall be provided with suitable cast iron bases and covers. Covers shall have cast thereon with appropriate name designating the service for which the valve is intended ("W" for water, "S" for drain or waste line). Covers in roadways shall be of the deep locking type.

- C. All parts of the valve boxes, bases, and covers shall be heavily coated with suitable bituminous finish.
- D. Valves and boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves with the top of the box flush with the finished grade.

Part 3 Execution

3.01 Examination

- D. Verify that municipal utility force main size, location, and invert are as indicated on the drawings. Report any discrepancies to the Engineer before proceeding with the work.
- E. Examine all pipe, fittings, valves, and other appurtenances carefully for damage and other defects immediately before installation. Mark defective materials and hold for final disposition.

3.02 Preparation

- A. Cut pipe ends square and beveled, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges, unions or threaded.

3.03 Trenching

- A. Hand trim excavation for accurate placement of pipe to elevations indicated. Bell holes shall be big enough so that there is ample room for pipe joints to be properly made. Between bell holes, carefully grade the bottom of the trench so that each pipe barrel will rest on a solid foundation for its entire length.
- B. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Install thrust restraints in the sizes indicated on the Drawings.
- C. Restrained Joints. Restrained Joints shall be installed as shown on the plans or as directed by the Engineer. Installation shall conform to the manufacturer's recommendation.
- D. The standard laying conditions shall be completed in accordance with ANSI/AWWA C150/A21.50 and as required by the specifications.

3.04 Installation – Pipe

- A. Separation of Water Mains from Sanitary Sewer Mains
 - 1. Parallel Installation
 - a. Normal conditions - Water mains shall be laid at least 10 feet horizontally from any sanitary sewer, storm sewer or sewer manhole,

whenever possible; the distance shall be measured edge-to-edge.

- b. Unusual conditions - When local conditions prevent a horizontal separation of 10 feet, a water main may be laid closer to a storm or sanitary sewer provided that:
 - 1) The bottom of the water main is at least 18 inches above the top of the sewer;
 - 2) Where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.

2. Crossings

- a. Normal conditions - Water mains crossing house sewers, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer, whenever possible.
- b. Unusual conditions - when local conditions prevent a vertical separation as described in 2.a. above, the following construction shall be used:
 - 1) Sewers passing over or under water mains should be constructed of materials and with joints that are equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.
 - 2) Water mains passing under sewers shall, in addition, be protected by providing:
 - 3) Provide a vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main;
 - 4) Provide adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking the water mains;
 - 5) The length of water pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.
 - 6) Both the sewer and the water main shall be constructed of water pipe materials and tested in accordance with this specification.

- B. Lay force main lines to and maintain at the lines and grades required by the drawings. All fittings and valves shall be at the required locations, the spigots centered in the bells, and all valve stems plumb. Establish elevations of buried piping to ensure not less than 48 inches of cover unless otherwise indicated on the drawings.

C. Thrust Restraint

1. Plugs, caps, tees and bends deflecting 11-1/4 degrees or more, either vertically or horizontally, shall be provided with thrust restraint. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Unless noted otherwise, thrust restraints shall be either thrust blocks or restrained joints.
2. Thrust Blocks: Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2000 psi after 28 days. Blocking shall be placed between solid ground and the fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.
3. Restrained Joints: Restrained joints shall utilize joint restraints as indicated above. Where restrained lengths are not shown on the drawings, restraint shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA TRD.

D. Route pipe as shown on the Drawings. Wherever pipe must be deflected from a straight line (in either the vertical or horizontal plane) in order to avoid obstructions or plumb stems, or wherever long radius curves are permitted, the amount of deflection shall not exceed 75% of the maximum deflection allowed by the pipe manufacturer, and shall be approved by the Engineer.

E. Lay pipe with the bell ends facing in the direction of laying unless otherwise directed by the Engineer.

F. Close the open ends of pipes with a watertight plug whenever pipe laying is not in progress. No debris, tools, clothing or other material shall be placed in the pipe at any time. If the joints of any pipe in the trench cannot be completed until a later time, caulk them with packing in order to make them as watertight as possible; this shall be done not only at the end of each working day but also before work is stopped for lunch periods, bad weather, or any other reason. If there is water in a trench, leave this seal in place until the trench has been pumped completely dry.

G. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations. Loop wire up in all valve boxes to provide a minimum 24" loop.

H. Lay no pipe in water or when it is the Engineer's opinion that trench conditions are unsuitable. If crushed stone is used to improve trench conditions or as backfill for bedding the pipe, its use is considered incidental to the project, and no separate payment will be made for its use.

- I. When crossing water courses which are greater than 15 feet in width:
 - 1. The pipe shall be of special construction, having flexible, watertight joints.
 - 2. Valves shall be provided at both ends of water crossing and the valves shall be easily accessible and not subject to flooding.
 - 3. Two 3/4-inch taps should be made for sampling and testing.
- J. For installations requiring other forms of corrosion protection, see AWWA Manual M27.

3.05 Installation – Valves

- A. Prior to installation, valves shall be cleaned of all foreign matter and inspected for damage. Valves shall be fully opened and closed to ensure that all parts are properly operating. Valves shall be installed with the stem in the vertical position.
- B. Set valves on solid bearing. Set valves so that operators are plumb.
- C. Center and plumb valve box over valve. Set box cover flush with finished grade. Install valve boxes so that no vehicle loads are transmitted from the valve box to the valve.
- D. Provide support such as crushed stone, concrete pads or sufficiently tarped trench bottom, so pipe is not carrying weight of the valve.

3.06 Bypass Pumping

- A. When pumping/bypassing is required, the Contractor shall supply the necessary pumps, conduits and other equipment to divert the flow of sewage around the manhole section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during periods of a rain storm. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system. A "setup" consists of the necessary pumps, conduits, and other equipment to divert the flow of sewage around a manhole section, from the start to finish of work performed in the manhole section.

3.07 Field Quality Control

- A. Hydrostatic Testing
 - 1. Pressure test
 - a. Test restrictions. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. Contractor shall work with the Engineer to determine working pressure.
 - b. Test pressure shall not exceed pipe or thrust-restraint design pressures.

- c. The hydrostatic test shall be of at least 1-hour duration.
 - d. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.
 - e. The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed valves.
2. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) shall be applied using a pump connected to the pipe. The system should be allowed to stabilize at the test pressure before conducting the hydrostatic test. Where valved sections are not available, install cleanouts on each section and pressure test between.
 3. Before applying the specified test pressure, air shall be expelled completely from the section of piping under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at these points to expel the air as the line is filled with water. After the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and the pipe plugged or left in place as required by Engineer.
 4. Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves or joints that are discovered following the pressure test shall be repaired or replaced with reliable material, and the test shall be repeated until satisfactory results are obtained.

B. Leakage Test

1. Leakage shall be defined as the quantity of makeup water that must be supplied into the newly laid pipe or any valved section thereof to maintain the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall be measured by a drop in pressure in a test section over a period of time.
2. The leakage test shall be of at least a 2 hour duration. Contractor to furnish the pump, pipe, connections, measuring devices, and all other necessary apparatus as well as all necessary assistance to conduct the test. The leakage test shall be conducted in the presence of the Owner's representative.

3. No pipe installation will be accepted if the amount by Table 3 of makeup water is greater than that listed.
4. Should any test of laid pipe disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair or replace the defective joints until leakage is within the specified allowance.
5. All visible leaks are to be repaired regardless of the allowance used for testing.

Table 3 Leakage testing allowance per 1,000 ft of pipeline*-gph^t

Avg. Test Pressure psi	Pipe Size (inches)				
	4	6	8	10	12
250	0.43	0.64	0.85	1.07	1.28
225	0.41	0.61	0.81	1.01	1.22
200	0.38	0.57	0.76	0.96	1.15
150	0.33	0.50	0.66	0.83	0.99

*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

- C. If tests indicate that the Work does not meet specified requirements, repair the Work until it meets the requirements or remove the Work, replace and retest at no cost to the Owner.
- D. After each section of pipe is successfully tested, remove all debris and construction materials from the work site. Grade all areas to the elevations required by the drawings, or to the pre-construction elevations if no grade changes are required by the drawings. Seed and sod all areas disturbed by the construction.
- E. Water for testing shall be obtained from the nearest fire hydrant. The cost of water for testing shall be borne by the Owner.

END OF SECTION

Part 1 General

1.1 Intent

- A. It is the intent of this specification to provide for the reconstruction of pipelines by the installation of a resin-impregnated flexible tube which is inserted into the original conduit. When cured, the finished pipe (CIPP) will be continuous and formed to the original conduit. There may also be some sections that the Owners records list the wrong diameter. The Owner's intention is that those sections will be lined, but they should be brought to the Owner's attention and if there is not a bid item for that size pipe, that will be negotiated.

1.2 Referenced Documents

- A. This specification references ASTM F1216 which is made a part hereof by such reference and shall be the latest edition and revision thereof. ASTM F1216 shall govern.

Part 2 Products

2.1 Materials

- A. Tube - The tube material shall meet the requirements of ASTM F1216. Bidder shall state manufacturer of felt to be used on this job.
 - 1. The tube shall be fabricated to a size that when installed will form to the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during insertion.
 - 2. The outside layer of the tube shall be plastic coated with a transparent flexible material that is compatible with the resin system used. The plastic coating shall not be subject to delamination after cure of the CIPP.
 - 3. No materials shall be included in the tube that are subject to delamination in the cured CIPP.
- B. Resin – The rein system shall meet the requirements of ASTM F12160
- C. The wall color of the interior pipe surface of the CIPP after installation shall not be of a dark or non-reflective nature that could inhibit proper closed circuit television inspection.

Part 3 Execution

3.1 Structural Requirements

- A. The CIPP shall be designed as per ASTM F1216, Appendix XI, with the following additional requirements:
 - 1. The CIPP strength design shall assume no bonding to the original pipe wall.
 - 2. External Hydrostatic Design - Acceptable third party testing and verification of the enhancement factor, K , (equation 1 - ASTM F1216) shall be submitted by each manufacturer and/or CIPP product.
 - 3. External Buckling Design - Where the CIPP is designed as a stand-alone pipe, a fully deteriorated condition, acceptable third party testing and verification of design analysis techniques (ASTM F1216, Section X1.2.2) shall be submitted by each manufacturer and/or CIPP product. This testing requirement can be accomplished with soil box testing.
- B. The bond between all CIPP layers shall be strong and uniform. All layers, after cure, must form one homogeneous structural pipe wall with no part of the tube left unsaturated by resin.

3.2 Testing Requirements

- A. Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
- B. Hydraulic Capacity - Calculations must support that the CIPP shall have at least 100% of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the original pipe material. A typical roughness coefficient of the CIPP shall be as verified by third party test data.
- C. CIPP Field Samples - To verify past performance, the manufacturer shall submit test results of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in section 4.2 of this specification have been achieved in previous field applications. New resin systems can be used by obtaining prior approval.
- D. Any water necessary for cleaning or testing shall be furnished by the Owner at a location designated by the Owner. All water usage shall be metered using a water meter. Meter will be furnished by the City upon request.

3.3 Execution/Installation

- A. CIPP installation shall be in accordance with ASTM F1216 with the following additional requirements:
 - 1. Resin Impregnation - The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall.
- B. Hydrotite shall be used in each manhole at the mouth of every pipe into the manhole that a liner is installed.
- C. Service Reconnections – Service reconnections shall be made without excavation.
 - 1. Service reconnections shall be cut out to at least 90% of the original tap size. Reconnections shall be brushed smooth where debris will not catch. Irregular or rough reinstatements noticed during work or on the finished video will have to be smoothed.
- D. Any water necessary for cleaning or installation of the liner shall be furnished by the Owner.

3.4 Inspection

- A. For every ten insertion lengths designated by the owner in the contract documents, one CIPP sample shall be prepared using one of the following methods.
 - 1. The sample shall be cut from a section of the cured CIPP at an intermediate manhole or at the termination point that has been inserted through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags.
 - 2. The sample shall be fabricated from material taken from the tube and the resin/catalyst system used and cured in a clamped mold placed in the downtube.
- B. Samples shall be tested in accordance with ASTM F1216.
- C. Leakage testing of the CIPP shall be accomplished while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid must be tested by an acceptable method, such as air testing.
- D. Visual inspection of the CIPP shall be in accordance with ASTM F1216.
- E. The Contractor shall supply the Owner with before and after videos of each section TV's and/or lined.

3.5 Clean-Up

- A. Upon acceptance of the installation work and testing, the Installer shall reinstate the project area affected by the operations.

END OF SECTION

CCTV Inspection of Sewer Main Lines

Part 1 General

1.1 Intent

- A. Requirements for television inspection (CCTV) of main sewer lines and providing the owner with a video log and digital video file of each section televised. These lines are being televised to find sources of infiltration and inflow (I/I) and to find structural defects and restrictions in the existing sewer line.
- B. There may be some instances that the Owner's records are incorrect and the contractor may discover that the line indicated on the drawings is either a different diameter or material than indicated. If such lines are discovered the Contractor shall bring it to the attention of the Owner and the Contractor shall correct his drawings and use the correct information of the logs and video.
- C. If any blockage and/or defect is discovered, that in the opinion of the Contractor requires immediate attention by the Owner, the Contractor shall immediately notify the Owner of such.

Part 2 Products

2.1 Equipment

- A. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the Owner's Representative; and if unsatisfactory, equipment shall be removed and no payment will be made for an unsatisfactory inspection.
- B. The contractor shall have on-site with the camera van an operator who is trained and certified in the use of NASSCO's Pipeline Assessment and Certification Program (PACP)©.

Part 3 Execution

3.1 Cleaning

- A. Require the use of a water jet truck. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the Contractor will not be required to clean those specific manhole sections. If in the course of normal cleaning operations, damage does result from pre-existing and unforeseen conditions such as broken pipe, the Contractor will not be held responsible. The equipment shall have a selection of at least three high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel. The NASSCO Jetter Code of Practice shall be consulted as a guide for the selection of different type nozzles and recommended pressure applications for various cleaning requirements.
- B. Cleaning Precautions: During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment especially with tools which retard the flow in the sewer line are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer.
- C. Root Removal: Roots shall be removed in the designated sections where root intrusion is a problem. Special attention should be used during the cleaning operation to assure almost complete removal of roots from the joints. Any root removal which requires the use of additional equipment such as a root saw to remove is considered heavy cleaning.
- D. Light cleaning includes removal of sediment up to 25% of the pipe diameter. Debris greater than that or which requires the use of special equipment such as a root saw is considered heavy cleaning. Where the contractor determines that heavy cleaning is necessary, he shall notify the Owner and document the before and after condition of the pipe and/or blockage. It is understood that the before video may not be complete such as when roots or grease block the camera from continuing. Depending on the way the bid item is worded – heavy cleaning may be part of the television or it may be a separate pay item.
- E. Any water necessary for cleaning or installation of the liner shall be furnished by the Owner at a location designated by the owner. The City requires that this water to be metered (meter can be furnished by the City upon request). Water Usage shall be reported to the owner on a monthly basis. If the Owner furnishes the meter, the meter must be returned prior to final payment being made.

3.2 TV Inspection

- A. Light cleaning is included in all televising bid items.
- B. Wet conditions, if used on the bid form, shall mean that it should be raining at the time of the line is televised, be within 48 hours of at least a ½ inch rain, a day that snow in melting, or the ground water table is sufficiently high as determined by the Engineer.
- C. After cleaning, the manhole sections shall be visually inspected by means of closed-circuit television. The inspection will be done one manhole section at a time and the flow in the section being inspected will be suitably controlled. All CCTV inspections shall be performed in accordance with PACP standards including the specific date and time of inspection.
- D. Each lateral must be shown with a view perpendicular to the main, with the camera centered on the lateral, and the camera shall pan the lateral connection looking for cracks and/or leaks.
- E. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Nothing shall be used to pull the camera through the line that obstructs the camera view. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete noted as Survey Abandoned and no additional inspection will be required.
- F. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device and displayed on the video. Accuracy of the distance meter shall be periodically checked by use of a walking meter, roll-tape, or other suitable device, and the accuracy shall be satisfactory to the Owner's Representative.
- G. TV Audio - The tape for each section televised shall have audio stating the upstream and downstream manhole numbers, pipe size description of taps and defects. The pipe size and manhole numbers shall be stated at least every 100' of line televised.

- H. TV Log - A written log by the Contractor and will clearly show the length of the section televised, size of pipe televised, the upstream and downstream manhole numbers, the location of major defects, and a description of the defect. In addition, other points of significance such as locations and positions of building sewers, unusual conditions, roots, storm sewer connections, cracks, fractures, broken pipe, presence of scale and corrosion, and other discernible features, as defined in the PACP defect codes, will be recorded on electronic media and a copy of such records will be supplied to the Owner. The location shall be by distance in 1/10 of a foot, from the manhole center. The position shall be clock position with 12 o'clock being the top of the pipe. The log shall also document defects that can be seen around the service connection or in the lateral.

- I. Documentation and deliverables shall be as follows:
 - 1. Television Inspection Logs shall be delivered to the Owner within two weeks of the line being televised.

 - 2. Electronic media recordings: The purpose of electronic media recording shall be to supply a visual and audio record of problem areas of the lines that may be replayed by the Owner. Acceptable formats are CD's, DVD's, or USB flash drives. Within two weeks of the line being televised the electronic media recording of video showing conditions and defects will be delivered to the Owner.

END OF SECTION