CONTRACT DOCUMENTS &
TECHNICAL SPECIFICATIONS

HIGH SCHOOL SANITARY SEWER REHABILITATION PHASE 1

September 2026

PREPARED FOR

HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT

HAMSHIRE, TEXAS

Fittz & Shipman INC.

Consulting Engineers and Land Surveyors
TX Board of Prof Engineers Firm No. 1160
Tx Board of Prof Land Surveyors Firm No. 100186

1405 CORNERSTONE COURT
BEAUMONT, TEXAS 77706
(409) 832-7238

FS Proj. No. 26009

HIGH SCHOOL SANITARY SEWER REHABILITATION PHASE 1
HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT

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LEGAL NOTICE

SEPTEMBER 2, 2026

Notice is hereby given that the following Competitive Sealed Bids (CSB) listed below will be accepted by Hamshire Fannett Independent School District on **Thursday, September 24, 2026 no later than 2:00 p.m**. Plans and Specifications for this project may be obtained from Fittz & Shipman, 1405 Cornerstone, Beaumont, TX 77706 or by **calling** 409.832.7238 for a non-refundable deposit of $50.00.

Submitted Competitive Sealed Bids are to state the bid number and name of project on the outside of the envelope. Bidders are invited to bid the project. Bidders shall forward an original and two (2) copies of their bid to the address shown below. **Late proposals will be rejected as non-responsive.** Proposals will be publicly opened and read aloud at the time/date below. Bidders are invited to attend the sealed bid opening. **Bid specs are located on our website: https://hfisdnet.finalsite.com/a-z-1/financebusiness/current-bid-opportunities**

NON-MANDATORY PRE-BID CONFERENCE:
THURSDAY, SEPTEMBER 17, 2026 AT 2:00 PM
ADMINISTRATION BOARD ROOM
12702 2ND STREET
HAMSHIRE, TX 77622

CSB OPENING: Thursday, September 24, 2026 at 2:00 pm
Boardroom - HFISD Administrative Building

CSB NO: 26009 Hamshire Fannett ISD
High School Sanitary Sewer Rehabilitation – Phase 1
RFP-26-03

MAIL OR DELIVER TO: Hamshire Fannett Independent School District
Jordan Walker
Business Specialist
HFISD Administration Building
12702 2nd Street
Hamshire, Texas 77622

Any questions relating to these requirements please call Ben Tristan, P.E. at 409.832.7238.

The Board of Trustees shall consider the bids for award at the next School Board Meeting to be held during the week of October 19th at the Administration Building Board Room, 12702 2nd Street, Hamshire, Texas 77622.

RESPONDENTS ARE STRONGLY ENCOURAGED TO CAREFULLY READ THE ENTIRE BID.

Published: Beaumont Enterprise Wednesday, September 2, 2026 and Wednesday, September 9, 2026

INSTRUCTIONS TO BIDDERS

1. Defined Terms.

Terms used in these Instructions to Bidders have the meanings assigned to them in the General Conditions.

Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1 ***Bidder*** - one who submits a Bid directly to OWNER as distinct from a sub-bidder, who submits a bid to a Bidder.

1.2 ***Issuing Office*** - the office from which the Bidding Documents are to be issued (Fittz & Shipman, 1405 Cornerstone Court, Beaumont, Texas 77706).

1.3 ***Successful Bidder*** - the lowest, responsible and responsive Bidder to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award.

2. Copies of Bidding Documents.

2.1 Complete sets of the Bidding Documents in the number and for the non-refundable deposit sum of $50.00 may be obtained from the Issuing Office.

2.2 Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 OWNER and ENGINEER in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

3. Qualifications of Bidders.

To demonstrate qualifications to perform the Work, each Bidder must submit along with the Bid detailed written evidence such as financial data, previous experience, present commitments, and other such data called for on the “Statement of Bidder’s Qualifications” form located in the “Bid Form and Statement of Bidder’s Qualifications” section of this document. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. Examination of Contract Documents and Site.

4.1 It is the responsibility of each Bidder before submitting a Bid:

4.1.1 To examine thoroughly the Contract Documents and other related data identified in the Bidding Documents (included "technical data" referred to below);

4.1.2 To visit the site to become familiar with and satisfy Bidder as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work;

4.1.3 To consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

4.1.4 To study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and

4.1.5 To promptly notify ENGINEER of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Contract Documents and such other related documents.

4.2 Reference is made to the Supplementary Conditions for the identification of:

4.2.1 Those reports of explorations and tests of subsurface conditions at or contiguous to the site which have been utilized by ENGINEER in preparation of the Contract Documents. Bidder may rely upon the general accuracy of the "technical data" contained in such reports but not upon other data, interpretations, opinions or information contained in such reports or otherwise relating to the subsurface conditions at the site, nor upon the completeness thereof for the purposes of bidding or construction.

4.2.2 Drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the site have been utilized by ENGINEER in preparation of the Contract Documents. Bidder may rely upon the general accuracy of the "technical data" contained in such drawings but not upon other data, interpretations, opinions or information shown or indicated in such drawings or otherwise relating to such structures, nor upon the completeness thereof for the purposes of bidding or construction.

4.3 Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is base upon information and data furnished to OWNER and ENGINEER by OWNERS of such Underground Facilities or others, and OWNER and ENGINEER do not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.4. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Contract Documents due to differing or unanticipated conditions appear in paragraph SC- 4 of the Supplemental Conditions.

4.5. Before submitting a Bid each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6. On request, OWNER will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests and studies.

4.7. Reference is made to the Supplementary Conditions for the identification of the general nature of work that is to be performed at the site by OWNER or others (such as Utility and other prime CONTRACTORS) that relates to the work for which a Bid is to be submitted. On request, OWNER will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such work.

4.8. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is promised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof by ENGINEER is acceptable to Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

5. Availability of Lands for Work, etc.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

6. Interpretations and Addenda.

6.1. All questions about the meaning or intent of the Bidding Documents are to be directed to ENGINEER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda and transmitted to all parties recorded by ENGINEER as having received the Bidding Documents. Questions received less than three (3) days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

6.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by OWNER or ENGINEER.

7. Bid Security.

7.1. Each Bid must be accompanied by Bid security made payable to OWNER in an amount of five (5) percent of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached in Bond Section of this document) issued by a surety.

7.2. The Bid security of Successful Bidder will be retained until such Bidder has executed the Agreement, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within fifteen (15) days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the seventh (7th) day

after the Effective Date of the Agreement or the sixtieth (60th) day after the Bid Opening, whereupon bid security furnished by such Bidders will be returned. Bid security with Bids which are not competitive will be returned within seven (7) days after the Bid opening.

8. Contract Times.

The number of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment are set forth in the Agreement (or incorporated therein by reference to the attached Bid Form.)

9. Liquidated Damages.

Provisions for liquidated damages, if any, are set forth in the Agreement.

10. Delete Section

11. Subcontractors, Suppliers and Others.

11.1 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to OWNER in advance of a specified date prior to the Effective Date of the Agreement, apparent Successful Bidder, and any other Bidder so requested, shall within five (5) days after Bid opening submit to OWNER a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, person or organization if requested by OWNER. An OWNER or ENGINEER who after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, may before the Notice of Award is given request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, that Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution and OWNER may consider such price adjustment in evaluating Bids and making the contract award.

If apparent Successful Bidder declines to make any such substitution, OWNER may award the contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom OWNER and ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER.

11.2 In contracts where the Contract Price is on the basis of Cost-of-the-Work Plus a fee, apparent Successful Bidder, prior to the Notice of Award, shall identify in writing to OWNER those portion of the Work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the Work with OWNER's written consent.

11.3 No CONTRACTOR shall be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection.

12. Bid Form.

12.1 The Bid Form is included with the Bidding Documents; additional copies may be obtained from the Issuing Office.

12.2 All blanks on the Bid Form must be completed by printing in black ink or by typewriter.

12.3 Bids by a corporation or limited liability company must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

12.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

12.5 All names must be typed or printed in black ink below the signature.

12.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

12.7 The address and telephone number for communications regarding the Bid must be shown.

12.8 Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with paragraph 3 above. State CONTRACTOR license number, if any, must also be shown.

13. Submission of Bids.

13.1 Bids shall be submitted at the time and place indicated in the Advertisement of Invitation to Bid and shall be enclosed in an opaque sealed envelope which shall be clearly labeled "Bid Documents" to guard against opening prior to the time set therefore. The label shall also include the Project Title, name and address of Bidder, and be accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

13.2 The following documents shall be required for a complete bid:

1. Completed Bid Form;
2. Bid Bond in the amount of 5% of the total bid amount (See Bid Bond Form);
3. Completed “Statement of Bidder’s Qualifications” and other information requested in Item 3 of this Section (The “Statement of Bidder’s Qualifications” form has been included immediately after the Instructions to Bidders.); and
4. And any other information required in the contract documents.

13.3 Oral, telegraphic, fax copies, or electronic copies of the bid form or modifications to bid form shall not be considered.

14. Modification and Withdrawal of Bids.

14.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

14.2 If, within twenty-four (24) hours after Bids are opened, any Bidder provides a duly signed, written notice to the 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, that Bidder may be allowed to withdraw its Bid through action of SPISD and the Bid security will considered to be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

15. Opening of Bids.

Bids will be opened and (unless obviously non-responsive) read aloud publicly at the place where Bids are to be submitted. An abstract of the amounts of the base Bids and major alternates (if any) will be made available to Bidders after the opening of Bids.

16. Bids to Remain Subject to Acceptance.

All Bids will remain subject to acceptance for sixty (60) days after the day of the Bid Opening, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to that date.

17. Award of Contract.

17.1. OWNER reserves the right to reject any or all Bids, for any reason, including without limitation the rights to reject any or all nonconforming, non-responsive, unbalanced or conditional Bids and to reject the Bid of any Bidder if OWNER believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by OWNER. OWNER also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Bidder. Discrepancies between the multiplication of units or Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

17.2. In evaluating Bids, OWNER will consider the qualifications of Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

17.3 OWNER may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. OWNER also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

17.4 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time.

17.5 If the Contract is to be awarded, it will be awarded to the lowest Bidder, based on the Unit Price Bids and the consideration of any or all Alternates, whose evaluation by OWNER indicates to OWNER that the award will be in the best interest of the Project. Contractor shall provide costs for base bid and all additive alternates.

17.6 If the contract is to be awarded, OWNER will give Successful Bidder a Notice of Award within sixty (60) days after the day of the Bid opening.

18. Contract Security.

When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by the required performance and payment Bonds.

19. Signing of Agreement.

When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by six (6) unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen (15) days thereafter CONTRACTOR shall sign and deliver six (6) counterparts of the Agreement and attached documents to OWNER with the required Bonds. Within ten (10) days thereafter OWNER shall deliver two (2) fully signed counterparts to CONTRACTOR. The Contractor shall be supplied with three (3) copies of the Plans and Specifications. Additional copies will be supplied at cost.

20. Pre-bid Conference.

A non-mandatory pre-bid conference will be held at 2:00 p.m. on Wednesday, September 9/17, 2026 at the HFISD Administration Board Room, 12702 2nd Street, Hamshire, Texas 77622. Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

21. Sales and Use Taxes.

The OWNER is a tax exempt agency, and is not subject to the payment of State, County and/or City sales taxes only to the **extent** allowable by law. CONTRACTOR is advised to contact the State Comptroller's Office and local governmental entities in order to apprize itself of sales tax payment obligations. Contractor shall include a “Separation of Materials Form” with Monthly payment estimates and final payment request.

Only equipment and materials incorporated into the permanent project are tax exempt. All unit contract prices shall include all applicable sales taxes. The Contractor will not be paid separately for sales tax.

The CONTRACTOR performing this contract may obtain allowable tax exemptions by issuing to his supplier a re-sale certificate in lieu of the tax. The OWNER will issue the CONTRACTOR an exemption certificate for his records upon request. CONTRACTOR shall submit breakdown for material to be incorporated within the project and other services and the total of the two items shall equal the contract amount. The statement of materials and services should be submitted prior to any payment being made to the contractor.

22. Retainage.

Provision concerning retainage and CONTRACTORS' rights to deposit securities in lieu of retainage are set forth in the Agreement.

23. Drawings and Specifications

Drawings and Specifications, as prepared by the Engineer, shall be taken as complementary and equipment and/or labor shown and/or required by one shall be furnished and performed as if treated by both. Should the Contractor require additional information, details or other instructions concerning any of the work, he shall request such information from the Engineer prior to Bid date.

22. Historically Under-Utilized Business and Minority-Women Business Enterprise Participation

It is the desire of Hamshire Fannett Independent School District to increase the participation of Historically Under-utilized Business (HUB) including Minority (MBE) and women owned (WBE) businesses in its contracting and procurement programs. While the District does not have any preference or set aside programs in place, it is committed to a policy of equitable participation for these firms. Below are some available resources to include HUM, MBE and WBE in the bidding process:

https://comptroller.texas.gov/purchasing/vendor/hub/

Lamar University SBDC
David Mulcahy, Director
801 Pearl Street
Beaumont, TX 77701
Phone: 409-880-2367
Fax: 409-880-2201
Email: David.Mulcahy@lamar.edu
Web Site: http://www.lamarbmt.sbdcnetwork.net

Golden Triangle Minority Business Council, Inc.
P.O. Box 5064
Beaumont, Texas 77726-5064
Phone: 409-962-8530
Fax: 409-722-5402
Email: hatcher.beverly@gtmbc.com
Web Site: http://www.gtmbc.comhttps://comptroller.texas.gov/purchasing/vendor/hub/

END OF SECTION

BID FORM AND
STATEMENT OF BIDDER'S QUALIFICATIONS

BID FORM

for

HIGH SCHOOL SANITARY SEWER REHABILITATION PHASE 1
HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT

1. The Bidder proposes to furnish all labor, material and equipment and perform all work required for the installation, construction and completion of new improvements, in strict accordance with the Contract Documents, Plans and Specifications, for the prices stated below. The bidder has examined the plans and specifications with related documents and the site of the proposed work, and is familiar with conditions surrounding the construction of the proposed project including the availability of materials and labor. **The bidder hereby agrees to commence work under this contract on or before a date to be specified in the "Notice to Proceed" and to fully complete the PROJECT within 45 consecutive calendar days as specified in the "Notice to Proceed", including, be not limited to, all Saturdays, Sundays, and Federal, State, and City holidays thereafter.**

2. The Unit Price Base Bid generally includes: Installation of inflow protection inserts in all manholes, clean, debris removal and video inspection of existing lift station along Alamo Street, install watertight plug and/or cap to existing cleanouts, cleaning, debris removal and video inspection of existing sewer lines and manholes throughout the Project Site located at 12702 2nd Street, Hamshire, Tx 77622 on the High School Campus property. If the Contract is to be awarded, it will be awarded to the lowest Bidder, based on the Unit Price Bid, whose evaluation by OWNER indicates to OWNER that the award will be in the best interest of the Project.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   (a) BIDDER has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged:

   Addendum No. _____ Dated _____ Received _____
   Addendum No. _____ Dated _____ Received _____
   Addendum No. _____ Dated _____ Received _____

   (b) BIDDER acknowledges that the following documents required for a complete bid in Item 13 of the Instructions to Bidders have been included in his bid package:

   _____ Completed Bid Form
   _____ Required Bid Security in the form of _____ and the amount of $_____. The Bid Security shall become the property of the owner in the event the contract and bonds are not executed within the time set forth above, as liquidated damages for the delay and additional expense caused to the Owner thereby. Bid Bond Form can be found in this document in the Bond Section.

   _____ Completed Statement of Bidder Qualifications included in these contract documents and any other information requested in Item 3 of the Instructions to Bidders. A copy of the Statement of Bidder Qualification form can be found in this document behind the Bid Form.

   (c) BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;

(d) BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

(e) BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site. BIDDER acknowledges that OWNER and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

(f) BIDDER is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

(g) BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

(h) BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(i) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

UNIT PRICE BID

UNIT PRICE BID - PROJECT WORK TO INCLUDE BUT NOT BE LIMITED TO: Installation of inflow protection inserts in all manholes, clean, debris removal and video inspection of existing lift station along Alamo Street, install watertight plug and/or cap to existing cleanouts, cleaning, debris removal and video inspection of existing sewer lines and manholes. Work shall be done to the limits and as specified in the plans and specifications.

ITEM NO.	ITEM WITH BID PRICES WRITTEN IN WORDS	UNIT	ESTIMATED QUANTITIES	UNIT PRICE	TOTAL AMOUNT BID
1	INSTALL MANHOLE INFLOW PROTECTION INSERTS (STAINLESS STEEL – VARIOUS SIZES) – in place at _____dollars and _____cents per Each.	EA.	16		
2	INSTALL WATERTIGHT PLUG AND/OR CAP TO EXIST SANITARY SEWER CLEANOUTS – in place at _____dollars and _____cents per Each.	EA.	11		
3	CLEAN, REMOVE DEBRIS AND INSPECT EXIST LIFT STATION – in place at _____dollars and _____cents per Each.	EA.	1		
4	CLEAN, REMOVE DEBRIS AND CCTV EXIST SANITARY SEWER (UP TO 12-INCH DIAMETER) – in place at _____dollars and _____cents per Linear Foot.	LF.	3,200		
5	CLEAN AND VIDEO INSPECT EXIST MANHOLE – in place at _____dollars and _____cents per Each.	EA.	16		

ITEM NO.	ITEM WITH BID PRICES WRITTEN IN WORDS	UNIT	ESTIMATED QUANTITIES	UNIT PRICE	TOTAL AMOUNT BID
6	MOBILIZATION (NOT TO EXCEED 7% OF TOTAL BASE BID) at _____dollars and _____cents per Lump Sum.	LS.	1		
7	TRAFFIC CONTROL AND BARRICADES- complete in place at _____dollars and _____cents per Lump Sum.	LS.	1		

UNIT PRICE BID - (ITEMS 1 THROUGH 7) AS DOLLAR FIGURE:

$_____

UNIT PRICE BID - (ITEMS 1 THROUGH 7) AMOUNT IN WORDS:

_____ DOLLARS

_____ CENTS

ADD ALTERNATE BID ITEMS – These alternate bid items shall be provided for a complete bid. The bid items cost shall include the adjustment of select manholes' ring and cover above grade, the restoration of disturbed lawn areas via sodding and existing line repair up to 12-inch, and waterproofing joints and connections to existing lift station along Alamo St. Work shall be done to the limits and as specified in the plans and specifications. This bid item to include the removal of temporary parking and restore site to original condition and surface.

ALT. ITEM NO.	ALTERNATE #1 ITEM WITH BID PRICES WRITTEN IN WORDS	UNIT	ESTIMATED QUANTITIES	UNIT PRICE	TOTAL AMOUNT BID
A.1	6" ADJUSTMENT OF EXIST MANHOLE FRAME AND COVER ABOVE NATURAL GROUND – in place at _____dollars and _____cents per Each.	EA.	8		

ALT. ITEM NO.	ALTERNATE #1 ITEM WITH BID PRICES WRITTEN IN WORDS	UNIT	ESTIMATED QUANTITIES	UNIT PRICE	TOTAL AMOUNT BID
A.2	ST. AUGUSTINE SODDING , in place at _____dollars and _____cents per Square Feet.	S.F.	1,300		
A.3	EXISTING LINE REPAIR (VARIOUS DIAMETERS UP TO 12-INCH) - in place at _____dollars and _____cents per Linear Foot	L.F.	100		
A.4	WATERPROOF JOINTS & CONNECTIONS AT EXIST LIFT STATION - in place at _____dollars and _____cents per Each.	EA.	1		

ADD ALTERNATE UNIT PRICE BID - (ITEMS 1 THROUGH 4) AS DOLLAR FIGURE:

$_____

ALTERNATE UNIT PRICE BID - (ITEMS 1 THROUGH 4) AMOUNT IN WORDS:

_____ DOLLARS

_____ CENTS

Amounts are to be shown in both words and figures. In case of discrepancy the amounts shown in words will govern. All unit prices provided on this bid form shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for. Bidder understands that the Owner reserves the rights to reject any and all bids and to waive any informalities in the bidding. Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents and Specifications.

Bidder agrees that the work will be substantially completed and ready for final payment in accordance with the General Conditions and within the time limits set forth in the Agreement. Bidder accepts the provision of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

If the owner elects to accept and include an additive bid item (if any) in the contract, the additive bid item prices will be added to the prices for the appropriate bid items. Additive bid item prices (if included in the Bid Form) are not meant to be stand alone prices but will be in addition to the bid items referenced.

Also as a part of this bid, bidders are required to list below subcontractors who will be providing 10% or more of the total dollar amount of the work described herein. Subcontractors providing 10% or more of the total dollar amount of the work described herein are also required to submit a Statement of Qualifications found in the instructions to bidders. Upon award, subcontractors will also be required to have insurance equal to that required of the contractor.

Subcontractor Name	**General work to be performed by Subcontractor**

CONTRACTOR _____

BY_____

TITLE_____

MAILING ADDRESS_____

STREET ADDRESS_____

COUNTY_____

PHONE_____

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires.

Name of Bidder:_____ Date Organized:_____
Address:_____ Date Incorporated:_____

Number of years in contracting business under present name _____

CONTRACTS ON HAND:

Contract	Amount $	Completion Date

Type of work performed by your company:_____
Number of years experience in this type of construction:_____
Have you ever failed to complete any work awarded to you?_____
Have you ever defaulted on a contract?_____

List at least five (5) projects of a similar nature completed by your firm in the past five (5) years (attach additional pages if necessary):

Contract	Amount $	Mo/Yr Completed

Major equipment available for this contract:_____
_____
_____

Attach resume(s) for the principal member(s) of your organization, including the officers as well as the proposed superintendent for the project.

Credit available: $_____ Bank reference:_____

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the _____ in verification of the recitals comprising this Statement of Bidder's Qualifications.

Executed this _____ day of _____, 20_____ .

By:(signature) _____ Title:_____

(Print name)_____

BONDS

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ _____, as Principal, and _____ _____, as Surety, are hereby held and firmly bound unto _____ as Owner in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for _____
_____

NOW, THEREFORE,

(A) If said BID shall be rejected, or

(B) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a Bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

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

_____ (L.S.)
Principal

_____
Surety

By: _____

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

CONSTRUCTION PERFORMANCE BOND

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

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

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

3.1. The Owner has notified the Contractor and the Surety at its address described Paragraph 10 below, that the Owner is considering declaring Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and

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

4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

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

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

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

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

1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
2. Deny liability in whole or in part and notify the Owner citing reasons therefore.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

6.1. The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
6.2. Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
6.3. Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.

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

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

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

12. Definitions.

12.1. Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
12.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
12.3. Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
12.4. Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: THAT

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars, $(_____) in lawful money of the United State, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of: **High School Sanitary Sewer Rehabilitation Phase 1, Hamshire Fannett Independent School District.**

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during

the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all obligation shall be void; otherwise to remain in full force and effect. Provided, that this bond is executed pursuant to Chapter 2253, Texas Government code as amended and all liabilities on this bond shall be determined in accordance therewith.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

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

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed, and the said surety has caused these presents to be executed, each by its duly authorized agent and officer, and its corporate seal to be affixed at _____ on this the ____ day of _____ A.D., 20__. This instrument is executed in _____ counterparts, each one of which shall be deemed an original.

_____
Contractor

ATTEST: By _____

_____ Title _____

_____
Surety

WITNESS: By _____

_____ Title _____

Surety companies executing the above-referenced Bonds must appear on the Department of the Treasury's Circular as to companies holding certificates of authority as acceptable sureties on federal bonds and as acceptable reinsurance companies (Department Circular 570, 2004 Revision or such subsequent revisions most currently dated prior to the date of the Bond). Sureties companies must also be authorized to transact business in the State of Texas. The date of the Bond must not be prior to the date of the Contract. If a CONTRACTOR is a partnership, all partners shall execute the Bond. If the CONTRACTOR is a corporation, then a corporate resolution must be presented and the Bond executed by the duly authorized corporate representative. All Bonds should have affixed to them a separate fully executed and completed Power of Attorney by the surety.

CONSTRUCTION PAYMENT BOND

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

2. With respect to the Owner, this obligation shall be null and void if the Contractor:
   2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
   2.2. Defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

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

4. The Surety shall have no obligation to Claimants under this Bond until:
   4.1. Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
   4.2. Claimants who do not have a direct contract with the Contractor:
      1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
      2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
      3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

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

6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
   6.1. Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
   6.2. Pay or arrange for payment of any undisputed amounts.

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

8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the

Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

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

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

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

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

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

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

15. DEFINITIONS

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

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

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

PAYMENT BOND

THE STATE OF TEXAS
KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF

THAT WE _____ of the City of _____, County of _____, and the State of _____, as principal, and _____, as surety, authorized under the laws of the State of Texas to act as surety on bonds for principals held and firmly bound unto the Hamshire Fannett Independent School District, and to all sub-contractors, workmen, laborers, mechanics and furnishers of material, and any other claimant, as their interest may appear, all of whom shall have the right to sue upon their bond, in the penal sum of _____($_____) Dollars, lawful currency of the United States of America, for the payment of which, well and truly to be made, we do hereby bind ourselves, our heirs, executors, administrators and successors, jointly and severally and firmly by these presents:

The condition of this Bond is such that, whereas, the above bounden Principal as prime contractor has on the _____ day of _____, 20__, entered into a formal contract with the Hamshire Fannett Independent School District for **High School Sanitary Sewer Rehabilitation Phase 1, Hamshire Fannett Independent School District** which is hereby referred to and made part hereof as if fully written herein.

NOW, THEREFORE, if the above bounden Principal shall protect all claimants supplying labor and material as provided for in Chapter 2253, Texas Government Code and shall pay and perform any and every obligation that of such principal is required or provided for in such law, this bond being totally for the protection of all such claimants and being for the use of each such claimant, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

It is stipulated and agreed that no change, extension of time, addition to or modification of the Contract or work performed thereunder, shall in anywise affect the obligation of this bond, and surety expressly waives notice of any such change, extension of time, addition or modification.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed, and the said has caused these presents to be executed, each by its duly authorized agent and officer, and its corporate seal to be affixed at _____ on this the ___ day of ____, A.D., 20__.

_____
Contractor
By: _____

ATTEST:
_____ Title _____

_____
Surety
By _____

WITNESS:

_____ Title _____

Surety companies executing the above-referenced Bonds must appear on the Department of the Treasury's Circular as to companies holding certificates of authority as acceptable sureties on federal bonds and as acceptable reinsurance companies (Department Circular 570, 2004 Revision or such subsequent revisions most currently dated prior to the date of the Bond). Sureties companies must also be authorized to transact business in the State of Texas. The date of the Bond must not be prior to the date of the Contract. If a CONTRACTOR is a partnership, all partners shall execute the Bond. If the CONTRACTOR is a corporation, then a corporate resolution must be presented and the Bond executed by the duly authorized corporate representative. All Bonds should have affixed to them a separate fully executed and completed Power of Attorney by the surety.

AGREEMENT AND
CONDITIONS OF AGREEMENT

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is dated as of the_____day of_____ in the year 2026 and between **THE HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT (**hereinafter called OWNER) and

_____ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents for the project scope which includes but is not limited to: Installation of inflow protection inserts in all manholes, clean, debris removal and video inspection of existing lift station along Alamo Street, install watertight plug and/or cap to existing cleanouts, cleaning, debris removal and video inspection of existing sewer lines and manholes and other pertinent bid items. Work shall be done to the limits and as specified in the plans and specifications.

The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

HIGH SCHOOL SANITARY SEWER REHABILITATION PHASE 1
HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT

Article 2. ENGINEER.

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

Article 3. CONTRACT TIMES.

3.1 The Work shall commence **on or before a date to be specified in the "Notice to Proceed" provided by the owner,** and to be fully completed **within 45 consecutive calendar days** as stipulated in the Bid Form. Contract Times commence to run as provided in paragraph 3.1 and 3.2 of the Supplemental Conditions, and completed and ready for final payment in accordance with paragraph 3.3 of the Supplemental Conditions.

3.2 *Liquidated Damages*. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving 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) CONTRACTOR shall pay OWNER Five Hundred Dollars ($500.00) for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in paragraph 3.1 for completion and

readiness for final payment or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER Two Hundred Fifty Dollars ($250.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

Article 4. CONTRACT PRICE.

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to the paragraph below:

4.1 For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in the Bid Form which is attached and made part of this Agreement.

UNIT PRICE BID - (ITEMS 1 THROUGH 7) AMOUNT IN WORDS

_____ DOLLARS

and _____ CENTS

UNIT PRICE BID - (ITEMS 1 THROUGH 7) AS DOLLAR FIGURE **$**_____

Article 5. PAYMENT PROCEDURES.

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

5.1 *Progress Payments; Retainage*. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Applications for Payment as recommended by ENGINEER, on or about the twenty-fifth (25th) day of each month during construction as provided in paragraphs 5.1.1. and 5.1.2. below. All such payments will be measured by the schedule of values established OR 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 in the General Requirements.

5.1.1. Prior to Substantial Completion, progress payment will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold.

90% of Work completed (with the balance being retainage).

5.1.2. Upon Substantial Completion, in an amount sufficient to increase total payments to CONTRACTOR to 90% of the Contract Price (with the balance being retainage), less such amounts as ENGINEER shall determine, or OWNER may withhold.

5.2 *Final Payment*. Upon final completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.13.

Article 6. CONTRACTOR'S REPRESENTATIONS.

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

6.1. CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in paragraph 8) and the other related data identified in the Bidding Documents including "technical data."

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

6.3. CONTRACTOR is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

6.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities). CONTRACTOR accepts the determination set forth in paragraph SC-4 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Terms and in accordance with the other terms and conditions of the Contract Documents.

6.5. 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.

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

6.7. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Article 8. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1 This Agreement;

8.2 Exhibits to this Agreement;

8.3 Notice to Proceed;

8.4 General Conditions;

8.5 Supplementary Conditions;

8.6 Summary of Work and Technical Specifications bearing the title" Technical Specifications" and Appendices;

8.7 Drawings (drawings included as an attachment to the specification document);

8.8 Addenda;

8.9 CONTRACTOR's Bid on Bid Form;

8.10 Bidding Documents as described in section 13 of the Instructions to Bidders submitted by CONTRACTOR prior to Notice of Award; and

8.11 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All written Amendments and other documents amending, modifying or supplementing the Contract Documents.

The documents listed in paragraphs 8.2 - 8.11 above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in the General Conditions.

Article 9. MISCELLANEOUS.

9.1 Terms used in this Agreement which are defined in the General Conditions will have the meanings indicated in the General Conditions.

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

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

9.4 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 Document 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.

9.5 OTHER PROVISIONS.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This Agreement will be effective on the _____ day of _____, 20___ (which is the Effective Date of the Agreement).

OWNER:	CONTRACTOR:
HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT	
By:_____	By:_____
Date:_____	Date:_____
	[CORPORATE SEAL]
Attest_____	Attest_____
Address for giving notices	Address for giving notices
12702 2nd Street Hamshire, Texas 77622	

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principal references to	**3.5.3, 10.1-10.2**
Written Amendment--	
definition of	**1.45**
principal references to	**1.10, 3.5, 6.6.2, 6.8.2, 6.19, 10.1, 10.4, 11.2, 12.1, 13.12.2, 14.7.2**
Written Clarifications and Interpretations	**3.6.3, 9.4, 9.11**
Written Notice Required--	
by CONTRACTOR	**7.1, 9.10-9.11, 10.4, 11.2, 12.1**
by OWNER	**9.10-9.11, 10.4, 11.2, 13.14**

GENERAL CONDITIONS

ARTICLE 1--DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

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

1.2 ***Agreement*****--The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.**

1.3 ***Application for Payment*****--The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.**

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

1.5 ***Bid*****--The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.**

1.6 ***Bidding Documents*****--The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).**

1.7 ***Bidding Requirements*****--The advertisement or invitation to Bid, instructions to bidders, and the Bid form.**

1.8 ***Bonds*****--Performance and Payment bonds and other instruments of security.**

1.9 ***Change Order*****--A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.**

1.10 ***Contract Documents*****--The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and ENGINEER's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.26 and 6.27 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.**

1.11 ***Contract Price*****--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).**

1.12 ***Contract Times*****--The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13.**

1.13 ***CONTRACTOR*****--The person, firm or corporation with whom OWNER has entered into the Agreement.**

1.14 ***Defective*****--An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendations of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).**

1.15 ***Drawings*****--The drawings which show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop Drawings are not Drawings as so defined.**

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

1.17 ***ENGINEER*****--The person, firm or corporation named as such in the Contract Document.**

1.18 ***ENGINEER's Consultant*****--A person, firm or corporation having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.**

1.19 ***Field Order*****--A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.**

1.20 ***General Requirements*****--Sections of Division 1 of the Specifications.**

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

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

1.23 ***Liens*****--Liens, charges, security interests or encumbrances upon real property or personal property.**

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

1.25 ***Notice of Award*****--The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.**

1.26 ***Notice to Proceed*****--A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.**

1.27 ***OWNER*****--The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.**

1.28 ***Partial Utilization*****--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.**

1.29 ***PCBs*****--Polychlorinated biphenyls.**

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

1.31 ***Project*****--The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.**

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

1.33 ***Resident Project Representative*****--The authorized representative of ENGINEER who may be assigned to the site or any part thereof.**

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

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

1.36 ***Specifications*****--Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards**

and workmanship as applied to the Work and certain administrative details applicable thereto.

1.37 *Subcontractor*--An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.38 *Substantial Completion*--The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

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

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

1.41 *Underground Facilities*--All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

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

1.43 *Work*--The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.44 *Work Change Directive*--A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.23. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in paragraph 10.2.

1.45 *Working Day*--A working day is defined as a calendar day not including Saturdays, Sundays, or those legal holidays as specified in the list prepared by the OWNER for contract purposes, in which weather or other conditions not under the control of the CONTRACTOR shall permit the performance of the principal units of work underway for a continuous period of not less than seven hours between 7 a.m. and 6 p.m.. A principal unit of work shall be that unit which controls the completion time of the contract.

1.46 *Written Amendment*--A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

ARTICLE 2--PRELIMINARY MATTERS

Delivery of Bonds:

2.1 When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2 OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work.

Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:

2.3 The Contract Times will commence to run on the thirtieth (30th) day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth (60th) day after the day of Bid opening or the thirtieth (30th) day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Work:

2.4 CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:

2.5 Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless CONTRACTOR knew or reasonably should have known thereof.

2.6 Within ten (10) days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

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

2.6.2 a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

2.6.3 a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.7 Before any Work at the site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with paragraph 5.4.

Preconstruction Conference:

2.8 Within twenty (20) days after the Contract Times start to run, but before any Work at the site is started, a conference attended by 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 2.6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9 Unless otherwise provided in the Contract Documents, at least ten (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 2.6. CONTRACTOR shall have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until the schedules are submitted to and acceptable to ENGINEER as provided below. The progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR

from CONTRACTOR's full responsibility therefor. CONTRACTOR's schedule of Shop Drawing and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the required submittals. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3--CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1 The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2 It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3 Reference to Standards and Specifications of Technical Societies; Reporting and Resolving Discrepancies:

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

3.3.2 If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and, CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.23) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

3.3.3 Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

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

3.3.3.2 the provisions of any such 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).

No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to OWNER, ENGINEER or any of ENGINEER's Consultants, agents or employees any duty or authority to supervise or direct the furnishing or

performance of the Work of any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.4 Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgement of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5 The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.5.1 a formal Written Amendment,

3.5.2 a Change Order (pursuant to paragraph 10.4), or

3.5.3 a Work Change Directive (pursuant to paragraph 10.1).

3.6 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.6.1 a Field Order (pursuant to paragraph 9.5),

3.6.2 ENGINEER's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.26 and 6.27), or

3.6.3 ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7 CONTRACTOR, and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER.

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

Availability of Lands:

4.1 OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a correct statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's lien against such lands so furnished with which CONTRACTOR will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR and OWNER are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in OWNER's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 Subsurface and Physical Conditions:

4.2.1 ***Reports and Drawings*****: Reference is made to the Supplementary Conditions for identification of:**

4.2.1.1 ***Subsurface Conditions*****: Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents; and**

4.2.1.2 ***Physical Conditions*****: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by ENGINEER in preparing the Contract Documents.**

4.2.2 ***Limited Reliance by CONTRACTOR Authorized; Technical Data*****: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:**

4.2.2.1 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

4.2.2.2 other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3 any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.

4.2.3 ***Notice of Differing Subsurface or Physical Conditions*****: If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:**

4.2.3.1 is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2 is of such a nature as to require a change in the Contract Documents, or

4.2.3.3 differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4 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 conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.23), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.2.4 ***ENGINEER's Review*****: ENGINEER will promptly review the pertinent conditions, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.**

4.2.5 ***Possible Contract Documents Change*****: If ENGINEER concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.**

4.2.6 ***Possible Price and Times Adjustments*****: An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in CONTRACTOR's cost of, or time required for**

performance of, the Work; subject, however, to the following:

4.2.6.1 such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4, inclusive;

4.2.6.2 a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

4.2.6.3 with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.10 and 11.9; and

4.2.6.4 CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Times if;

4.2.6.4.1 CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a negotiated contract; or

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

4.2.6.4.3 CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.2.3.

If OWNER and CONTRACTOR are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not 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.

4.3 Physical Conditions--Underground Facilities:

4.3.1 *Shown or Indicated*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities or by others.

Unless it is otherwise expressly provided in the Supplementary Conditions;

4.3.1.1 OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.1.2 The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2 *Not Shown or Indicated*: If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.23), identify the owner of such Underground Facility and given written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect

and document the consequences of the existence of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

Reference Points:

4.4 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 shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point 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 by professionally qualified personnel.

4.5 Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1 OWNER shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. OWNER shall not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom Contractor is responsible.

4.5.2 CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.23), and (ii) notify OWNER and ENGINEER (and 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 hazardous condition or take a corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work is stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim therefor as provided in Articles 11 and 12.

4.5.3 If after receipt of such special 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 such portion of the Work that is in connection with such hazardous condition or in such affected are to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim

therefor as provided in Articles 11 and 12. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

4.5.4 This section deleted.

4.5.5 The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5--BONDS AND INSURANCE

Performance, Payment and Other Bonds:

5.1 CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one (1) year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2 If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within ten (10) days thereafter substitute another Bond and surety, both of which must be acceptable to OWNER.

5.3 Licensed Sureties and Insurers; Certificates of Insurance:

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

5.3.2 CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which Contractor is required to purchase and maintain in accordance with paragraph 5.4.

CONTRACTOR's Liability Insurance:

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

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

5.4.2 claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

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

5.4.4 claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

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

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

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7 with respect to insurance required by paragraphs 5.4.3 through 5.4.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers and employees of all such additional insureds;

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

5.4.9 include completed operations insurance;

5.4.10 include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.12, 6.16 and 6.31 through 6.33;

5.4.11 contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty (30) days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.3.2 will so provide);

5.4.12 remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing *defective* Work in accordance with paragraph 13.12; and

OWNER's Liability Insurance:

5.5 In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.4, 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.

ARTICLE 6--CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1 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, but CONTRACTOR shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.2 CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3 CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the

Work or property at the site adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4 Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all 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 furnishing, performance, testing, start-up and completion of the Work.

6.5 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for 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 kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

Progress Schedule:

6.6 CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1 CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2 Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7 Substitutes and "Or-Equal" Items:

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

6.7.1.1 *"Or-Equal"*: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

6.7.1.2 *Substitute Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under subparagraph 6.7.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by the ENGINEER will include the following as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR

shall first make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use 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 work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute.

6.7.1.3 ***CONTRACTOR's Expense:*** **All data to be provided by CONTRACTOR in support of any proposed "or-equal" or substitute item will be at CONTRACTOR's expense.**

6.7.2 ***Substitute Construction Methods or Procedures:*** **If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.7.1.2.**

6.7.3 ***Engineer's Evaluation:*** **ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.2 and 6.7.2. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR pursuant to paragraphs 6.7.1.2 and 6.7.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER accepts a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute item.**

Concerning Subcontractors, Suppliers and Others:

6.8.1 CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of

materials or equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject *defective* Work.

6.9.1 CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization , nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.9.2 CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the ENGINEER through CONTRACTOR.

6.10 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.

6.11 All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.6 or 5.7, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier will waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants and all other additional insured for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

Patent Fees and Royalties:

6.12. 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. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or

resulting from 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.

Permits:

6.13. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.14 Laws and Regulations:

6.14.1 CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and 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.

6.14.2 If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses and damages caused by, arising out of or resulting therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.3.2.

Taxes:

6.15 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.

Use of Premises:

6.16 CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

6.17 During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

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

Record Documents:

6.19 CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work

Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered to ENGINEER for OWNER.

Safety and Protection:

6.20 CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1 all persons on the Work site or who may be affected by the Work;

6.20.2 all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

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

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant 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 of negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

Safety Representative:

6.21 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.

Hazard Communication Programs:

6.22 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.

Emergencies:

6.23 In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or ENGINEER, 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. 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 to document the consequences of such action.

6.24 Shop Drawings and Samples:

6.24.1 CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawings and Sample

submittals (see paragraph 2.9). All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The 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 materials and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.26.

6.24.2 CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.26. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.25 Submittal Procedures:

6.25.1 Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

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

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

6.25.1.3 all information relative to CONTRACTOR's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

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

6.25.2 Each submittal will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

6.25.3 At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

6.26 ENGINEER will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by ENGINEER as required by paragraph 2.9. 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. ENGINEER's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.27 ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless

CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.25.1.

6.28 Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by ENGINEER as required by paragraph 2.9, 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.

Continuing the Work:

6.29 CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.30 CONTRACTOR'S General Warranty and Guarantee:

6.30.1 CONTRACTOR warrants and guarantees to OWNER, ENGINEER and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be *defective*. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

6.30.1.1 abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors or Suppliers; or

6.30.1.2 normal wear and tear under normal usage.

6.30.2 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:

6.30.2.1 observations by ENGINEER;

6.30.2.2 recommendation of any progress or final payment by ENGINEER;

6.30.2.3 the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

6.30.2.4 use or occupancy of the Work or any part thereof by OWNER;

6.30.2.5 any acceptance by OWNER or any failure to do so;

6.30.2.6 any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13;

6.30.2.7 any inspection, test or approval by others; or

6.30.2.8 any correction of *defective* Work by OWNER.

Indemnification:

6.31 To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants 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) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) 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, and (ii) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused

in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.32 In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.31 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 person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.33 The indemnification obligations of CONTRACTOR under paragraph 6.31 shall not extend to the liability of ENGINEER and ENGINEER's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

Survival of Obligations:

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

ARTICLE 7--OTHER WORK

Related Work at Site:

7.1 OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other direct contracts therefor which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then: (i) written notice thereof will be given to CONTRACTOR prior to starting any such other work, and (ii) CONTRACTOR may make a claim therefor as provided in Articles 11 and 12 if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the amount or extent thereof.

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

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

Coordination:

7.4 If OWNER contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

> **7.4.1 the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;**

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

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

Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8--OWNER'S RESPONSIBILITIES

8.1 Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.2 In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer against whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.3 OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4 OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.

8.5 OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraph 5.5.

8.6 OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7 OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8 In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

8.9 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 furnishing or performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10 This section deleted.

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

ARTICLE 9--ENGINEER'S STATUS DURING CONSTRUCTION

OWNER's Representative:

9.1 ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2 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 will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections 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 on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against *defective* Work. ENGINEER's visits and on-site observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of ENGINEER's on-site 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 furnishing or performance of the Work.

Project Representative:

9.3 If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. 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 person will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4 ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5 ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR who shall perform the Work involved promptly. If OWNER or CONTRACTOR believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6 ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be *defective*, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7 In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraphs 6.24 through 6.28 inclusive.

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

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

Determinations for Unit Prices:

9.10 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 upon OWNER and CONTRACTOR, unless, within ten (10) days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other and to

ENGINEER written notice of intention to appeal from ENGINEER's decision and: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in Exhibit GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to ENGINEER's decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. Such appeal will not be subject to the procedures of paragraph 9.11.

Decisions on Disputes:

9.11 ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty (30) days) after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty (60) days after the start of such occurrence or event unless ENGINEER allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to ENGINEER and the claimant within thirty (30) days after receipt of the claimant's last submittal (unless ENGINEER allows additional time). ENGINEER will render a formal decision in writing within thirty (30) days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. ENGINEER's written decision on such claim, dispute or other matter will be final and binding upon OWNER and CONTRACTOR unless: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in EXHIBIT GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within thirty (30) days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty (60) days of the date of such decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. THIS AGREEMENT CONTAINS NO PROVISION FOR BINDING ARBITRATION AS A MEANS OF RESOLVING ANY DISPUTE ARISING HEREUNDER. Non-binding mediation, to be conducted in Jefferson County, Texas.

9.12 When functioning as interpreter and judge under paragraphs 9.10 and 9.11, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 or 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter pursuant to Article 16.

9.13 Limitations on ENGINEER's Authority and Responsibilities:

9.13.1 Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility by ENGINEER shall create, impose or give rise to any duty owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

9.13.2 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 furnishing or performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3 ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4 ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instruction, schedules, guarantees, bonds and certificates of inspection, tests and approvals and Other documentation required to be delivered by paragraph 14.12 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.

9.13.5 The limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to ENGINEER's Consultants, Resident Project Representative and assistants.

ARTICLE 10--CHANGES IN THE WORK

10.1 Without invalidating the Agreement 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 additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2 If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefor as provided in Article 11 or Article 12.

10.3 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 and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

10.4 OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

10.4.1 changes in the Work which are (i) ordered by OWNER pursuant to paragraph 10.1, (ii) required because of acceptance of *defective* Work under paragraph 13.13 or correcting *defective* Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2 changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3 changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11--CHANGE OF CONTRACT PRICE

11.1 The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

11.2 The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an adjustment in the Contract Price shall be based on

written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty (30) days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty (60) days after the start of such occurrence or event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

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

11.3.1 where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.9.1 through 11.9.3, inclusive);

11.3.2 where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2);

11.3.3 where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 11.3.2, on the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work:

11.4 The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

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

11.4.2 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.

11.4.3 Payments made by CONTRACTOR to the Subcontractors for Work performed or furnished 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 accepted. 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 paragraphs 11.4, 11.5, 11.6, and 11.7. All subcontracts shall be subject

to the other provisions of the Contract Documents insofar as applicable.

11.4.4 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.

11.4.5 Supplemental costs including the following:

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

11.4.5.2 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.

11.4.5.3 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, installation, dismantling and removal thereof, all 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.

11.4.5.4 Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

11.4.5.5 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.

11.4.5.6 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 and furnishing of the Work provided they 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. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7 The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9 Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5 The term Cost of the Work shall not include any of the following:

11.5.1 Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4--all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

11.5.2 Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

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

11.5.4 Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5 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. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6 The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1 a mutually acceptable fixed fee; or

11.6.2 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:

11.6.2.1 for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's fee shall be fifteen percent;

11.6.2.2 for costs incurred under paragraph 11.4.3, the CONTRACTOR's fee shall be five percent;

11.6.2.3 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 11.4.1, 11.4.2, 11.4.3 and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of fifteen percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

11.6.2.4 no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5 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

11.6.2.6 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 11.6.2.1 through 11.6.2.5, inclusive.

11.7 Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8 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 furnished and performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

11.8.1 the 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

11.8.2 CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the 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.

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

11.9 Unit Price Work:

11.9.1 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 established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with paragraph 9.10.

11.9.2 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.

11.9.3 OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

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

11.9.3.2 there is no corresponding adjustment with respect to any other item of Work; and

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

ARTICLE 12--CHANGE OF CONTRACT TIMES

12.1 The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty (30) days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty (60) days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Times (or Milestones) shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2 All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3 Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefor as provided in paragraph 12.1. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.4 Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii) delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

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

13.1 *Notice of Defects:* Prompt notice of all *defective* Work of which OWNER or ENGINEER have actual knowledge will be given to CONTRACTOR. All *defective* Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

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

Tests and Inspections:

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

13.4 OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, test, or approvals required by the Contract Documents except:

13.4.1 for inspections, tests or approvals covered by paragraph 13.5 below;

13.4.2 that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3 as otherwise specifically provided in the Contract Documents.

13.5 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, CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work.

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

13.7 Uncovering Work as provided in paragraph 13.6 shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

Uncovering Work:

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

13.9 If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or

inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is *defective*, CONTRACTOR shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such 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 Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

OWNER May Stop the Work:

13.10 If the Work is *defective*, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any surety or other party.

Correction or Removal of Defective Work:

13.11 If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all *defective* Work, whether or not fabricated, installed or completed, or , if the Work has been rejected by ENGINEER, remove it from the site and replace it with Work that is not *defective*. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12 Correction Period:

13.12.1 If within one (1) year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or 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*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not *defective*, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

13.12.2 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 or by Written Amendment.

13.12.3 Where *defective* Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, the correction period hereunder with respect to such Work will be extended for an additional period of one (1) year after such correction or removal and replacement has been satisfactorily completed.

Acceptance of Defective Work:

13.13 If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so. 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). If any such acceptance occurs prior to ENGINEER's

recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14 If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct *defective* Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven (7) days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors and ENGINEER and ENGINEER's Consultants access to the site to enable OWNER to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. 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. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14--PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1 The schedule of values established as provided in paragraph 2.9 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.

Application for Progress Payment:

14.2 At least twenty (20) days before the date established 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 and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

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

Review of Applications for Progress Payment:

14.4 ENGINEER will, within ten (10) days after receipt of each Application for Payment, either indicate in

writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. Ten (10) days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by OWNER to CONTRACTOR.

14.5 ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's on-site 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:

14.5.1 the Work has progressed to the point indicated,

14.5.2 the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation), and

14.5.3 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.

However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

14.6 ENGINEER's recommendation of any payment, including final payment, shall not mean that ENGINEER is 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 furnishing or performance of Work, or for any failure of CONTRACTOR to perform or furnish Work in accordance with the Contract Documents.

14.7 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 referred to in paragraph 14.5. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1 the Work is *defective*, or completed Work has been damaged requiring correction or replacement,

14.7.2 the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3 OWNER has been required to correct *defective* Work or complete Work in accordance with paragraph 13.14, or

14.7.4 ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

14.7.5 claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work.

14.7.6 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,

14.7.7 there are other items entitling OWNER to a set-off against the amount recommended, or

14.7.8 OWNER has actual knowledge of the occurrence of any of the events enumerated in

paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

Substantial Completion:

14.8 When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion will shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven (7) days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within fourteen (14) days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said fourteen (14) days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

14.9 OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10 Use by OWNER at OWNER's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) 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, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1 OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready or its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. 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 paragraphs 14.8 and 14.9 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.

14.10.2 No occupancy or separate operation or part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

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

Final Application for Payment:

14.12 After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, (ii) consent of surety, if any, to final payment, and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and (ii) all payrolls, material and equipment bills and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

Final Payment and Acceptance:

14.13 If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten (10) days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, ENGINEER will return the Application 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. Thirty (30) days after the presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

14.14 If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Waiver of Claims:

14.15 The making and acceptance of final payment will constitute:

14.15.1 a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from *defective* Work appearing after final inspection pursuant to paragraph 14.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

14.15.2 a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15--SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1 At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

OWNER May Terminate:

15.2 Upon the occurrence of any one or more of the following events:

15.2.1 if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2 if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.3 if CONTRACTOR disregards the authority of ENGINEER; or

15.2.4 if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any,) seven (7) days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), 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 finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by OWNER arising out of or resulting from completing the Work such excess will be paid to CONTRACTOR. If such claims, costs, losses and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and when so approved by ENGINEER incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

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

15.4 Upon seven (7) days' written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

15.4.1 for 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;

15.4.2 for 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;

15.4.3 for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and

15.4.4 for reasonable expenses directly attributable to termination.

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

CONTRACTOR May Stop Work or Terminate:

15.5 If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety (90) days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty (30) days after it is submitted or OWNER fails for thirty (30) days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven (7) days' written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within thirty (30) days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may upon seven (7) days' written notice to OWNER and ENGINEER stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude CONTRACTOR from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

ARTICLE 16--MISCELLANEOUS

Giving Notice:

16.1 Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Times:

16.2.1 When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

16.2.2 A calendar day of twenty-four (24) hours measured from midnight to the next midnight will constitute a day.

Notice of Claim:

16.3 Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

Cumulative Remedies:

16.4 The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.12, 6.16, 6.30, 6.31, 6.32, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER

and ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and 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.

Professional Fees and Court Costs Included:

16.5 Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

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SUPPLEMENTARY CONDITIONS OF AGREEMENT

These Supplementary Conditions amend or supplement the "General Conditions" and other provisions of the *Contract Documents* as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

SC-1. DEFINITIONS

The terms used in these Supplementary Conditions which are defined in the "General Conditions" have the meanings assigned to them in the "General Conditions".

SC-1.17 *ENGINEER*--The word "ENGINEER" in these specifications shall be understood as referring to **FITTZ & SHIPMAN, INC**, 1405 Cornerstone Court, Beaumont. Texas 77706.

SC-1.27 *OWNER*--The word "OWNER" in these specifications shall be understood as referring to **HAMSHIRE FANNETT INDEPENDENT SCHOOL DISTRICT (HFISD)**, 12702 2nd Street, Hamshire, Texas 77622.

SC-2. PRELIMINARY MATTERS

SC-2.1 *ORDER OF PRECEDENCE* -- The order of Precedence for the contract shall be as follows:

1. Addenda
2. Drawings
3. Technical Specifications
4. Special Conditions
5. General Conditions

SC-3. CONTRACT TIME

A. Working Day

A Working Day is defined as any day, in which weather or other conditions, not under the control of the CONTRACTOR, will permit construction of the principal units of the work for a period of not less than seven (7) hours between 7:00 a.m. and 6:00 p.m. Saturdays, Sundays and legal holidays will not be counted as a working day if not worked. If the Contractor works on any of these days, he will be charged a working day. Work will not be permitted on Sundays or within 30 minutes of sunset on any working day except with the approval of the Engineer and/or Owner.

If the Contractor intends to claim a day as a “rainout” day, one in which weather or site conditions will not permit the construction of the principal items of the project, as defined herein, he must do so before 9 a.m. of each day by notifying the Engineer. This does not pertain to weather conditions that develop after 9 a.m. and stop the progress of the work for the rest of the day. Site conditions that prevent work must be determined before 9 a.m. of each day. Requests for additional time will be reviewed on a case by case basis but only for the proceeding 30 day period. Requests for additional time should be made each month. No request for additional time will be considered for delays from previous months.

B. Calendar Day

A calendar day is everyday of the week including Saturday, Sunday and legal holidays. Additional time is not normally granted for CALENDAR day contracts for weather related delays. Requests for additional time for other delays will be reviewed on a case by case basis but only for the proceeding 30 day period. Requests for additional time should be made each month. No request for additional time will be considered for delays from previous months.

SC-3.1 *COMMENCEMENT OF CONTRACT TIMES, NOTICE TO PROCEED* --The Contract Times will commence to run on the thirtieth (30th) day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth (60th) day after the day of Bid opening or the thirtieth (30th) day after the Effective Date of the Agreement, whichever date is earlier.

SC-3.2 *STARTING THE WORK* --CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

SC-3.3 *FINAL PAYMENT AND ACCEPTANCE*--If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten (10) days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable. Otherwise, ENGINEER will return the Application 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. Thirty (30) days after the presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

SC-4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.2 *SUBSURFACE AND PHYSICAL CONDITIONS*--Any "technical data" pertaining to reports of explorations and tests of subsurface or physical conditions at or contiguous to the site and their related drawings will be furnished in the Appendices. This material, if present, is subject to the exclusions set forth in the Contract Documents.

SC-4.3. *SHOWN OR INDICATED*--The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities or by others.

4.3.1 OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.2 The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.3 *Not Shown or Indicated*: If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith, identify the owner of such Underground Facility and given written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefor. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

SC-5. BONDS AND INSURANCE

SC-5.1 *PERFORMANCE, PAYMENT AND OTHER BONDS*--The successful bidder shall furnish a Performance Bond for the protection of the OWNER and a Payment Bond for the protection of the OWNER and persons furnishing labor and materials, in an amount equal to one hundred (100%) percent of the contract price if the contract exceeds $50,000. Said Bonds shall remain in effect for a period of one (1) year from the date of acceptance. Bonds must be executed within fifteen (15) days of the date of the Notice of Award. Said period will be extended only upon presentation to the OWNER within said period, reasons which in the opinion of the OWNER, justify an extension. If contract and bonds are not received by the OWNER within said period, the OWNER may proceed to have the work specified herein performed by any means at its command, and any excess cost to the OWNER will be charged against the bidder to whom award was made. If the contract award does not exceed the sum of $50,000, no Payment and Performance Bonds will be required, but no money will be paid to the Contractor until completion and acceptance of the work.

SC-5.4 *CONTRACTOR'S LIABILITY INSURANCE*--Before commencing work under this contract, the CONTRACTOR shall obtain insurance to cover claims which may arise from the CONTRACTOR's operations, including operations by any *Subcontractors*. CONTRACTOR shall maintain such insurance until the completion of work.

Such insurance shall be furnished by companies licensed to do business in Texas, rated "A" or better by Best's, and (or) approved by the OWNER.

Prior to beginning work, the CONTRACTOR shall furnish to the OWNER a Certificate of Insurance verifying coverages, limits and provisions outlined below. The insurance shown below is the minimum coverage to be provided. CONTRACTOR should carry additional insurance which he deems appropriate.

INSURANCE:
EACH BID MUST BE ACCOMPANIED BY CERTIFICATES OF COVERAGE FROM WELL REGARDED INSURANCE COMPANIES REFLECTING THE FOLLOWING COVERAGE:
(Certificates must be issued in the name of the company submitting the bid.)

a. Worker's Compensation and Employers Liability
Covering all work contemplated in the contract by the bid. Amount of statutory requirement.
b. General Liability
Written on a Comprehensive General Liability or Commercial General Liability form to include completed operations/products and addition of the Broad Form Comprehensive General Liability Endorsement and removal of any X (explosion), C (collapse) and U (underground) exclusions. Minimum General Aggregate Limit of $300,000 with Hamshire Fannett Independent School District named as an additional insured.
c. Automobile Liability
Issued on a Comprehensive Automobile Liability form covering all owned and non owned vehicles. Minimum Combined Single Limit of $300,000 or $100,000/$300,000/$100,000.
d. Builders Risk
Equal to contract amount with SPISD named as additional insured.

ALL CERTIFICATES SUBMITTED WITH BIDS WILL BE REVIEWED BY THE DISTRICT'S INSURANCE COMMITTEE. ANY DEVIATIONS OR DEFICIENCIES FOUND MAY BE CAUSE FOR THE REJECTION OF THE BID. ALL COVERAGE REQUIRED AT THE TIME OF THE AWARD OF CONTRACT MUST REMAIN IN FORCE DURING THE ENTIRE CONTRACT PERIOD. RENEWAL CERTIFICATES MUST BE RECEIVED PRIOR TO THE EXPIRATION DATE LISTED ON THE ORIGINAL CERTIFICATE. These certificates must contain a provision that the Owner shall be notified thirty (30) days before the cancellation of the insurance. **FAILURE TO SUBMIT INSURANCE CERTIFICATES WITH BID WILL BE CAUSE FOR THE REJECTION OF THE BID.**

Other Provisions:

A. Additional Insured - CONTRACTOR shall provide endorsements on General Liability, Automobile and Umbrella policies naming **HFISD**, the ENGINEER and their subsidiaries, affiliates, employee, officers, directors, and agents of all of them.

B. Waiver of Subrogation - CONTRACTOR shall provide endorsements in favor of the **HFISD**, the ENGINEER and their subsidiaries, affiliates, employees, officers, directors, and agents of all of them, on Worker's Compensation, General Liability, Automobile, and Umbrella policies. Must be noted on certificate of insurance in force.

C. Detail of Bidder's Standard Coverage - Where this standard coverage is greater or broader than that required above. The above stated coverages and limits are not deemed to be a limitation on or a limit of liability and are not a representation by the **HFISD**, that the above insurance is

all that should be obtained nor that said insurance is sufficient to protect CONTRACTOR.

SC-6. CONTRACTOR'S RESPONSIBILITIES

SC-6.3 *LABOR REQUIREMENTS*--Preference shall be given to qualified local residents in the employment of laborers and mechanics for work on the project under this contract. No person under the age of sixteen years shall be employed on the project under this contract.

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 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 his non-discrimination clause.

SC-6.8.1 *SUBCONTRACTING*-- *Subcontractors* shall be required to have insurance equal to that required of the contractor. Any subcontractor will also be required to abide by requirements set forth in the contract documents. The CONTRACTOR shall not award any work to a *Subcontractor* without prior written approval of the OWNER which approval will not be given until the CONTRACTOR submits to the OWNER a written statement concerning the proposed award to the *Subcontractor*, which statement shall contain such information as the OWNER may require.

SC-6.16 *PROTECTION OF AND RESTORATION OF PROPERTY*--The CONTRACTOR shall be responsible for the protection of adjacent or adjoining property or properties in any way encountered, which may be damaged or seriously affected by any process of construction to be performed under this agreement; and he shall be liable for any and all claims for such damage on account of his failure to fully protect all adjoining property.

The CONTRACTOR shall not enter public or private property for any purpose related to this agreement without prior consent of the OWNER or person or entity having the right of possession thereof. The CONTRACTOR shall notify the proper representative of any public utility, corporation or entity at least 48 hours in advance of work that might interfere with the use of such utility. When entering upon public or private property, including easements appurtenant to private property, the CONTRACTOR shall exercise great care to prevent damage to trees, fences, shrubbery, plants, culverts, lawns, driveways, pavement, overhead pole lines, underground utility and other lines, and all other property or appurtenances, private or public, on or adjacent to property entered for a purpose related to this agreement.

The CONTRACTOR shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect or misconduct in the manner or method of executing the work, or due to his non-execution of the work, or at any time due to *defective* work or materials, and said responsibility shall not be released until the work shall have been completed and accepted. When any damage or injury is done to public or private property on account of any act, omission, neglect, or misconduct in the execution of the work or in consequence of the non-execution thereof on the part of the CONTRACTOR, he shall restore or have restored at his sole cost, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed by the ENGINEER, or he shall make payment to the property OWNER for such damage or injury. If the CONTRACTOR should fail, refuse, or neglect to repair, rebuild, or otherwise restore such property, the OWNER may, upon 48 hours written notice, under ordinary circumstances, and without notice when a

nuisance or hazardous condition results, proceed to repair, rebuild or otherwise restore such property as may be determined necessary and CONTRACTOR agrees to pay the reasonable cost to ENGINEER of such restoration or, in the alternative, the cost thereof will be deducted from any monies due or to become due the CONTRACTOR under this contract.

The CONTRACTOR agrees to defend, indemnify, save and hold the OWNER harmless against any claim or claims for damages to adjacent or adjoining property, or to any public or private property, arising or growing out of the performance of the contract or resulting from entry upon such property by CONTRACTOR.

A copy of any agreement or memorandum of agreement between the CONTRACTOR and any property in connection with the performance of this contract shall be filed with the OWNER during the term of this contract. The CONTRACTOR shall file an affidavit with the OWNER declaring that any claim or claims for damages to adjacent or adjoining property, or to any public or private property, arising or growing out of the performance of the contract or resulting from entry upon such property by CONTRACTOR have been reported to the OWNER and the insurance carrier for CONTRACTOR.

The filing of a copy of the agreement between the CONTRACTOR and the property OWNER and the affidavit reporting claims for damages shall be a condition precedent to acceptance of final payment under the contract.

If the CONTRACTOR must use City streets in his operation, he will obtain necessary permits to do so. In addition to permit requirements, the CONTRACTOR shall observe the following basic regulations:

1. The CONTRACTOR, at all times, shall conduct work so as to insure the least practicable inconvenience to traffic in accordance with the special provisions of the Detailed Specifications. No street or part of street shall be closed until the CONTRACTOR has on hand and immediately available all of the necessary materials and equipment to complete the work thereon and shall notify the OWNER or ENGINEER a minimum of 24 hours in advance of the closing of said street or part of street.

2. The CONTRACTOR shall provide and maintain suitable warning signals, barricades, and night lights where necessary, to direct and protect traffic, and shall carry out any orders thereon which may be given by the ENGINEER. No street or part of street shall be closed to the public until such barricades and warning signals for day and night have been provided and placed by the CONTRACTOR. The failure of the ENGINEER to issue orders on this subject, or the inadequacy of orders which may be issued by him, shall not release the CONTRACTOR from any of his responsibilities. Barricades, signs and handling of traffic shall be in accordance with the "Manual on Uniform Traffic Control Devices" as adopted by the Texas Highway Department, and as directed by the ENGINEER, all in accordance with these plans and specifications.

SC-6.20 *PUBLIC SAFETY AND CONVENIENCE*--The safety of the public and the convenience of traffic shall be regarded as of prime importance. Unless otherwise shown on the plans or except as herein provided, all portions of the street shall be kept open to traffic. It shall be the entire responsibility of the CONTRACTOR to provide for traffic along and across the street as well as for ingress and egress to private property all as specified herein, as shown on the plans, or as directed by the ENGINEER.

The CONTRACTOR shall plan and execute his operations in a manner that will cause the minimum interference with traffic. The CONTRACTOR shall secure the ENGINEER's approval of his proposed plan of operation, sequence of work and methods of providing for safe passage of traffic before it is placed into

operation. Such plans shall also meet the approval of the OWNER or ENGINEER.

If at any time during construction, the approved plan does not accomplish the intended purpose, due to weather or other conditions affecting the safe handling of traffic, the CONTRACTOR shall immediately make necessary changes therein to correct the unsatisfactory conditions.

Where the specifications require, or the ENGINEER directs that traffic be carried over or along the proposed work, construction operations shall be so prosecuted and new material kept as placed and spread as to allow the passage of traffic in comfort and safety.

At night or otherwise, all equipment not in use shall be stored in such manner and at such locations as not to interfere with the safe passage of traffic. The CONTRACTOR shall provide and maintain flagmen at such points and for such periods of time as may be required to provide for the safety and convenience of public travel and CONTRACTOR's personnel, and as directed by the ENGINEER.

SC-7. MISCELLANEOUS

SC-7.1 *PRE-CONSTRUCTION CONFERENCE* -- A pre-construction conference will be held between the Engineer, Owner, and the Contractor prior to construction. The dates, time, and place will be announced after the project has been bid.

SC-7.2 *WARRANTY* -- Neither the final Certificate of Completion nor any provision in the contract nor partial or entire use of the improvements included in this contract shall constitute an acceptance of work not done in accordance with this contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within a period of 12 months from the date of the Certificate of Completion.

SC-7.3 *PERMITS* - The Contractor shall be responsible for acquiring all necessary permit associated with the construction of this project.

SC-7.4 *NOTIFICATION* -- The contractor shall be responsible for notifying the Owner at least 48 hours prior to the commencement of work. The contact person and phone number will be given to the Contractor at the pre-construction conference.

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT_____

DATE OF ISSUANCE_____

_____

OWNER_____

OWNER'S Contract No. _____

CONTRACTOR_____ ENGINEER_____

_____

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

From the date of Substantial Completion the responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

RESPONSIBILITIES:

OWNER:_____

_____

_____

CONTRACTOR:_____

_____

_____

_____

The following documents are attached to and made a part of this Certificate:

[For items to be attached see definition of Substantial Completion as supplemented and other specifically noted conditions precedent to achieving Substantial Completion as required by Contract Documents.]

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR'S obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on _____, 20__.

_____
ENGINEER

By:_____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____, 20__.

_____
CONTRACTOR

By:_____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on _____, 20__.

_____
OWNER

By:_____
(Authorized Signature)

TECHNICAL SPECIFICATIONS

SANITARY SEWER REHABILITATION
HAMSHIRE-FANNETT ISD
HIGH SCHOOL CAMPUS
HAMSHIRE, TEXAS

TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

Item 1050 GENERAL
Item 1566 GENERAL EROSION AND SEDIMENTATION PRACTICES

DIVISION 2 - SITEWORK

Item 2400 PIPE/MANHOLE CLEANING & CCTV INSPECTION
Item 2550 CONSTRUCTION OF SANITARY SEWER LINES
Item 2560 BYPASS PUMPING
Item 2570 MANHOLES
Item 2580 REHABILITATION OF MANHOLES & STRUCTURES
Item 2590 TRENCH SAFETY SYSTEMS
Item 2622 EXCAVATION AND BACKFILL FOR SANITARY SEWERS
Item 2790 CEMENT STABILIZED SAND
Item 2932 SODDING

DIVISION 3 - CONCRETE

Item 3050 CONCRETE
Item 3211 REINFORCING STEEL

ITEM 1050
GENERAL

A. PROJECT MEETINGS

1. PRECONSTRUCTION CONFERENCE
To be held at a time, date, and place to be determined. Mandatory attendance by: Project Superintendent, Major Material Suppliers, Engineer, and Owner Representatives.

2. PURPOSE:
a. To discuss questions pertaining the Drawings and Specifications from any person present.
b. To clarify the Owner's role and participation in materials supplying.
c. To review submittals and procedures required.
d. To discuss requirements for monthly payments, substantial completion, and final payment.
e. To discuss specific phasing requirements to accommodate and minimize disruption to the surrounding neighborhood.

3. PROJECT PROGRESS MEETINGS:
Review of the project status on a biweekly basis by the Project Superintendent, Engineer, Subcontractors, and Representative of the Owner. Meetings will typically be held on the job site.

B. CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. GENERAL:
The Project Superintendent shall be responsible to the Owner for all temporary facilities, storage area, and traffic controls, in and around the project site during the construction period, and shall control excessive dust, noise, etc. with the intent of minimizing it. Each sub-contractor shall coordinate temporary facilities, storage areas and traffic control, in and around the project site, with the Project Superintendent.

2. ACCESS TO SITE:
Suitable areas at the project site for the Contractor's office, warehouse, storage of materials, etc. will be provided free of charge by the Owner. Specific location shall be coordinated with and approved by the Engineer and Owner.

3. SANITARY FACILITIES:
The Project Superintendent shall provide and maintain sanitary toilets and sanitary urinals for use by those engaged on the job site. Provide one (1) urinal and one (1) toilet for each 25 workmen. The Project Superintendent shall keep such toilet facilities in sanitary condition and at the completion of the contract, remove them from the job site.

4. TEMPORARY UTILITIES:
The Owner will pay for temporary utilities at the construction site. The Sub-Contractors shall confer with the Project Superintendent, utilities representatives, and other sub-contractors, making such arrangements as are required, for temporary utilities needed during the course of construction. Each Sub-Contractor shall provide and coordinate with the Project Superintendent, hook-ups and runs for all utilities used during construction until final acceptance by the Owner. All Sub-Contractors shall make arrangements with the Project Superintendent for such services as they may require.

5. TEMPORARY CONSTRUCTION BUILDINGS:

a. The Project Superintendent shall provide one (1) job sign, located in a prominent location at the project site or along a major thoroughfare within the community as directed by the Engineer & Owner. The job sign shall be constructed and installed immediately after signing of the construction contract and will remain in place until final completion, or by instruction of the Owner. The job sign will include the job name, the Owner's information, the name and address of the Engineer, name and address of the Contractor.

b. Signs or advertisements other than the job sign are not permitted to be displayed without Owner's approval.

C. GUARANTEES / WARRANTIES:

1. Where guarantees and/or warranties are required by the Contract Documents, or they are shown in printed technical literature, the Sub-Contractor shall furnish to the Project Superintendent three (3) copies of all guarantees or warranties made out in the name of the Owner prior to final payment. At completion of the work, the Contractor must supply a copy of the warranty and proof that the warranty has been received and accepted by the manufacturer, to the Owner, in care of the Contractor.

D. WORKER PROTECTION AND OSHA COMPLIANCE

1. Protection of workers and construction practices will be in accordance with OSHA requirements.

2. Worker Protection Program: The Contractor will have a written plan for the protection of his workers in accordance with OSHA requirements. The Plan must also address required training and Certification of such training for all workers and the competent person for the project.

3. Competent Person - The Contractor must identify in writing the name, job title and qualifications of the person that will be designated as the competent person on the project site.

END OF ITEM 1050

ITEM 1566

GENERAL EROSION AND SEDIMENTATION PRACTICES

PART 1 - GENERAL

1.01 DESCRIPTION

This item describes the installation of erosion and sedimentation control practices which must be utilized during construction activities.

1.02 RELATED WORK

Related work as called for in PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATION.

PART 2 - PRODUCTS

Provide materials as specified in PART 3.

PART 3 - EXECUTION

3.01 GENERAL

A. No clearing and grubbing or rough cutting, other than as specifically directed by the Owner to allow soil testing and surveying, shall be permitted until erosion and sedimentation control systems are in place.

B. Equipment and vehicles shall be prohibited by Contractor from maneuvering on areas outside of designated construction zone. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.

C. Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site.

D. Conduct all construction operations under this Contract in conformance with the erosion control practices described in that Item.

3.2 TOPSOILING FOR EROSION AND SEDIMENTATION CONTROL SYSTEMS

A. When removal, stockpiling, and replacing of topsoil and vegetation (topsoiling) is called for as a component of another Item, conduct erosion control practices described in this Item during topsoiling operation.

    1. When topsoiling, maintain erosion and sedimentation control systems, such as swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.

    2. Maintain grades which have been previously established on areas to be topsoiled.

    3. After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil ,the subgrade shall be loosened by discing or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil. Compact by passing a bulldozer up and down the slope to create horizontal erosion control slots.

4. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 PROTECTION OF TREES IN CONSTRUCTION AREAS

A. Heavy equipment, vehicular traffic, and stockpiles of construction materials, including topsoil, are not permitted within the dripline of any tree to be retained. Contractor shall avoid all contact with trees to be retained unless otherwise directed by Owner or required by the work of this Contract.

B. Specimen trees shown on the PLANS shall be boxed or fenced. When called for in the PLANS, tunnel under the root system for the installation of utility lines.

C. Tree trunks, exposed roots, and limbs of the trees designated to be retained which are damaged during construction operations will be cared for as prescribed by a forester or licensed tree expert at the expense of the Contractor.

3.4 DUST CONTROL

A. Control dust blowing and movement on construction sites and roads to prevent exposure of soil surfaces, to reduce on and off-site damage, to prevent health hazards and to improve traffic safety.

B. Control dust blowing by utilizing one or more of the following methods:

1. Mulches, bound with chemical binders such as Curasol, Terratack, or equal.

2. Temporary vegetative cover.

3. Spray-on adhesives on mineral soils when not used by traffic.

4. Tillage to roughen surface and bring clods to the surface.

5. Irrigation by water sprinkling.

6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

C. Dust control methods shall be implemented immediately whenever dust can be observed blowing on the project site.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Maintenance and repair of construction machinery and equipment must be confined to areas specifically designated for that purpose. Such designated areas must be located and designed so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance systems. These areas must be provided with adequate waste disposal receptacles for liquid as well as solid waste. Maintenance areas should be inspected and cleaned daily.

B. On a construction site where designated equipment maintenance areas are not feasible, care must be taken during each individual repair or maintenance operation to prevent potential pollutants from becoming available to be washed into streams or conveyance systems. Temporary waste disposal receptacles must be provided.

3.6 WASTE COLLECTION AND DISPOSAL

A. A plan shall be formulated for the collection and disposal of waste materials on a construction site. Such a plan must designate locations for trash and waste receptacles and establish a special collection schedule. Methods for ultimate disposal of waste must be specified and carried out in

accordance with applicable local, state, and federal health and safety regulations. Special provisions must be made for the collection and disposal of liquid wastes and toxic or hazardous materials.

B. Receptacles and other waste collection areas must be kept neat and orderly to the extent possible. Waste should not be allowed to overflow its container or accumulate for excessively long periods of time. Trash collection points must be located where they will least likely be affected by concentrated storm runoff.

3.7 WASHING AREAS

Vehicles such as cement or dump trucks and other construction equipment must not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Special areas must be designated for washing vehicles. These areas should be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Wash areas must have gravel or rock bases to minimize mud generation.

3.8 STORAGE OF CONSTRUCTION MATERIALS, CHEMICALS, ETC.

Sites where chemicals, cements, solvents, paints, or other potential water pollutants are to be stored, must be isolated in areas where they will not cause runoff pollution.

Toxic chemicals and materials, such as pesticides, paints, and acids must be stored in accordance with manufacturer's guidelines. Groundwater resources must be protected from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened or stored.

3.9 DEMOLITION AREAS

Demolition projects usually generate large amounts of dust with significant concentrations of heavy metals and other toxic pollutants. Dust control techniques shall be used to limit the transport of the airborne pollutants. However, water or slurry used to control dust must be retained on the site and not allowed to run directly into watercourses or storm water conveyance systems.

3.10 SANITARY FACILITIES

All construction sites must be provided with adequate sanitary facilities for workers in accordance with applicable health regulations.

3.11 PESTICIDES

Pesticides used during construction should be stored and used in accordance with manufacturer's guidelines and with local, state and federal regulations. Overuse should be avoided and great care should be taken to prevent accidental spillage. Pesticide containers must never be washed in or near flowing streams or storm water conveyance systems.

3.12 CONSTRUCTION METHODS

A. Provide filter fabric fence systems at locations specified on PLANS in accordance with enclosed drawing. Filter fabric fence systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulate.

B. Attach the filter fabric to 1 inch by 2 inch wooden stakes spaced at a maximum of 3 feet apart and embedded a minimum of 1 foot. The wooden stakes shall be installed at a slight angle toward the source of anticipated runoff.

C. Trench in the tow of the filter fabric fence with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow or for V-trench configuration as

shown on the attached detail drawing. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. The filter fabric should be provided in continuous rolls and cut to length of the Silt Fence to minimize the use of joints. When joints are necessary, the fabric should be spliced together only at a support post with a minimum 6 inch overlap, and sealed securely.

E. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once a week. Repair or replace damaged section immediately to restore the requirements of this Item. Remove sediment deposits when silt reaches one-third of the height of the fence in depth.

3.13 MEASUREMENT AND PAYMENT

A. Unless indicated in the PROPOSAL as a pay item, there will be no separate payment for work performed under this Item. Include cost of work performed under this Item in Contract prices bid for items of which this work is a component. When indicated in PROPOSAL as pay item, measure and pay for the filter fabric fence by the linear feet of completed and accepted filter fabric fence between the limits of the beginning and ending of wooden stakes. Filter fabric fence, measured as stated, will be paid for at the unit price bid for "Filter Fabric Fence, complete in place."

   A. Payment for filter fabric fence will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.

END OF ITEM 1566

ITEM 2400

PIPE/MANHOLE CLEANING & CCTV INSPECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

Requirements and procedures for Closed Circuit Television CCTV Inspection of sanitary sewer.

1.2 PAYMENT

A. Pipe Cleaning, Debris Removal & Pre Installation CCTV Inspection

1. Measurement

Measurement for this item will be by the linear foot of line televised for CCTV inspection performed prior to any line modification or replacement determined from the distance recorded on the video log.

2. Payment

The work performed and materials furnished in accordance with this item and measured as provided under “Measurement” will be paid for at the unit price bid per linear foot for “Pipe Cleaning & CCTV Inspection” or per each for “Clean & Video Inspect Exist Manhole”.

Contractor will not be paid for unacceptable video.

3. The price bid shall include:
   a. Mobilization
   b. Cleaning & Debris Removal
   c. Digital file (including Inspection Report)

A Post-CCTV Inspection (If applicable)

1. Measurement

Measurement for this item will be by the linear foot of line televised for CCTV inspection performed following repair or replacement any line modification or replacement determined from the distance recorded on the video log.

2. Payment

The work performed and materials furnished in accordance with this item and measured as provided under “Measurement” will be paid for at the unit price bid per linear foot for “Post-Installation CCTV”.

Contractor will only be paid for video that is accepted in writing by the Engineer.

3. The price bid shall include:
   a. Mobilization

b. Cleaning
c. Digital file

1.3 REFERENCES

A. Reference Standards

1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision logged at the end of this specification, unless a date is specifically cited.

B. Definitions

1. Pre-CCTV – CCTV Inspection performed by Contractor on existing mains prior to any line modification or replacement.

2. Post CCTV – CCTV Inspection performed by the Contractor following installation of new mains but before completion of other infrastructure.

1.4 ADMINISTRATIVE REQUIREMENTS

A.2 Coordination

a Sanitary Sewer Lines
i Meet with the Owner/Engineer to confirm that the appropriate equipment, software and standard templates are being used, if required.

B.2 Schedule

a Include Pre and Post CCTV schedule as part of the Overall Project Schedule

a Allow time for Engineer review (2 weeks minimum – Notification needs to be sent out to Project Manager, Owner's Inspector and Engineer. Post-CCTV can be scheduled and submitted for review after each sewer main construction has been completed.

a If CCTV is accepted by the Owner or Engineer, proceed with work. If rejected, coordinate with City per Part 1.4 A.

1.5 SUBMITTALS

A. All CCTV submittals shall be submitted to the Engineer for review and comment.

B. Contractor shall provide Engineer with video file in MP4 with H.264 code – Advanced Video Coding and compression standard.

C. Inspection Report shall include:

1. Asset
a. Date of Inspection
b. Project Name
c. Main Number – as shown on drawings or GIS ID (if available)
d. Upstream Manhole Station – as shown on drawings or GIS ID (if available)
e. Downstream Manhole Station – as shown on drawings or GIS ID (if available)
f. Pipe Diameter

g. Material
h. Pipe Length
i. Inspector's Name

2. Inspection
   a. Inspection Number (i.e. 1st, 2nd, etc…)
   b. Crew Number
   c. Operator Name
   d. Operator Comments
   e. Reason for Inspection
   f. Camera Travel Direction is Upstream to Downstream – Deviation will require written justification.
   g. Inspected Length (feet)
   h. City Contract Name
   i. Consultant Company Name
   j. Consultant Contact Name
   k. Consultant Contact Phone Number
   l. Contractor Company Name
   m. Contractor Contact Name
   n. Contractor Contact Phone Number

D. CCTV overlay screen shall include (opening text to CCTV inspection)
   a. Date of inspection
   b. City Name
   c. City Project Number
   d. Project Name
   e. Main number
   f. Upstream Manhole station
   g. Downstream Manhole Station
   h. Diameter
   i. Material
   j. Length
   k. Contractor
   l. Inspector's Name
   m. Travel Direction

PART 2 PRODUCTS

A. Equipment

1. Closed Circuit Television Camera

   a. The television camera used shall be one specifically designed and constructed for sewer 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 percent humidity/submerged conditions. The equipment will provide a view of the pipe head of the equipment and of features to the side of the equipment through turning and rotation of the lens. The camera shall be capable of tilting at right angles along the axis of the pipe while panning the camera lens through a full circle about the circumference of the pipe. The lights on the camera shall also be capable of panning 90-degrees to the axis of the pipe.

   b. The radial view camera must be solid state color and have remote control of the rotational lens. The camera shall be capable of viewing the complete circumference of the pipe and manhole structure, including the cone-section or corbel. The camera lens shall be an auto-iris type with remote controlled manual override.

2. Video Capture System

    a. The video and audio recordings of the sewer inspections shall be made using digital video equipment. A video enhancer may be used in conjunction with, but not in lieu of, the required equipment. The digital recording equipment shall capture sewer inspection on USB drive, with each sewer segment (from upstream manhole to downstream manhole) inspection recorded as an individual file in MP4 with H.264 code format.

    b. The system shall be capable of printing pipeline inspection reports with captured images of defects or other related significant visual information on a standard color printer.

    c. The system shall store digitized color picture images and be saved in digital format on a USB drive.

    d. The system shall be able to produce data reports to include, at a minimum, all observation points and pertinent data.

    e. Camera footage, date & manhole numbers shall be maintained in real time and shall be displayed on the video monitor as well as the video character generators illuminated footage display at the control console.

PART 3 EXECUTION

A. General

1. Prior to inspection, obtain pipe and manhole asset identification numbers from the plans or Owner to be used during inspections. Inspections performed using identification numbers other than the line number (or existing sanitary sewer main/lateral) and station numbers from plans or from assigned numbers from the Owner will not be accepted.

2. CCTV inspection shall not commence until the sewer section to be televised has been completely cleaned.

3. CCTV inspection shall not commence until the sewer section to be televised has been connected to existing sewer system and is active.

4. Post CCTV inspection of newly installed sewers (not yet in service) shall not commence until completion of the following items:
    a. Manhole final grade is set.
    b. Sewer main is cleaned.
    c. Sewer air test is complete
    d. Vacuum test of manholes is complete
    e. Installation of all lateral services and completion of low pressure testing of all new services.
    f. All sewer main and manhole work is complete.

5. Use manual winches, power winches, TV cable, and power rewinds that do not obstruct the camera view, allowing for proper evaluation.

B. Pipe

- Begin inspection immediately after cleaning of the main.

- Move camera through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the main's condition.

- Do not move camera at a speed greater than 30 feet per minute.

- During investigation stop camera at each defect along the new main.
    a. Record the nature, location and orientation of the defect.

5. Service connections, Pan the camera to get a complete overview of the service connection including zooming into service connection. Include location (i.e. clock position with respect to main line).

6. Joint defects, include comment on condition, signs of damage, etc… Note offset and/or separation at a joint. Includes joints where one pipe is not correctly aligned with the connecting section of pipe causing a lip that could impede flow or a section of pipe that is aligned but has pulled apart horizontally and may not connect to the other section of pipe.

7. Notable visible pipe defects such as cracks, broken or deformed pipe, holes, offset joints, obstructions, sags or debris (show as % of pipe diameter). If debris has been found in the pipe during the post CCTV Inspection, additional cleaning is required, and pipe shall be re-televised.

8. Notable other locations that do not appear to be typical for normal pipe conditions. This could also include any damage to the main and/or services after the main has been replaced.

9. Note locations where camera is underwater and level as a percent of pipe diameter. Camera underwater – Point in which the camera lens is 100% submerged underwater and/or 50% of the pipe's diameter. Camera emerged – point in which the camera lens has emerged from being underwater. Severity is described in ranges by linear feet. This would include pipe deflections causing a considerable increase (i.e. double or more) in the depth of flow in the pipe (to at least between 1/3 to ½ of the pipe diameter).

10. Provide accurate distance measurement. The meter device is to be accurate to the nearest 1/10 foot.

11. CCTV recording segments are to be a single continuous file item. A single segment is defined from manhole to manhole.

12. Pre-installation inspection for sewer mains to be rehabilitated
    a. Perform Pre-CCTV inspection immediately after cleaning of the main and before rehabilitation work.
        1. No cleaning equipment shall be present in the main during CCTV.
        2. Water shall be present (or flowing) while recording CCTV to confirm system functionality.
    b. If, during inspection, the CCTV will not pass through the entire section of the main due to blockage or pipe defect, set up so the inspection can be performed from the opposite manhole.

13. Post Inspection
    a. Prior to inserting the camera, flush and clean the main. Water should be present/flowing during the recording operation, to demonstrate the functioning of the installed system.

14. Documentation of CCTV Inspection

a. Sanitary Sewer Lines
    1. Follow requirements set forth above in Part 1.5 C.

END OF ITEM 2400

ITEM 2550

CONSTRUCTION OF SEWER LINES

PART 1 - GENERAL

The work to be performed shall consist of the furnishing and installation of sanitary sewer lines, including all excavation, backfill, and disposal of surplus excavation. The type or types of pipe to be furnished and installed under the contract will conform to the type or types designated on the plans and as set out on the bid proposal sheet.

PART 2 – PRODUCTS

2.1 CONSTRUCTION MATERIALS

Where the plans do not indicate the specification under which the pipe is to be furnished, the pipe supplied shall conform with the ASTM specification given in the table for the depth of bury.

Pipe shall be manufactured in accordance with the latest revision published by the American Society for Testing Materials of the specifications shown in Table I and II. Unless otherwise specified, piping, joints and fittings shall conform to ASTM or ANSI Standards hereinafter described.

2.2 WASTEWATER SYSTEMS

A. PVC Sewer Pipe

PVC sewer pipe and joints shall conform to ASTM D-2241 Class 160 for the size and type required. PVC sewer pipe shall be installed in accordance with ASTM D 2321.

The Contractor shall take care in handling the pipe and protect it from damage. If necessary to cut the pipe, the Contractor will follow the recommendations of the manufacturer.

Before making a joint, all pipe and couplings shall be clean, dry, and free of mud, oil and grease. The use of non-toxic water-soluble lubricant will be permitted for making the joint assembly or as recommended by the manufacturer.

The pipe will be laid in the trench at lines and grades shown on the plans and trench bottoms shall be shaped to conform with the pipe and couplings. Any defective pipe found in place will be replaced at the Contractor's expense.

Leakage testing will be performed in accordance with ASTM F1417 “Low-Pressure Air Test”

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. Excavation

Except as otherwise specified or shown on the plans, all pipelines shall be constructed in open cut trenches with vertical sides excavated with a ladder-type trenching machine or backhoe. Where machines other than ladder-type trenching machines are used, excavated material composed of large chunks and clods shall not be used for backfilling and such material shall be disposed of by

the Contractor and other suitable material for backfill shall be provided without additional expense to the Owner.

Trenches for pipe lines shall have a width of not less than the outside diameter of the pipe plus 12 inches and not more than the outside diameter of the pipe plus 18 inches.

No excavated material shall be deposited and left overnight on the gravel, shell, asphalt, concrete or other paved area of any roadway or sidewalk, or on any lawns, garden or shrubbery, and such material shall be handled in such a manner as not to obstruct drainage. Where necessary for compliance with this provision, the material shall be hauled.

A.1 Surplus Excavated Material

Any surplus excavated material shall be hauled and disposed of as directed by the Engineer. If the Engineer notifies the Contractor that the Owner does not have use for this material, it shall become the property of the Contractor to dispose of as he wishes without injury to the Owner or any individual.

If excavated material is left on the street, and this material becomes mixed with material excavated by public service corporations, or with that of any other firm, corporation or individual excavating on any of the streets in the Project Area, and if the Contractor does not protect himself by removing his material before anyone else can mix other material with his, or if he does not put up proper partitions or barriers to keep his material separated from the other material, then the Engineer shall be the sole judge as to whom is responsible for this excavated material. If the Contractor does not remove this material when directed by the Engineer, the Owner has the right under this Contract and these specifications, to hire trucks and men to remove his material and to deduct the cost of same from any estimate due the said Contractor.

A.2 Wet Trench Construction

Where the earth in the trench bottom does not, in the opinion of the Engineer, provide a suitable foundation for the pipeline, the Contractor shall, where ordered by the Engineer, place granular material in the trench bottom under and around the pipe. This material will be placed in accordance with "CLASS C BEDDING".

A.3 Dewatering Trench

No pipeline, manhole or appurtenance shall be laid in a trench in the presence of water. All water shall be removed from trench sufficiently ahead of the pipe placing operation to insure a dry, firm bed on which to place the pipe. The trench will continue to be dewatered until after all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping, or pumping in connection with wellpoint installation as the particular situation may warrant. The Engineer may direct the Contractor to install the pipe with "CLASS C BEDDING" in conjunction with or in lieu of trench dewatering.

A.4 Sheeting and Bracing

Contractor shall provide Trench Safety Systems in accordance with Specification Item “Trench Safety Systems” and comply with OSHA rules for all trenches with depths greater than 5 feet.

Sheet and brace excavation as necessary to prevent caving or where necessary, in the Engineer's opinion, the sides of the trench or other excavation shall be braced and rendered secure. This in no way relieves the Contractor his responsibility for Safety and Protection as required by the general conditions.

All timber shall be free of seriously weakening defects such as knots and splits, solid and sound, sufficient in strength without increased thickness and suitable for the use intended. The

Contractor shall place timber in the trench in accordance with Details. Spacing of cross bracing is not to exceed four (4) feet. All bracing is to be securely nailed in position. After the excavation has been backfilled and tamped, steel or other sheeting may be pulled. To protect adjacent property, the Engineer may order timber sheeting to be left in trench.

A.5 Pipe Bedding

The pipe shall be bedded in the trench as described herein for the class of bedding required by the specifications and as directed by the Engineer. Pipe bedding shall be “CLASS B” for all depths up to 10 foot depth. The cost of preparing CLASS B BEDDING shall be included in the Contract unit price bid for type, size, and depth of pipe installed. "CLASS C BEDDING" shall be furnished, if directed by the Engineer. Measurement and payment of "CLASS C BEDDING" shall be as described in later sections of this specification.

"CLASS B BEDDING" shall be in accordance with the Details and as described below:

The bottom of the trench for the pipe barrel shall be excavated to a line parallel to the flow line of the pipe and to a depth of not less than three inches (3") below the outside surface of the pipe barrel. Then select native materials shall be spread over the entire bottom of the trench to the flow line grade of the pipe after which a subgrade conforming to the outside shape of the pipe shall be prepared.

The bottom of the trench shall be accurately shaped by hand to conform to the lowest half pipe diameter of the pipe taking special care to provide uniform bearing for the entire length of the pipe and to provide depressions for bell ends of couplings of pipe. Select backfill shall be placed under and around the pipe and hand tamped up to the springline of the pipe after which the remainder of the trench shall be backfilled in accordance with the subsection of this item entitled, “Backfilling”.

"CLASS C BEDDING" shall be in accordance with the Details and as described below:

The bottom of the trench for the pipe barrel shall be excavated to a line parallel to the flow line of the pipe and to a depth of not less than three inches (3") below the outside surface of the pipe barrel. Then clean crushed stone or gravel in accordance with TxDOT Type A Grade 1 shall be spread over the entire bottom of the trench to the flow line grade of the pipe after which a subgrade conforming to the outside shape of the pipe shall be prepared taking special care to provide uniform bearing for the entire length of the pipe and to provide depressions for bell ends of couplings of pipe.

Select backfill shall be placed under and around the pipe and hand tamped up to the springline of the pipe after which the remainder of the trench shall be backfilled in accordance with the subsection of this item entitled, “Backfilling”.

A.6 Installation of Pipe Sewers

No pipe shall be installed in the trench until the excavation has been completed, the bottom of the trench shaped, and the trench has been approved for condition, line, and grade by the Engineer.

The Contractor shall, at his own expense, furnish and place in position as directed by the Engineer, all the necessary stakes, grade and laser elevation and alignment devices for locating the work. All location stakes must be protected from injury or change of location. The Contractor must also furnish, at his own expense, laser elevation and alignment device for use in giving lines and grades, the necessary plummets and graduated poles made of a form approved by the Engineer.

The pipes and specials shall be so laid in the trench such that after the sewer is completed, the interior surface thereof shall conform accurately to the grades and alignments fixed and given by the Engineer.

All sewers must be laid in perfectly straight lines, so that a light can be seen from one manhole to the other, with the exception of curves as indicated on the plans, for all sizes of sewers.

The pipe shall be laid accurately to line and grade, with the spigot end downstream entering the bell to full depth. Pipes shall be fitted together and matched so that when laid they will form a sewer with a smooth and uniform invert. Special care shall be used to insure that the joints are pushed home or adequately tightened and remain in that position. Joints shall be completed in accordance with the published instructions of the manufacturer and ASTM Specifications. Contractor shall temporarily seal open end of pipe when pipe laying operation is halted.

The Contractor shall supply the Engineer with a statement from the manufacturer or other competent authority, certifying that the jointing materials meet the requirements of the specifications. Contractor shall also supply a statement from the manufacturer of gaskets not fabricated with the pipe, showing the type and dimensions of the pipe joint for which the gaskets are designed and the pipe used shall be in conformity therewith.

The Contractor shall place tees, where shown on the plans or as directed by the Engineer, and extend service lines up to the Resident's property line or easement edge. Under no circumstances shall the service line have less than 18 inches of cover at any point.

The Contractor shall construct cleanouts where shown on the plans or as directed by the Engineer. The Contractor shall take special care to excavate the end of the trench in such a manner to provide a firm, undisturbed soil bottom for the cleanout extension. All backfill under, around and above the cleanout extension shall be firmly compacted to provide a suitable base for the cleanout slab.

Backfill for service lines and cleanouts within the limits of existing pavement shall be cement stabilized sand. Unless otherwise specified, all bedding for service lines and cleanouts shall be in conformance with "ORDINARY BEDDING".

All open pipe ends on service lines and cleanouts are to be closed with removable, watertight plugs or caps. The wye located at the bottom of the cleanout construction shall be permanently plugged.

A.7 Backfilling

Backfilling shall not be started over pipe lines until all of the steps required under PIPE BEDDING in this section have been completed.

Unless otherwise provided, backfill above the pipe zone shall be as follows:

A. Trenches shall be backfilled with material selected from the trench excavation, or obtained from other sources, which is free from stones of such size as to interfere with compaction and is free from large lumps which will not break down readily under compaction. The Engineer shall have the right to reject any material containing more than 20 percent by weight of material retained on a 3-inch sieve, or material excavated in such a manner as to produce large lumps not easily broken down or which cannot be spread in loose layers. In general, material excavated by means of a trenching machine will meet the requirements provided above.

B. The backfill shall be placed in layers not more than 12 inches in depth (loose measurement) and shall be compacted to 95% standard proctor density. The backfill shall be level with natural ground. After the backfill takes its initial settlement, and if the

settlement is below the original ground surface, more earth backfill shall be placed to bring the backfill up to natural ground. Poor compaction of the backfill resulting in densities less than 95% standard proctor shall be removed, replaced and re-compacted at the Contractor's expense.

When the pipe trench crosses paved surfaces, or if directed by the Engineer, the trench shall be backfilled to the bottom of pavement or natural ground with cement stabilized sand. The stabilized backfill shall contain a minimum of 1-½ sacks of standard Portland Cement per ton of material as placed. The materials for the stabilized backfill shall conform to the requirements of Spec. "Cement Stabilized Sand".

Backfill below the top of pipelines, manholes or other structures and appurtenances shall be placed and compacted equally along both sides of the structure so as to prevent strain on or displacement of the structure.

B. Pipe Jacking, Boring and Tunneling

B.1 General

1) Work Included

A. All labor, materials and equipment required to furnish and install pipelines under highways, railroads, or streets by jacking, boring, or tunneling.

B. The CONTRACTOR shall conform to the requirements of the Texas Department of Transportation, railroad company, county, or city construction specifications. All work necessary to meet these requirements shall be considered incidental to the installation of the pipeline in the rights-of-way.

C. Pipeline crossings of railroad tracks will be encased using welded steel casing pipe as specified herein and also in accordance with all railroad specifications while in the right-of- way. No tunnel liner plates shall be used within railroad right-of-way.

2) Submittals

A. Certificate: Submit certificates of compliance with referenced standards for all products specified herein.

B. Material specifications and/or calculations by licensed professional engineer must be submitted verifying the suitability of the material to sustain installation and service loads.

3) Definitions

A. Carrier pipe shall mean the pipeline placed inside the encasement pipe. The carrier pipe conveys potable or non-potable water, or sanitary sewer and shall have the same inside diameter and be installed on the same grade and at the same alignment as shown on the plans.

B. Encasement (casing) pipe shall mean any pipe, tunnel liner plates, tunnel pipes, similar material, etc., used to protect the excavation through the embankment from collapsing and used to contain the carrier pipe. The encasement pipe is placed in the excavation and the carrier pipe is placed inside the encasement pipe.

B.2 Products

1) Tunnel Liner Plates

A. Material

i **Plates** – The plates shall be fabricated from steel sheets conforming to the requirements of Steel, Carbon (0.15 minimum, percent) Hot-Rolled Sheet and Strap, Commercial Quality, ASTM Designation A569. In addition, the flat plates shall have the following minimum mechanical properties before cold forming.

- Tensile strength = 42,000 psi
- Yield strength = 28,000 psi
- Elongation, 2 inch (51 mm) = 30 percent

ii. **Bolts and Nuts** – Bolts used with lapped seam type (2 flange) liner plates shall be not less than 5/8-inch (15 mm) diameter. Bolts shall conform to Quenched and Tempered Steel Bolts and Studs, ASTM Designation A449 for plate thickness equal or greater than 0.209 inch (5 mm) and to Carbon Steel Externally Threaded Standard Fasteners, ASTM Designation A307 for plate thickness less than 0.209 inch (5 mm). The nuts shall conform to ASTM Designation A307.

B. Fabrication.

The plates shall be new and unused prior to fabrication. All plates shall be punched for bolting on both longitudinal and circumferential seams or joints and shall be so fabricated as to permit complete erection from the inside of the tunnel. All plates shall be uniform in fabrication and those intended for one size tunnel shall be interchangeable.

C. Grout Holes.

One half of the total number of the top plates shall be equipped with 2-inch (50-mm) diameter grout holes to facilitate grouting above and around the tunnel liner conduit. All grout holes shall be equipped with screw type galvanized plugs for final watertight closure of the grout holes.

D. Galvanizing.

After the plates are formed to shape and after all holes are punched, the plates shall be galvanized on all surfaces by the hot-dip process. A coating of prime western spelter, or equal, shall be applied at the rate of not less than 3 ounces per square foot of finished plate or 1-1/2 ounce each side. Spelter coating shall be of a first-class commercial quality free from injurious defects such as blisters, flux and uncoated spots. All nuts and bolts shall be galvanized or sherardized.

E. Bituminous Coating.

The plates shall be given a bituminous coating (inside and outside) meeting in all respects the American Railway Engineering Association specifications for bituminous protected corrugated metal pipe.

F. Rejection.

Structures on which the spelter coating has been bruised or broken either in the shop or in shipping, or which shows defective workmanship, shall be rejected. The requirement applies not only to the individual plates but to the shipment on any contract as a whole. Among others, the following defects are specified as constituting poor workmanship, and the presence of any or all of them in any individual culvert plate or in general in any shipment shall constitute sufficient cause for rejection:

i Uneven laps,
ii Elliptical shaping,
iii Variation from a straight centerline,
iv Ragged edges,
v Unevenly lined or spaced bolt holes,
vi Illegible brands,
vii Bruised, scaled or broken spelter coating, or
viii Dents or bends in the metal itself.

G. Section Properties.

Section properties shall conform to those specified in Section 16, Steel Tunnel Liner Plates, of the AASHTO Standard Specifications for Highway Bridges.

A. Design.

Tunnel liner plates shall be designed in accordance with Section 16, Division 16.3A Design of Steel Tunnel Liner Plates@ of the AASHTO Standards.

2) Pipeline Encasement

A Casing Pipe:

i. Material: A-36 steel.

ii. Exterior and interior coating: Coal tar epoxy in accordance with AWWA C210.

iii. Nominal diameter: Minimum 12 inches larger than OD of carrier pipe, unless otherwise indicated on the plans.

iv. Wall thickness: Sufficient to support loads. Minimum wall thickness of casing pipe is as follows:

Maximum Carrier Pipe (Inches)	Casing Size (Inches)	Minimum Wall Thickness (Inches)
4	16	.281
8	21	.375
10	24	.375
16	30	.469
21	36	.531
30	42	.625
36	48	.688
40	54	.781
54	72	1.000

v. Minimum yield stress: 36,000 psi

vi. Type of joint: Welded in conformance with AWWA C206

vii. Method of installation: Boring or jacking

B. Casing pipe shall be located as required by the specifications and as shown on the Drawings.

B.3 Execution

1) Installation

A. General:

1) When jacking, boring or tunneling casing pipe from a point starting below the ground surface, suitable pits or trenches shall be excavated for the purpose of conducting these operations and for placing end joints of the pipe.

2) Such pits and trenches shall be sheathed securely and braced in a manner satisfactory to prevent earth caving. Open excavations shall be adequately barricaded for safety of personnel and/or livestock in the area.

3) The pits and trenches shall be backfilled after these construction operations are completed and excess excavated material shall be disposed of as specified.

a. Pipes installed under railroad tracks or under highways, streets, or other facilities by these construction methods shall conform to the following:

i. All work shall be performed during daylight hours.

ii. Construction shall be done in such a manner that will not interfere with the operation of the transportation facilities.

iii. During construction operations, barricades and lights to safeguard traffic and pedestrians shall be furnished and maintained until backfilling has been completed.

iv. Construction shall not weaken or damage any embankment or structure.

v. The railroad shall be notified and requested to furnish a flagman whenever tunneling is being performed closer than 40 feet from the center line of the railroad track. The CONTRACTOR shall reimburse the railroad for the flagman's services.

vi. Temporary bulkheads shall be in the tunnel liner plate before and during the passage of trains and when work ceases for the day.

vii. Construction must comply with all requirements and specifications of any railroad company, State highway Department, city or county incidental to the pipeline installation within respective right-of-ways.

viii. All backfilling of open excavations within these right-of-ways shall

be compacted to 95 percent of the maximum dry density, Standard Proctor, as defined by ASTM D698.

ix. The pipe shall be installed starting from the lower end.

x. Lateral and vertical variation in the field position of the pipe from the line and grade shall be permitted to the extent of 1 inch in 100 feet, provided that such variation shall be regular and only in one direction and that the final grade of flow line shall be in the direction indicated on the plans.

xi. Any pipe damaged as a result of the construction operations shall be removed and replaced by the Contractor at no additional cost. Variations in plan, profile and manhole locations suggested by Contractor shall be submitted in writing to the Engineer and must be approved prior to construction.

4) Dewatering:

a. All water used or encountered during construction by boring, jacking or tunneling by the Contractor is the responsibility of the Contractor and measures shall be provided by the Contractor in such a manner that the water will not damage public or private property or create a nuisance or health menace.

b. The Contractor shall provide and operate pumps, pipes and equipment to keep all excavations and accesses free from water until the pipeline is installed and backfilling has been completed.

c. The Contractor shall provide all power and facilities necessary to operate the pumps and equipment.

d. Water, if odorless and stable, may be discharged into an existing storm drain, channel, or street gutter in a manner approved by the Owner.

e. When required, a means of desilting the water before discharging shall be provided.

f. Shoring in areas of railroad crossings shall be done in accordance with this Project Manual and in accordance with American Railway Engineering Association (AREA) Manual Volume 1, Chapter 8, Part 20, and the Burlington Northern Santa Fe Railway Company. The more conservative approach shall govern.

g. The design of the trench safety system for all pipe jacking, boring and tunneling operations is the Contractor's sole responsibility. The Contractor shall engage a Professional Engineer registered in the State of Texas to prepare the trench safety system design. Prior to beginning any construction activities in the vicinity of a railroad crossing, trench safety system designs prepared for railroad crossings shall be submitted to the Owner for forwarding to the railroad for the railroad owner's review and approval. The same shall apply to highway crossings.

B. Jacking:

i. Heavy-duty jacks suitable for forcing the casing pipe through the embankment shall be provided.

ii. Even pressure shall be applied to all jacks used.

iii. A suitable jacking head and suitable bracing between jacks and jacking head shall be provided so that pressure will be applied to the pipe uniformly around the ring of the pipe.

iv. Pipe guides shall be properly braced together and positioned to support the pipe section being jacked and to direct the pipe in the proper line and grade.

v. Excavation for the undersides of the pipe shall conform to the contour and grade of the pipe for at least one third of the pipe circumference.

vi. A clearance of not more than 2 inches may be provided for the upper half of the pipe and shall be tapered to zero at the point where the elevation conforms to the contour of the pipe as shown on the Drawings.

vii. Excavation shall not exceed 2 feet beyond the end of the pipe.

viii. The Contractor may use a steel plate cutting edge extending a short distance beyond the head end of the pipe with inside angles and lugs.

ix. Once jacking has begun, the operation shall be carried on without interruption, insofar as practicable, to prevent the pipe from being firmly set in the embankment.

x. All voids created by over-cutting shall be filled by pressure grouting the entire length of the casing pipe and per grout specifications.

C. Boring

i. Holes are to be bored mechanically and shall be accomplished using a pilot hole.

ii. A 2-inch pilot hole shall be bored the entire length of the crossing and shall be checked for line and grade on both sides of the embankment.

iii. The pilot hole shall serve as the centerline of the larger diameter hole to be bored.

iv. Use of water or other fluids in connection with boring operations shall be permitted only to lubricate and assist cuttings.

v. Jetting shall not be permitted.

vi. Gel-forming colloidal drilling fluid consisting of at least 10 percent high grade carefully processed bentonite may be used in unconsolidated soil formations to:

- Consolidate cuttings.
- Seal the bore hole walls.
- Provide lubrication for subsequent removal of cuttings.
- Provide immediate lubrication for installing the pipe.

vii. All voids created because of any over-cutting shall be filled by pressure grouting the entire length of the pipe boring installation, per grout specifications.

D. Tunneling:

i. Tunneling shall be used where soil characteristics or size of the proposed pipe would require such a method of construction or where tunneling is called for on the Drawings.

ii. Work pits shall be located where shown on the Drawings. Where no such locations are given, the Contractor shall have the operation of determining such locations subject to approval by the Engineer or Owner.

iii. In general, access shafts or portals will not be permitted within rights-of-way.

iv. All materials encountered in the tunnel within the width and height shall be excavated as necessary to install tunnel supports, place pipe, make joints, and properly place backfill to fill all void space around the pipe to complete the pipe installation in tunneling.

v. Clearances shown on the tunnel details on the Drawings are minimums and no encroachment within the dimensions shown will be permitted.

vi. The Spring line clearances shown shall be increased by 3 inches for any tunnel to be constructed on a curve with a centerline radius of less than 300 feet.

vii. All Drilling shall be performed in such a manner as to avoid undue shattering or loosening of material.

viii. The Contractor shall remove all material which is likely to fall or appears dangerous to workmen or the work. That such removal may enlarge the excavation beyond the required limits shall not relieve the Contractor from the necessity of performing such work, and the Contractor will not be entitled to any additional compensation by reason of such tunnel enlargement.

ix. Excavation for tunnel shall be held to the minimum diameter required for installation for the liner plate and not more than 18 inches from the end of the tunnel liner plate.

x. Blasting shall not be allowed.

xi. All 1-inch plates for the full length of a specified tunnel shall be of one type only and shall be assembled in accordance with the manufacturer's instructions.

E. Grouting:

i. To fill all voids created because of over cutting, the outside diameter of the tunnel liner plate shall be pressure grouted after installation is completed, per grout specifications.

F. Carrier Pipe Installation:

i. Install carrier pipe to grade and securely block in place to prevent movement as shown on the Plans.

ii. After the carrier pipe has been installed as detailed on the Drawing, the ends of the tunnel/casing shall be installed. The void space between the carrier pipe and casing shall not be filled.

iii. All voids created between the outside of the casing pipe and undisturbed soil shall be pressure grouted after installation of the casing pipe, per grout specifications.

G. Tolerances:

i. Conduits shall be placed to line and grade and the Contractor shall correct any deviation.

ii. Unless otherwise noted on the Drawings, the Contractor will be permitted a tolerance from exact grade alignment of 1 inch per 100 linear feet, or portion thereof, for vertical and horizontal. The variation shall be regular and only in one direction and the final grade of flow line shall be in the direction indicated on the drawings.

iii. The Contractor shall inform the Engineer of any horizontal or vertical variations for their approval. The Engineer will approve or reject the pipe position and the Contractor shall make appropriate modifications to the pipe alignment and grades, if necessary, at the Contractor's sole expense.

iv. As-built record data of crossings shall be completed by a surveyor licensed in the State of Texas. An electronic data format approved by the Owner shall be submitted to the City.

H. Pipe Bursting/Crushing

1) General

This specification defines the approved methods and materials for rehabilitation of existing gravity sewer lines by the Pipe Bursting or Pipe Crushing (Pipe Bursting/Crushing) process.

2) Methods

This section specifies the method and process for furnishing all labor, materials, tools equipment and incidentals necessary to provide for the complete rehabilitation of deteriorated gravity sewer lines by the Pipe Bursting/Crushing process that is to be installed by licensed Contractor of one of the following or prior approved equivalent. All other processes will need approval by the Engineer in writing and must be granted a minimum of ten (10) days prior to the bid opening.

3) Definition

The Pipe Bursting is defined as a trenchless replacement method in which an existing pipe is broken either by brittle facture or by splitting, using an internal mechanically applied force applied by a bursting tool. During this process a new pipe of the same or larger diameter is pulled in replacing the existing pipe.

Acceptable methods involve the use of a hydraulic “moling” device or pneumatic hammer, suitably sized to break out the old pipe or using a modified boring “knife” aided by the use of a hydraulic winch. This specification is based on the precedent that the Pipe Bursting/Crushing system used has been pre-approved by the Engineer. No other Pipe Bursting methods other than those set forth above shall be used prior to approval by the Engineer.

4) Material Specifications

a. Solid Wall Polyethylene Pipe (HDPE)

- The replacement pipe shall be manufactured from a high density high molecular weight polyethylene resin having a PPI designation of PE 4710 and a minimum cell classification of 345444C or E, in accordance with ASTM D3350. The pipe shall be manufactured in compliance with ASTM F714. The interior of the pipe shall be gray or black in color. A “certificate of compliance” shall be furnished for all materials to be supplied.

  Before beginning work, the Contractor shall submit to the Engineer for approval the vendor’s specific technical data with complete physical properties of pipe and pipe dimensions pertinent to this job.

- The outside diameter and minimum wall thickness shall conform to dimensions listed in the table below and shall be measured in accordance with ASTM D-2122.

Table 7
Polyethylene Replacement Pipe Dimensions
(ASTM F714, DIPS Sizing System)

DIPS Nominal OD	Average OD	Minimum Wall Thickness (Inches)			
(Inches)	(Inches)	SDR 21	SDR 19	SDR 17	SDR 11
6	6.90	.329	.363	.406	.627
8	9.05	.431	.476	.532	.823
10	11.10	.529	.584	.653	1.009
12	13.20	.629	.695	.776	1.200
14	15.30	.729	.805	.900	1.391

- The SDR Classification for various depths shall be as follows:

The Standard Dimensional Ratio (SDR), which is the ratio of the outside diameter (OD) of the pipe to its minimum wall thickness, shall be SDR-17 for all depths unless otherwise specified on the plans.

5) Backfill

At all points where the polyethylene pipe has been exposed, such as at the insertion pits, or other points where the old pipe must be removed, the polyethylene pipe and fittings shall be encased in 1.5 sack cement stabilized sand or other high density material as specified by the Engineer to prevent deflection due to earth loading or subsidence. At this point, in preparation for the placing of the encasement material, debris and soil shall be removed along each side of the existing pipe down to the spring line. After the encasement material is in place and accepted by the Engineer, backfill is placed and compacted to required finished grade in accordance with specification item 2622 Excavation and Backfill for Sanitary Sewer. Care shall be taken to ensure compaction of earth beneath the lateral pipe in order to reduce subsidence and resultant bending at the lateral connection at the sewer main.

6) Pre-Installation Preparations

The Contractor shall submit a work plan to the Engineer for review and acceptance. The work plan shall address the following minimum preparations/steps, unless approved otherwise by the Engineer.

1. Safety

The Contractor shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Special attention shall be given to safety requirements involving work on an elevated platform as well as confined space entry. It shall be the Contractor's responsibility to comply with OSHA Standards and Regulations pertaining to all aspects of the work.

2. Bypassing Sewage

When required for acceptable completion of the pipe bursting process, the Contractor shall provide for continuous sewage flow around the section(s) of pipe designated for the installation of replacement pipe. The pump bypass lines shall be of adequate capacity and size to handle the flow.

7) Installation Procedures

The Contractor shall submit information, in detail, of the procedure and the steps to be followed for the installation of the pipe bursting method selected, even if the process is named in the specification. All such instructions and procedures submitted shall be carefully followed during installation. Any proposed changes to the installation procedures shall require submittal of revised procedures to the Engineer for acceptance.

8) Finished Pipe

The installed replacement pipe shall be continuous over the entire length of each pipe segment from manhole to manhole. Should additional insertion or access pits be required between manholes, the Contractor shall, with approval of the Engineer, provide materials and perform a permanent type of repair as recommended by the pipe manufacturer. Small diameter HDPE pipe shall be coupled utilizing a flange fused to each end of the coupling section and the flanges bolted together. HDPE pipe sizes larger than twelve inches (12") in diameter shall be coupled utilizing a flanged spool piece fabricated to precisely fit the length of the coupling and bolted to the flanges fused to the open ends. If

the Contractor is unable to assess the open ends of the pipe in the additional access pit for pipe fusion, he shall with the approval of the Engineer, provide and place a stainless steel full circle bolt-on wrap-around clamp with a stainless steel stiffener insert into each end of the pipe. A minimum clamp length of two (2) times the nominal pipe diameter shall be provided. The full circle clamp length of two (2) times the nominal pipe diameter shall be provided. The full circle clamps shall be recommended by the manufacturer for use on HDPE pipe. No additional payment will be made for coupling repairs performed for lengths less than 500 foot runs between manholes.

The installed replacement pipe shall be free from visual defects such as foreign inclusions, concentrated ridges, discoloration, pitting, varying wall thickness and other deformities. Replacement pipe with gashes, nicks, abrasions, or any such physical damage which may have occurred during storage and/or handling, which are larger/deeper than 10% of the wall thickness shall not be used and shall be removed from the construction site. The replacement pipe passing through or terminating in a manhole shall be carefully cut out in a shape and manner approved by the Engineer and shall be as shown in the details. The invert and benches shall be streamlined and improved for smooth flow. The installed pipe shall meet the leakage requirements of the pressure test specified later.

9) Pipe Joining

Sections of polyethylene replacement pipe shall be assembled and joined on the job site above the ground. Joining shall be accomplished by heating and butt-fusion method in strict conformance with manufacturer's printed instructions and ASTM D-2657.

The butt-fusion method for pipe joining shall be carried out in the field by operators with prior experience in fusing polyethylene pipe with similar equipment using proper jigs and tools per standard procedures outlined by the pipe manufacturer. These joints shall have a smooth, uniform, double rolled back bead made while applying the proper melt, pressure, and alignment. It shall be the sole responsibility of the Contractor to provide an acceptable butt-fusion joint. All joints shall be made available for inspection by the Engineer before insertion. The replacement pipe shall be joined on the site in appropriate lengths near the insertion pit. The maximum length of continuous replacement pipe which shall assembled above ground and pulled on the job site at any one time shall be 600 linear feet. Prior to installation, the contractor shall locate the joined pipe to minimize disruption of traffic and access to private property adjacent to the site.

10) Insertion or Access Pits

The location and number of insertion or access pits shall be planned by the Contractor and submitted in writing for approval by the Engineer prior to excavation. The pits shall be located such that their total number shall be minimized and the length of replacement pipe installed in a single pull shall be maximized. Locations of damaged pipe shall be used for insertion pits if approved by the Engineer. Insertion pits shall adhere to ASTM F-585.

The cost for diversion pumping required around an insertion pit, from a manhole upstream to a manhole downstream, and excavation for insertion pits shall not be paid separately, but shall be included in the unit bid price for pipe bursting.

11) Service Connections

Each existing service connection shall be replaced/reconnected upon replacement of the sanitary sewer main. Each service connection shall be located and exposed prior to replacement of the main line segment. Upon completion of any necessary pressure testing of the replacement sanitary sewer main, the replacement main shall be punctured at each connection to limit inconvenience to existing residents and prevent sewer backups. **The replacement main shall be punctured at each service connection on the same day that the replacement main is installed.** Service connections and service lines shall be replaced as soon as possible after replacement of the main. If service connections and service lines are not replaced on the same day as the main replacement, the Contractor shall provide adequate covers and markers to prevent nuisance conditions and protect the public health and safety.

Service connections on the replacement main shall be made using "DFW Flexible Tee Saddles" or approved equal, installed in accordance with the manufacturer's instructions. The hole in the replacement main shall be cut with a hole saw and shall be placed 45° above horizontal. The service connection shall be embedded in 1.5 sack per cubic yard compacted cement stabilized sand, extending at least 6" below and 12" above the replacement main for a distance of not less than 6 feet. If the service connection is within 5 feet of a paved area, the access pit shall also be backfilled with stabilized sand.

Service connections into manholes shall be made in accordance with section H-13, below.

Unless otherwise indicated in the contract, each service line shall be replaced up to the resident's property line or edge of easement, as the case may be, with 4" or 6" PVC, Schedule 40 (ASTM D1785), to match the existing line size. The replacement service line shall be installed at the same grade and elevation as the existing service line. The existing service line shall be replaced by open trenching, pipe bursting, static pipe bursting, or other method approved by the Engineer. The replacement service line shall also be connected to the resident's service line at the property line or edge of easement with a flexible "Fernco" coupling and a cleanout assembly shall also be installed at the property line or edge of easement.

The cost for locating service connections shall not be paid directly, but shall be considered subsidiary to the various bid items in the contract.

12) Process Limitations

Though the installation process may be licensed or proprietary in nature, the Contractor SHALL NOT change any material, thickness, design values or procedural matters stated or approved in the submittals, without the Engineer's prior knowledge and pre-approval. The Contractor shall submit, in writing, full details about component materials, their properties and installation procedures and abide by them fully during the entire course of the project.

All sewer rehabilitation by pipe bursting methods are being considered structurally equal processes as far as "end product" required by the Owner. The minimum required performance criteria, and/or standards, physical/structural properties, chemicals resistance tests, and the replacement pipe thicknesses as given in this specification shall be strictly complied with. It shall be the responsibility of the Contractor to comply with specifications in full without any

request for any change after the award of the contract. The City or Owner reserves the right to accept, reject, or modify any later requests for change at no additional cost to the City or Owner or even to the extent of asking for a credit to the City or Owner.

13) Sealing and Benches in Manhole

The replacement pipe shall be installed with a tight fitting seal at the existing or new manholes to prevent inflow at the manhole as per details in the plans.

For entry into fiberglass manholes above the invert, a molded entry saddle with flexible boot connector and stainless steel clamp shall be used. The replacement pipe shall extend at least 6 inches into the manhole. For entry into concrete or brick manholes above the invert, the Contractor shall provide a half-inch diameter activated oakum band soaked in non-shrink grout or equal, applied circumferentially on the replacement pipe passing through the manhole wall, and encased with a non-shrink grout. The replacement pipe shall extend at least 6 inches into manhole. For all entries into manholes above the invert, the hole cut in the manhole riser shall be circular and no more than 1" larger than the outside diameter of the pipe.

For entry into new or existing manholes at or near the flow line, the pipe shall extend at least 6 inches into the manhole. When the pipe continues through the manhole, top half of the pipe crossing through the manhole shall be neatly cut off and not broken or sheared off, at least 6 inches away from the manhole walls. Twelve inches (12") of 4.5 sack concrete shall be placed around the pipe on the outside of the manhole. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels, if any. Channel cross-section shall be U-shaped with a minimum height of half pipe diameter to three-fourths of the pipe diameter for fifteen inches and larger. The side of the channels shall be built-up with grout to form an invert, as specified, to provide benches at 1H : 1V pitch towards the channel. The invert shall extend above all pipes entering the manhole near the flow line.

When pipe bursting through an existing manhole, the Contractor shall remove a sufficient portion of the manhole base and invert to avoid a "hump" in the newly installed line.

Payment for above work shall be incidental to sewer rehabilitation by the pipe bursting method.

The replacement pipe in the manhole shall be sealed as specified in the plans and details before proceeding on to the next manhole section and all manholes shall be individually inspected for replacement pipe cut-offs, benches and sealing works.

14) Testing of the Replacement Pipe

A low pressure air test will be required for each pipe section, as specified in section K Low Pressure Air Test. The Owner reserves the right to require deflection testing and television inspection. All costs for testing the replacement pipe will be incidental to the installation.

I. Deflection Testing of Sewer Lines

Deflection testing shall be performed on all PVC gravity sewer lines and PVC force main. Tests shall be performed by use of a rigid ball or mandrel equal to 95% of the

inside diameter of the pipe. Test shall not be conducted until a minimum 30 days after backfill of the line. Mandrel or ball shall be pulled manually without the aid of mechanical devices. Pipe exceeding a deflection of 5% shall be considered non-conforming and shall be removed and replaced.

J. Exfiltration Testing of Sewer Lines

Exfiltration testing shall be performed on all PVC gravity sewer lines. In performing a hydrostatic head test, the total exfiltration shall not exceed 50 gallons per inch diameter per mile of pipe in a 24 hour minimum test period. Tests shall be conducted at a minimum head of 2 feet above the crown of the pipe at the upstream manhole. The Contractor shall supply all water, labor and equipment to conduct the test, install test plugs and to perform all other incidental work as necessary.

K. Low Air Pressure Testing of Sewer Lines

Low air pressure testing shall conform to ASTM C 828, ASTM C924, or ASTM F 1417, as applicable, with holding time not less than calculated value determined using process below:

1) Time allowed for pressure loss from 3.5 psig to 2.5 psig shall be based on the equation from Texas Natural Resources and Conservation Commission (TNRCC) Design Criteria 317.2(a)(4)(B).

$$T = 0.0850(D)(K)/(Q)$$

where:

T	=	time for pressure to drop 1.0 pounds per square in gauge in seconds
K	=	0.000419 DL, but not less than 1.0
D	=	average inside diameter in inches
L	=	length of line of same pipe size in feet
Q	=	rate of loss, 0.0015 ft^3/min./sq.ft. internal surface

2) Minimum/Maximum testing times for pipe diameters 4-inch thru 8-inch are as follows:

4-inches @ 150ft = 3:47 (min:sec) ; @ 1000ft = 6:20 (min:sec)
6-inches @ 150ft = 5:40 (min:sec) ; @ 1000ft = 14:15 (min:sec)
8-inches @ 150ft = 7:34 (min:sec) ; @ 1000ft = 25:20 (min:sec)

L. Separation of Water & Sewer Lines

Water mains and sanitary sewers shall be installed no closer to each other than 4 feet in all directions and shall be installed in accordance with TCEQ Chapter 290.44 of the Texas Administrative Code. TCEQ Section 290.44 “Separations Distances”.

B.4 METHOD OF MEASUREMENT

All pipelines installed in accordance with these specifications and accepted by the Engineer shall be measured by **linear foot** from centerline of fitting to centerline of fitting, at the depths and of the size and type installed.

B.5 BASIS OF PAYMENT

All pipe lines measured as set out above shall be paid for at the unit price bid by the Contractor, per **linear foot** at complete in place of the depth, type and size constructed.

The unit price bid for these items shall be full compensation for furnishing all labor, furnishing and installing all pipe, furnishing all material and equipment, for all hauling, excavation, shaping of trench bottom, for all backfilling, tamping backfill, removal of surplus excavated material, removal and replacement of street base and surface, and for all cleanup and incidentals necessary to furnish pipe, complete in place.

No extra compensation will be made for any and all other construction as described in this item

END OF ITEM 2550

ITEM 2560
BYPASS PUMPING
(INCLDUDING PIPING FOR SEWER SYSTEM)

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies bypass pumping and piping for sewer main installation and sewer rehabilitation, including all of the materials, labor, equipment, power, maintenance, etc. to implement a temporary bypass pumping system for diverting the existing sewer flow around the work area for the time required to complete the entire project or portions of the entire project as required in the Contract Documents.

B. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defects in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Owner and/or Engineer.

1.2 SUBMITTALS

A. Contractor shall provide a detailed bypass pumping plan to the Owner and Engineer including detailed design plans and descriptions outlining all provisions and precautions to be taken by the Contractor to handle the existing wastewater flows.

1.3 PROJECT CONDITIONS

A. The bypass pumping plan shall not be implemented until the plan is reviewed and accepted by the Owner.

B. The design, installation, and operation of the temporary bypass pumping system shall be solely the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. When directed by the Owner or Engineer, the Contractor shall put the affected sanitary sewer line back into service at the end of each working day.

D. Contractor shall have on call staff available 24/7/365 to maintain bypass pumping systems that are in continuous operation.

PART 2 – MATERIALS

2.1 EQUIPMENT

A. All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to account for the cyclical nature of effluent flows.

B. Contractor shall provide the necessary stop/start controls for each pump.

C. Contractor shall include one stand-by pump for each size to be maintained on site. Back-up pumps shall be on-line, isolated from the primary system by a valve.

D. All unmanned bypass pumping operations shall be fitted with an auto-dialer feature to monitor the operation of the pump and notify the Contractor in the event of a pump failure or overflow situation.

E. Piping

1. Discharge and suction piping sizing shall be determined according to flow calculations and system operating calculations.

2. HDPE piping shall be in accordance with the following.

A. Polyethylene pipe (4-inch and larger): HDPE pipe shall conform to AWWA C906, SDR-11, Ductile Iron Pipe (DIP) size and NSF 61 Standard. For pipe sizes 24-inch and larger, the HDPE may be IPS size, DR-11. Polyethylene pipe shall be manufactured in accordance with ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, percent carbon, dimensions and either quick burst or ring tensile strength (equipment permitting).

B. Nominal pipe sizes only are to be indicated on the drawings and bid form. Outside diameter or pipe is generally 1 to 2-inches greater than nominal pipe diameter.

C. SERVICE IDENTIFICATION: Permanent identification of pipe shall be provided by co-extruding multiple equally spaced color stripes into the pipe outside surface or by solid colored pipe shell. The striping material shall be the same material as the pipe material except for color.

2. All rigid or hard piping shall be constructed with positive restrained joints.

3. Aluminum irrigation type piping or glued PVC pipe shall not be allowed.

F. Flexible Hose

1. Flexible hose and couplings shall be abrasive resistant and suitable for the intended services (i.e., fire hoses are not permitted).

2. Flexible hose and couplings shall be rated for external and internal loads anticipated including test pressure.

3. External load design shall incorporate anticipated traffic loadings, including traffic impact loading where applicable. When subjected to traffic loading, the system shall be composed of traffic ramps and covers maintaining an H-20 loading requirement while in use or as directed by the Owner.

2.2 DESIGN REQUIREMENTS

A. The bypass pumping system shall be designed to provide adequate capacity for peak flows.

B. The Contractor shall provide all pipeline plugs, pumps and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired.

C. Bypass pumping system may be required to be operated 24 hours a day. Contractor shall provide all necessary monitoring devices to notify the Contractor of any pump failure.

D. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby

pump for each pump size utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

E. Bypass pumping system shall be capable of bypassing the flow around the Work area as necessary for satisfactory performance of the Work.

F. The Contractor shall make all arrangements for bypass pumping during the time when the main is shut down for any reason. The system must overcome any existing force main pressure on at the discharge location.

2.3 PERFORMANCE REQUIREMENTS

A. It is essential to the operation of the existing sewerage system that there is no interruption in the flow of sewage throughout the duration of the project.

B. The Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with work, carry it past the work area, and return it to the existing sewer downstream of the work area.

C. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility.

D. The bypass system shall meet the requirements of all local, State, and Federal codes and regulations.

E. The Contractor shall not be permitted to stop or impede the main flows under any circumstances.

F. The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.

G. The Contractor shall protect water resources, wetlands, and other natural resources.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL AND MAINTENANCE

A. Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Owner's Representative shall be given 24 hours' notice prior to testing.

B. Contractor shall inspect bypass pumping system every two hours to ensure that the system is working properly.

C. Contractor shall insure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pump(s) is operating.

D. Spare parts and materials for pumps and piping shall be kept on site as required.

E. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.2 PREPARATION

A. Existing Utilities

1. Contractor is responsible for locating any existing utilities in the area the contractor selects to locate the bypass pipelines.
2. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Utility Owner.
3. All costs associated with relocating utilities and obtaining approvals shall be the responsibility of the Contractor.

B. Precautions:

1. During all bypass pumping operation, the Contractor shall protect the pumping station, main and all local sewer lines from damage inflicted by any equipment.

2. The Contractor shall be responsible for any physical damage to the pump station and main and all local sewer lines caused by human or mechanical failure.

3.3 INSTALLATION AND REMOVAL

A. Contractor shall remove manhole sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access locations indicated on the bypass pumping plan.

B. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance of Work, the plugging or blocking shall be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging, and/or causing other major disturbances downstream.

C. When working inside a manhole or force main, the Contractor shall exercise caution and comply with OSHA requirements for working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces.

D. The installation of bypass pipelines is prohibited in all salt marsh/wetland areas.

E. The bypass pipeline shall be located off streets, sidewalks, and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the Contractor shall place the bypass line in trenches and cover with temporary pavement or shall install the bypass pipeline by trenchless installation methods.

F. The Contractor is responsible for obtaining any approvals for placement of temporary pipelines from local agencies.

G. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Utility, the Contractor shall remove all piping, restore all property to pre-construction condition, and restore all pavement and roadways.

4.0 BASIS OF PAYMENT

The cost of bypass pumping shall not be paid for separately, and is considered subsidiary to work performed under Item 2550 “Construction of Sewer Lines”. All costs associated with bypass pumping including materials, labor, equipment, tools, power, maintenance, and incidentals necessary to complete the work, shall be included in the unit price bid for work that this is a component part thereof.

END OF ITEM 2560

ITEM 2570
MANHOLES

1.0 GENERAL

This item shall govern for the construction and adjustment of manholes complete in place and the materials used therein, including the installation, and when required, the removal of existing manholes, the furnishing of frames, grates, rings, covers and stainless steel inflow protection devices.

A. Types

The type of manhole shall be as designated on the plans. Fiberglass manholes shall comply with ASTM D3753 and be installed in accordance with the details shown on the plans and to the depth required by the profiles, schedules given and field conditions.

2.0 CONSTRUCTION MATERIALS

A. Mortar

Mortar shall be composed of one part Portland Cement and two parts clean, sharp mortar sand suitable graded for the purpose of conforming in other respects to the provisions of Spec. "CONCRETE", for fine aggregate. Hydrated lime or lime putty may be added to the mix but in no case shall it exceed 10% by weight of the total dry mix.

A Fiberglass Manholes

i. Fiberglass manholes shall conform to all ASTM standards governing plastic laminations and the latest Glass Fiber-Reinforced Polyester Manholes, ASTM D3753, with supplementary details or additions as set forth in these specifications.

ii. The barrel and cone shall each be produced in a continuous manufacturing process ensuring continuous reinforcement and uniform strength and composition.

The cone section, if produced separately, shall be affixed to the barrel section at the factory with a reinforced glass-resin joint resulting in a one-piece unit. Field-made joints shall not be accepted.

iii. The manholes shall be a circular cylinder with a minimum internal diameter of four feet. The cone of the manhole shall have a bearing surface wide enough to facilitate the placement of concrete adjustment rings. The ring and cover shall not be placed directly on the manhole.

iv. Provide and install concrete grade rings to bring the cast iron frames to grade. Grade rings shall be 2 inches by 8 inches with an inside diameter of 24 inches. When manholes are located in non-paved areas and not within 5 feet of a roadway, cast iron frames shall be adjusted 18-inches above grade.

v. Where PVC piping is connected to manholes, provide and install PVC sleeves with rubber gaskets and an abrasive silica outer coating. Sleeve shall be as manufactured by GPK products, Inc., of Fargo, North Dakota, or approved equivalent. Sleeve shall be firmly grouted into manhole opening in accordance with manufacturer’s instructions.

vi. Any manhole shall be rejected for failure to conform with any of the requirements of these specifications.

Any manhole found to be defective or damaged resulting from improper handling or installation shall be removed and replaced at no additional expense to the OWNER. Patching shall not be acceptable.

A Inflow Protection Device (Manhole Insert)

i. Manhole inserts shall be furnished and installed at each manhole and shall be a stainless steel Preco Sewer Guard ME C-4 watertight manhole insert or equivalent.

ii. The manhole insert shall be stainless steel and each of its components, the valve bodies, the valve plugs, the valve springs, and the gasket shall be manufactured of plastic, stainless steel, or other corrosion proof material.

iii. Each insert shall contain a gasket manufactured of Grade RE-41 black closed cell neoprene and meet the requirements of ASTM D-1056-73T. The gasket shall have a pressure sensitive adhesive on one side and be placed on the underside of the insert rim by the manufacturer.

iv. Each insert shall have a gas relief valve and a vacuum relief valve each designed to release at a pressure differential equivalent to approximately ½ psi and approximately 2.25 psi, respectively. The valve body shall be manufactured of specially formulated plastic polymers and the valve plug shall be neoprene confined within a stainless steel spring.

v. The manhole insert shall be manufactured and finished to fit upon the manhole frame rim upon which the manhole cover rests.

vi. The manhole frame shall be cleaned of all dirt/debris before placing the insert upon the rim.

vii. The insert lip with gasket shall be placed in contact with 360 degrees of manhole frame rim to retard water seepage between the insert rim

viii. After the manhole insert has been installed on the manhole frame rim, note that the insert does not come in contact with the cover upon its removal or replacement (flipping).

ix. After installation of the watertight manhole insert, the seal shall be water tested and shall not allow more than 1-gallon of inflow during a period of 24 hours.

D. Reinforcing Steel

Reinforcing Steel shall conform to the requirements of Spec. "REINFORCING STEEL".

E. Concrete Blocks

Concrete blocks when shown on the plans shall conform to the requirements of ASTM Designation C l39.

F. Frames, Grates, Rings, and Covers

This item shall govern for the furnishing and installation of frames, grates, rings, and covers for manholes and other structures in accordance with the plans and specifications.

Welded steel grates and frames shall conform to the member size, dimensions and details shown on the plans and shall be welded into an assembly in accordance with those details. Steel shall conform to the requirements of ASTM Designation A 36.

Castings, whether Carbon-Steel, Gray Cast Iron or Ductile Iron shall conform to the shape and dimensions shown on the plans and shall be clean substantial castings, free from sand or blow holes or other defects.

Surfaces of the castings shall be free from burnt-on sand and shall be reasonably smooth. Runners, risers, fins, and other cast-on pieces shall be removed from the castings and such areas ground smooth. Bearing surfaces between manhole rings and covers or grates, and frames shall be cast or machined with such precision that uniform bearing shall be provided throughout the perimeter area of contact. Pairs of machines castings shall be match marked to facilitate subsequent identification at installation.

Steel castings shall conform to the requirements of the specifications for "Mild to Medium Strength Carbon Steel Castings for General Application", ASTM Designation A 48, Class 30.

Ductile iron castings shall conform to the requirements of "Ductile Iron Castings" ASTM Designation: A 536. Grade 60-40-18 shall be used otherwise specified.

G. Cast Iron

Cast iron for supports, steps and inlet units shall conform to the shape and dimensions shown on the plans. The castings shall be clean and perfect, free from sand or blow holes, or other defects. Cast iron castings shall conform to the requirements of "Gray Iron Castings" ASTM Designation A 48, Class 30.

3.0 CONSTRUCTION METHODS

A. Manhole Base

1. Inverts shall be built of concrete or half-sections of pipe (unless otherwise shown on the Plans) and shall be true and troweled to a smooth, hard finish. The invert depth shall be equal to one-half of the diameter of the largest pipe connected to the manhole, and shall be sloped at 1:1 between the inlet and outlet pipe flowlines. The top of the poured manhole invert outside of the flow channel shall be steeply-sloped to prevent solids deposition.

2. Concrete and reinforcing steel for the manhole base shall be placed in accordance with the details on the Plans and the applicable provisions of these Specifications.

3. Fiberglass manholes shall be installed in accordance with the manufacturer's recommendation and with supplementary details, addition or exception as directed by the OWNER and/or shown on the Plans. A minimum of 8 holes 5/8-inch in diameter shall be drilled around the periphery of the manholes, 2 inches from the bottom for use in securing the manhole to the concrete base.

4. All concrete used in the construction of fiberglass manhole bases shall have a minimum concrete alkalinity of 70 percent calcium carbonate equivalency in the final concrete product. Alkalinity shall be tested in accordance with methodology set forth in Concrete Pipe Handbook, published by the American Concrete Pipe Association, or equivalent industrial standards, with test results provided to the ENGINEER for record data.

B. Provide an adequate connection where the pipe connects to the manhole such that infiltration and exfiltration are prevented from occurring at the connection. When required, manhole adaptors shall be used. If the manhole base is concrete and cast-in-place around the pipe, an adapter gasket shall then be installed such that the gasket will serve as a watertight seal (water stop) between the pipe and concrete. If the manhole base has a pipe fabricated integrally with the manhole, then a manufacturer's recommended adaptor shall then be used to connect the pipe to the manhole pipe. If a "boot type" flexible connection is used, a minimum of two stainless steel straps shall then be used to secure the flexible connector to the pipe.

C. Fames and covers shall be furnished and installed as required and indicated on the plans and specification herein.

D. Use no more than four (4) grade rings per manhole. Ring hold down bolts shall pass through rings into the top of the cone.

E. Where piping is connected to a manhole, CONTRACTOR shall provide a resilient connector in accordance with ASTM C-923 and the specifications and drawings. Where resilient connectors cannot be made at manhole connections, CONTRACTOR shall ensure that the pipe on each side of the manhole does not extend further than six (6) feet from the outside of the manhole wall or base, and the concrete cradle extends to within one (1) foot of the end of the pipe.

F. Where main sewer (lowest line) passes straight through manhole or degree of deflection of main sewer is less than 5 degrees, and no other line or stub-out is shown entering manhole below centerline of main sewer, lay sewer continuous through manhole. After manhole wall sections have been completed above top of sewer, break out and remove top half of barrel of sewer pipe that was previously laid through manhole. Use barrel of sewer pipe that was previously laid through manhole. Use concrete with 1-inch mortar topping and shape floor.

   Where main sewer (lowest line) alignment deflects greater than 5 degrees at manhole or where another sewer or stub-out enters at or below centerline of main sewer, terminate main sewer pipe laying in such a manner that ends of pipe are 2 inches inside of manhole wall.

G. Where manholes are to be placed within 9 feet of existing or proposed water lines, the manhole shall be encased with 12 inches of cement stabilized sand.

4.0 METHOD OF MEASUREMENT

Measure all "SEWER MANHOLES" per each, complete in place, in accordance with the plans and specifications.

5.0 BASIS OF PAYMENT

"SEWER MANHOLES" as set out above shall be paid for at the unit price bid by the Contractor, for all depths, types and sizes constructed.

“SEWER MANHOLES” designated for removal and replacement shall be paid for at the unit bid price by the Contractor for all depths, types and sizes constructed.

“SEWER MANHOLES” designated for uncovering and/or adjustment shall be paid for at the unit bid price by the Contractor for all depths, types and sizes uncovered and adjusted.

The price bid shall include full compensation for furnishing all labor, furnishing and installing all pipe, furnishing all material and equipment, for all removal and disposal of existing, hauling, excavation, shaping of trench bottom, for all backfilling, tamping backfill, removal of surplus excavated material, removal and replacement of street base and surface, and for all cleanup and incidentals necessary to furnish pipe, complete in place.

No extra compensation will be made for any and all other construction other than those specifically listed above as described in this item. The cost for such construction shall be included in the price bid for items of which they are a component and shall be full compensation for furnishing all materials, equipment, and labor necessary to perform the work in accordance with the plans and specifications.

END OF ITEM 2570

ITEM 2580

REHABILITATION OF MANHOLES & STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. This item includes recommended minimum requirements for the repair and/or rehabilitation, hereinafter collectively referred to as rehabilitation, of sanitary and storm sewer manholes and structures by providing the work necessary to furnish and install manhole rehabilitation systems, either individually or together, as specified by the Owner or Owner's assigned representative, herein referred to as Owner.

B. Rehabilitation of existing manholes can include the following rehabilitation systems, hereinafter collectively referred to as "SYSTEM(S)" to describe use of one or several rehabilitation systems.

1. Cementitious Systems
2. Polymeric Systems
3. Cured-in-Place Manhole (CIPM)
4. Poured-in-Place Concrete Liner
5. Panel Liners
6. Mechanical Chimney Seal
7. Applied Polymer Chimney Seal
8. Cured-in-Place Chimney Seal

C. This includes the minimum requirements for the rehabilitation of manholes defined herein and shown on the plans included as part of these contract documents.

D. Manholes and other structures may be specified for rehabilitation using one SYSTEM or the combination of several SYSTEMS. The Contractor is responsible for the accurate and complete installation and warranty of SYSTEMS installed.

1.2 DESCRIPTION OF WORK AND PRODUCT DELIVERY

A. The Work covered by this specification consists of all work necessary to furnish and install one or more SYSTEMS. The Contractor shall deliver a finished product(s) including all materials, labor, equipment, and services necessary for mobilization, traffic control, bypass pumping and/or diversion of sewage flows, cleaning equipment, product installation, quality control and samples for performance of required material tests, final inspection and warranty work, as included in these specifications and at the quantities of each component contained in the Bid Proposal.

B. Every manhole and structure rehabilitated shall be integrated and compatible with the SYSTEMS, materials, equipment and installation procedures used to complete the work.

C. Installed SYSTEMS shall be inspected and tested to confirm the installation meets the performance criteria specified for each SYSTEM as required in the specifications, which may include the following:

1. Prevent infiltration or inflow from entering the manhole through rehabilitated components.

2. Create a barrier covering rehabilitated components of the manhole that is impermeable to corrosive gases or liquids to prevent future corrosion of the rehabilitated components.

3. Restore or replace deteriorated components of the manhole to re-establish the structural integrity of the manhole, structure or rehabilitated components.

D. Installed SYSTEMS shall be free of defects that will compromise the operation or performance of the rehabilitated manhole or structure.

Materials or processes used by the Contractor shall not result in the distribution to, formation, or production of detrimental compounds or by-products at the wastewater treatment plant, facility or receiving waters. The Contractor shall notify the Owner and identify by-products produced because of the installation operations, test and monitor the levels, and comply with local waste discharge requirements.

E. The rehabilitation process and/or materials installed shall not cause adverse effects to the Owner's processes or facilities during construction.

F. The Contractor will conduct installation operations and schedule cleanup in a manner to restore the site to existing conditions while minimizing disruption to traffic, pedestrians, businesses, property owners or tenants in accordance with local regulations.

G. All materials furnished shall be marked with product information, stored in a manner specified by the manufacturer and tested to the requirements of this contract.

H. Samples from the project installation, marked with a chain of custody information, shall be collected at the request of the Owner.

I. For each manhole or structure rehabilitation, a complete and accurate record of materials installed/applied shall be prepared by the Contractor. The record shall include the date, identifying manhole or structure number, location, and quantities of rehabilitation components installed based on the Bid Item descriptions.

J. Quality assurance documentation and test reports for SYSTEM installations shall be prepared and submitted post-rehabilitation by the Contractor as required herein.

K. Testing and warranty inspections shall be executed by the Owner. Defects shall be repaired or replaced by the Contractor as required in the contract documents.

1.3 PRICES

A. The Contractor shall deliver a finished product(s) including all materials, labor, equipment, and services necessary to complete the work including traffic control, bypass pumping and/or diversion of active flows, cleaning equipment, product installation, quality controls and samples for performance of required material tests, final inspection and warranty work, as specified in the Description of Work and at the quantities of each component contained in the Bid Items.

1.4 REFERENCE STANDARDS

A. ASTM, ICRI, NACE, SSPC and other applicable standard documents, which are listed in the specifications, are made a part of these specifications by reference to the extent stated herein and shall be the latest edition thereof. Where there are differences between codes, standards and these specifications, these specifications shall govern.

B. ASCE Manuals and Reports on Engineering Practice No. 92, Manhole Inspection and Rehabilitation, Third Edition, 2022.

C. NASSCO's Inspector Training Certification Program (ITCP™) for Manhole Rehabilitation

1.5 PERFORMANCE WORK STATEMENT (PWS)

A. The Contractor shall submit, to the Owner, a Performance Work Statement (PWS) which clearly defines the proposed SYSTEMS delivery in conformance with the requirements of these contract documents. Unless directed otherwise by the Owner, the PWS shall at a minimum contain the following:

1. Documentation that the SYSTEMS will conform to the project requirements as outlined in these specifications.
2. A SYSTEMS installation plan describing preparation work, cleaning operations, pre-inspections, bypass or flow maintenance, traffic control, installation procedure, method of curing, quality control, testing to be performed, final inspection, and other necessary and appropriate for a complete SYSTEMS application/installation.
3. An installation schedule shall be prepared, submitted and conform to the requirements of this contract.
4. The manufacturer's description of the SYSTEMS, or materials which comprise the SYSTEMS, to be furnished for the project. Material descriptions shall be sufficiently detailed in the submittals to verify conformance to the specifications and/or conform to the pre-approved SYSTEMS submission.
5. A statement of the Contractor's experience for each SYSTEMS to be submitted within the Bid Proposal. The name and experience of each lead individual performing work on this contract, for each component, shall be submitted with the PWS. Personnel replaced by the Contractor, on this contract, shall have similar, verifiable experience as the personnel originally submitted for the project.
6. Current documentation from the SYSTEMS manufacturer certifying that the Contractor possesses the required equipment and training to comply completely with the SYSTEMS manufacturer's Quality Assurance requirements for installation. Contractor's personnel possessing current required training shall be listed individually.

B. To verify the competency of the contractors for properly installing the specified SYSTEMS, the requirements outlined in the specifications may include certification of training completion from the manufacturer, documentation showing that the contractor has successfully completed a project of similar scope and size, evidence of installing a requisite volume of footage or having a certain number of years of experience installing the SYSTEM. For contractors with training but without the required experience, allowances may be considered by requiring a technical representative from the manufacturer to be present on site. A minimum of five (5) references of the Contractor's work is required, indicating the successful application of the SYSTEMS, or that of the same material type, as specified herein or to be furnished by the Contractor and applied in a similar project environment as included in these contract documents.

C. Structural design calculations certified by a registered Professional Engineer shall be provided and include data that conforms to the requirements of these specifications or has been pre-approved by the Owner.

D. Manufacturer's technical data (e.g., technical data sheet(s) on SYSTEMS, safety data sheets (SDS), storage, handling, use and installation guidelines) shall be submitted for SYSTEMS and associated technology to be furnished.

E. Information on the SYSTEMS and tools and equipment required for a complete application/installation, shall be submitted. The PWS shall identify which tools and equipment will be redundant on the job site in the event of equipment breakdown. The Contractor shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.

F. A description of the Contractor's proposed procedures for cleaning and preparing manholes and structures prior to applying/installing the SYSTEMS shall be submitted as part of the PWS, including testing that will be performed by the Contractor to verify acceptability of the prepared surfaces for application/installation of the SYSTEMS.

G. A description of the Contractor's evaluation and remediation process to address common defects that may occur in the installed SYSTEM.

H. Compensation for the work required for the submittal of the PWS shall be included in the corresponding pay item contained in the Bid Proposal.

1.6 PRODUCT SUBMITTALS

A. Product data submittals for each SYSTEM proposed for installation under this contract, including materials that comprise the SYSTEMS or material used in the rehabilitation.

B. Technical data sheet(s) including manufacturer, product material type, intended use, physical properties, and standards referenced for material design.

C. Copies of third-party test results for mechanical properties and chemical resistance indicating that the product meets the requirements of these specifications and when required the submitted design.

D. Design approach and test data derived from the SYSTEMS being submitted that supports the ability of the product to meet the design and expected service life required in these specifications.

E. Manufacturer's requirements for handling and storing materials. If applicable to the proposed SYSTEM materials, include a method for maintaining and monitoring the environment (i.e., temperature, humidity) at the storage location.

F. Safety Data Sheets (SDS) for all materials to be furnished for the project.

G. Manufacturer's quality assurance guidelines for inspection and testing throughout the installation process including acceptance protocol.

1.7 DESIGN

A. SYSTEMS consisting of a coating or liner material application or wall thickness shall be in accordance with design as submitted and approved in the contract documents to:

1. Sustain prescribed earth, hydrostatic and dynamic loading without support of the existing structure.

2. Sustain prescribed hydrostatic loading by groundwater while maintaining a bond to the existing structure.

3. Provide a monolithic protective barrier against corrosion.

B. Certification and submission of design by a registered Professional Engineer is required for the following:

1. Manholes and structures specified to be structurally rehabilitated to sustain prescribed earth, hydrostatic and dynamic loading without support by the existing structure or manhole.

C. Certification and submission of the required thickness (i.e., wall thickness) of the installed SYSTEM and/or additional design requirements by the SYSTEMS manufacturer are required for the following:

1. Manholes and structures specified for structural restoration or rehabilitation to sustain prescribed hydrostatic loading by groundwater.

D. Certification and submission of third party chemical resistance testing, minimum application thickness, and installed SYSTEMS inspection procedure required by the SYSTEMS manufacturer is required for the following:

1. Manholes and structures specified for rehabilitation to prevent future corrosion for prescribed operational conditions.

E. Submission of third party testing provided by the SYSTEMS manufacturer will be acceptable for application suitability for the following:

1. Manholes and structures specified to receive a coating to restore mortar or other deteriorated components of the manhole but has no specified longevity or corrosion resistance requirement.

2. Manholes and structures specified to receive repair materials for select portions of the manhole or structure.

1.8 SAFETY

A. The Contractor shall comply with applicable work safety requirements set forth by relevant regulatory agencies, including but not limited to Occupational Safety and Health Administration (OSHA), and shall ensure that the work site is secured and maintained in accordance with these standards. The Contractor shall erect signs and other devices as are necessary for the safety of the work site.

B. The Contractor shall perform Work in accordance with compliance with relevant OSHA standards. Emphasis shall be placed upon the requirements for entering confined spaces, traffic control, trenching, and equipment being used.

Requirements for confined space entry are found in OSHA Construction Standard 29 CFR 1926 Subpart AA. Trenching and excavation requirements are specified in OSHA Trenching and Excavation Standard 29 CFR 1926.650. For hazardous materials that may be encountered, requirements are found in the OSHA Hazard Communication Standard 29 CFR 1910.1200. Guidance for traffic control can be found in the latest edition of the Manual for Uniform Traffic Control Devices (MUTCD).

C. The Contractor shall submit a proposed Safety Plan to the Owner prior to beginning Work. The plan shall include a description of a daily safety program for the job site and emergency procedures to be implemented in the event of a safety incident. Work shall be conducted in accordance with the Contractor's submitted Safety Plan and relevant OSHA and regulatory guidelines.

D. Mixing and handling chemical grout, which may be toxic under certain conditions shall be done to minimize hazards to personnel and shall be in accordance with the manufacturer's recommendations and relevant OSHA standards, including Hazard Communication Standard 29 CFR 1910.1200. It is the responsibility of the Contractor to conduct a hazard risk assessment and provide appropriate protective measures to ensure that chemicals are handled only by trained and authorized personnel. Equipment used to install the grout shall be as recommended by the manufacturer and only personnel trained by the employer with the grouting material and meeting the qualification requirements specified herein shall perform the actual grouting operation.

1.9 QUALITY CONTROL PLAN (QCP)

A. QCP shall be submitted to the Owner that conforms to the requirements of these specifications. At a minimum, the QCP shall include the following:

1. A description of the proposed quality controls to be performed by the Contractor.
2. Proposed procedures for quality control, product sampling and testing.
3. Proposed methods for product performance controls, including method of and frequency of product sampling and testing both in raw material form and cured product form as applicable.
4. Scheduled performance and product test result reviews between the Contractor and the Owner at regularly scheduled progress meetings.
5. Proposed methods and procedures for SYSTEMS repair or replacement in the event of product defects or total failure.
6. A description of the qualifications of individuals scheduled to perform inspection and/or testing, such as NASSCO-certified MACP™ or ITCP™ professionals.

B. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in the contract documents and submitted within the QCP.

1.10 DELIVERY, STORAGE AND HANDLING

A. Rehabilitation component materials are to be kept dry, protected from weather and stored under cover and in accordance with manufacturer's recommendations.

B. Materials are to be handled according to their safety data sheets (SDS) and manufacturer recommendations.

1.11 WARRANTY

A. The material used for the project shall be certified by the manufacturer for the specified purpose. The manufacturer shall warrant the SYSTEMS to be free from defects in raw materials for 12 months after installation or from the date of acceptance by the Owner, whichever is later. The Contractor shall warrant the installation of the rehabilitation component for a period of 12 months. During the warranty period if the rehabilitation component fails, delaminates, peels or presents a defect, which may materially affect the integrity, strength, function and/or operation of the manhole or structure, it shall be immediately repaired at the Contractor's expense to the quality originally specified or approved in the contract documents.

PART 2 PRODUCTS

2.1 GENERAL

A. The SYSTEMS defined herein include those identified as commercially accepted methods for manhole and structure rehabilitation, Methods or products not defined herein must be pre-approved by the Owner before use on this project under these specifications.

B. Materials used to stop infiltration, repair and rehabilitate shall be chemically compatible and designed to work together without causing adverse reactions or degradation to ensure the durability and effectiveness of the installed SYSTEMS.

2.2 GENERAL

A. Infiltration Control Materials

1. Hydraulic Water Plug – rapid setting cementitious materials shall be designed specifically for leak control with the following requirements:
    a. References:
        1) ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
        2) ASTM C1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout
    b. Initial Set Time at 70°F: 60 to 90 seconds with final set time 1 hour
    c. Compressive Strength, ASTM C109, minimum value of 1,200 psi in 1 hour, 2,500 psi at 24 hours.
    d. Shrinkage, ASTM C1090, minimum value at 28 days of 0%, tested at 90% relative humidity.
2. Chemical Grout Material – Chemical grout specially formulated to stop active infiltration, seal cracks and around penetrations.
    a. References:
        1) ASTM F2414 Standard Practice for Sealing Sewer Manholes Using Chemical Grouting.
    b. The grout shall quickly react with water to form a waterproof membrane. Minimum set time shall be established to ensure grout travel is achieved to stop active infiltration. Reaction time and shrinkage shall be controllable with the use of chemicals supplied by the same manufacturer.
    c. The grout shall be non-toxic in its cured form.
    d. Oakum Water Plugs shall include rapid setting, oil-free oakum and hydrophilic grout to seal active infiltration. Oil-free oakum meeting Federal Specification HH-P-117 saturated with a hydrophilic urethane resin specially formulated for leak control.

B. Repair Materials
1. Materials shall be designed to fill large voids in manhole walls and to repair or reconstruct benches, channels, and inverts.
2. Repair materials shall be specifically designed and/or formulated for compatibility with other materials to be used in contract with repair materials or resistant to direct exposure to the corrosive environment of the existing manhole or structure.
    a. Polymer materials shall include solvent-free polymer grout or mastic.
    b. Cementitious materials shall include factory blended, rapid setting, high early strength, non-shrink repair mortar.

C. Cementitious materials
1. References:
    a. ASTM F2551 Standard Practice for Installing a Protective Cementitious Liner System in Sanitary Sewer Manholes
    b. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
    c. ASTM C78 Standard Test Method for Flexural Strength of Concrete; Using Simple Beam with Third Point Loading
    d. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

e. ASTM C267 Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes

f. ASTM C469 Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression

g. ASTM C496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

h. ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

i. ASTM C882 Standard Test Method for Bond Strength of Bonding Systems Used With Concrete by Slant Shear

j. ASTM C1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout

2. Materials shall be factory blended, one-component (just add water) Cementitious or geopolymer formulations specifically designed for the rehabilitation of manholes and structures.

3. Suitable for hand troweled, spray or centrifugally cast (i.e., spincast) application.

4. Materials shall meet the requirements of these contract documents. When specified for corrosion resistance, test results shall include sulfide resistance in accordance to ASTM C267.

D. Polymeric Materials

1. References:

a. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

b. ASTM D638 - Standard Test Method for Tensile Properties of Plastics

c. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics

d. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

e. ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages

f. ASTM D7234 - Standard Test Method for Pull-off Adhesion Strength of Coatings On Concrete Using a Portable Adhesion Tester

g. ASTM G210 - Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus

h. SSPC SP-10/NACE No. 2 - Near-White Metal Blast Cleaning

i. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete

j. ICRI Technical Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

k. NACE SP0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

2. Polymeric materials shall include epoxy, polyurethane, polyurea, and multi-layer polyurea with polyurethane foam SYSTEMS. These shall be solvent-free and specifically formulated and designed for the rehabilitation of manholes and structures.

3. Suitable for hand troweled, spray or centrifugally cast (i.e., spincast) applications.

4. Materials shall meet the performance requirements of these contract documents. Chemical resistance test results shall include reagents commonly found within sanitary sewer environments when tested in accordance with ASTM D543.

E. Hand Applied Reinforced Materials

1. References:

a. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

b. ASTM D638 - Standard Test Method for Tensile Properties of Plastics

c. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics

d. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

e. ASTM D7234 - Standard Test Method for Pull-off Adhesion Strength of Coatings on Concrete Using a Portable Adhesion Tester

f. ASTM G210 - Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus

g. SSPC SP-10/NACE No. 2 - Near-White Metal Blast Cleaning

h. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete

i. ICRI Technical Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

j. NACE SP0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

2. Materials shall consist of fiberglass fabric of type E glass and solvent-free epoxy specifically formulated and designed for use in constructing a composite liner for the rehabilitation of manholes and structures.

3. Materials shall meet the performance requirements of these contract documents. Chemical resistance test results shall include reagents commonly found within a sanitary sewer environment when tested in accordance with ASTM D543.

F. Cured-In-Place Manhole (CIPM) Materials

1. References:

a. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

b. ASTM D638 Standard Test Method for Tensile Properties of Plastics

c. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics

d. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

e. ASTM F3033 Standard Practice for Installation of a Single-Sized Cured-In-Place Liner Utilizing an Inflatable Bladder for Resurfacing Manhole Walls of Various Shapes and Sizes.

f. ASTM D3039 Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials

g. ASTM D4787 Standard Practice of Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates.

h. ASTM D7234 Standard Test Method for Pull-Off Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.

i. SSPC SP-10/NACE No. 2 - Near-White Metal Blast Cleaning

j. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete

2. Materials shall consist of textile materials made of felt and/or fiberglass fabric, and a non-porous membrane layer designed for saturation with compatible thermosetting resins for use with polyvinyl chloride/polyester (PVCP) liner material to form a composite once cured specifically for partial or full depth rehabilitation of a manhole or the structural sealing of a the chimney component.

3. Materials shall meet the performance requirements of these contract documents. Chemical resistance test results shall include reagents commonly found within sanitary sewer environment when tested in accordance with ASTM D543,

G. Poured-In-Place Manhole Materials

1. References:

a. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

b. ASTM C94 Standard Test Method for Ready-Mix Concrete

c. ASTM C1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

2. Materials shall consist of Type I/II Portland cement concrete in accordance with ASTM C94, with maximum aggregate size of 5/8 inch, fiber reinforcement, and plasticizers producing an 8 to 10 in. slump specifically designed for poured-in-place construction of manholes and structures.

3. Concrete walls shall have a cross-sectional dimension of sufficient thickness to be structurally independent and allow for the maximum new finished inside diameter.

H. Panel Liners

1. References:

a. ASTM C1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

b. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension

c. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

d. ASTM D638 - Standard Test Method for Tensile Properties of Plastics

e. ASTM D4787 Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates

2. Panel materials shall consist of:

a. High density polyethylene (HDPE) integrally extruded complete with anchoring studs, minimum 39 studs per square foot. The minimum thickness of panel sheet with anchoring studs shall be 2 mm (.0787 inches). The minimum thickness of flat liner sheet at joint overlaps shall be 3 mm (.1181 inches). Joint materials shall be of the same material type and capable of being sealed using thermal welding as recommended by the manufacturer.

b. Polyvinyl chloride (PVC) is integrally extruded complete with anchoring studs at maximum 2.5 inch center and minimum 3/8 inch deep. The minimum thickness of liner sheet with anchoring studs and joint overlap shall be 3 mm (.1181 inches). Joint materials shall be of the same material type and capable of being sealed using thermal welding as recommended by the manufacturer.

3. Grout materials shall consist of flowable concrete or polymer mastic specifically designed for use with the panel materials in the rehabilitation of manholes and structures.
4. Minimum acceptable test values of the panel material shall be:
    a. Tensile Elongation at Break, ASTM D412 or ASTM D638, HDPE >400%, PVC >200%
    b. Minimum pull-out strength (from grout material): 100 pounds per linear inch
5. Material shall meet the performance requirements of these contract documents. Chemical resistance test results shall include reagents commonly found within sanitary sewer environments when tested in accordance with ASTM D543.

I. Mechanical Chimney Seal Materials

1. References:
    a. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
2. The flexible sleeve portion of the seal shall be extruded or molded from a high quality rubber compound, which conforms to the resilient material properties prescribed in ASTM C923 Table 1.
    a. The sleeve shall have an unexpanded vertical height sufficient to seal the entire grade adjustment area and be corrugated or pleated to allow for vertical and horizontal movement.
    b. The expansion bands used for compressing the sleeve and extensions against the manhole shall be fabricated stainless steel, conforming to the applicable section 4.2 of ASTM C923. The manufacturers mechanism used to expand the bands shall have the capacity to develop sufficient pressure to create a watertight seal. The bands shall be permanently held in the expanded position with a positive locking mechanism that conforms to the applicable section 4.2 of ASTM C923.

J. Applied Polymer Chimney Seals

1. References:
    a. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
    b. ASTM D638 - Standard Test Method for Tensile Properties of Plastics
    c. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics
    d. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
    e. ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages
    f. ASTM D7234 - Standard Test Method for Pull-off Adhesion Strength of Coatings on Concrete Using a Portable Adhesion Tester
    g. SSPC SP-10/NACE No. 2 - Near-White Metal Blast Cleaning
    h. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete
    i. ICRI Technical Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair
    j. NACE SP0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

2. Polymer chimney seal materials shall include epoxy, polyurethane, and polyurea SYSTEMS. These shall be solvent-free and specifically formulated and designed for rehabilitation and sealing of a manhole chimney.
3. Suitable for hand troweled or spray application.
4. Materials shall meet the performance requirements of these contract documents. Chemical resistance test results shall include reagents commonly found within a sanitary sewer environment when tested in accordance with ASTM D543.

K. Cured-In-Place Manhole Chimney Seals

1. References:
   a. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
   b. ASTM D638 Standard Test Method for Tensile Properties of Plastics
   c. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics
   d. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
   e. ASTM F3033 Standard Practice for Installation of a Single-Sized Cured-In-Place Liner Utilizing an Inflatable Bladder for Resurfacing Manhole Walls of Various Shapes and Sizes
   f. ASTM D3039 Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
   g. ASTM D4787 Standard Practice of Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
   h. ASTM D7234 Standard Test Method for Pull-Off Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
   i. SSPC SP-10/NACE No. 2 - Near-White Metal Blast Cleaning
   j. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete
2. The cured-in-place manhole chimney seal consists of a resin impregnated textile tube that is inserted into the manhole chimney and cured under pressure.

PART 3 EXECUTION

3.1 GENERAL

A. Maintain or bypass flow in the manhole throughout duration of project to prevent backups or overflows.

B. Provide 48-hour notice to the Owner prior to the start of work for the Inspector to review and document materials and equipment to be used, for Quality Assurance and testing requirements.

C. Contractors qualified in accordance with these specifications shall perform the installation or application of the SYSTEM.

D. SYSTEM installation or application shall be made in accordance with these specifications, by the Contractor, using equipment and methods as recommended and approved by the specific SYSTEM manufacturer, including surface preparation, material installation or application, cure, sampling and testing.

E. Confirm that SYSTEMS and materials to be used for the rehabilitation of the manhole are compatible. Do not use materials that have not been verified for compatibility.

F. Method for SYSTEM termination in a manhole shall be in accordance with the requirements of the SYSTEM manufacturer, or as submitted and approved in the PWS.

3.2 PRE-REHABILITATION PREPARATION

A. Flow control shall be conducted as required by the SYSTEM manufacturer.

B. Prior to the application or installation of a coating or lining system, the manhole surfaces shall be cleaned and prepared to produce a uniform, sound, clean and neutralized surface suitable for installation or application of the specified system, and to promote adhesion to the manhole surfaces when required.

C. Before starting cleaning or preparation work, install a perforated device, catch bucket, or other straining device to prevent construction debris from entering downstream pipes.

D. Standard Portland cement - concrete (not quick setting high strength cement) must cure a minimum of 28 days prior to application of the coating product(s), unless otherwise approved by the Owner.

E. Clean interior surfaces of manhole to produce a uniform, sound, clean and neutralized surface suitable for installation or application of the specified SYSTEMS, and to promote adhesion to the manhole surfaces when required for performance of the SYSTEMS being installed.

F. Sealing Active Infiltration

1. The work consists of hand applying a hydraulic water plug or chemical grout designed to instantly stop running water or seepage in concrete and masonry structures. The applicator shall apply material in accordance with manufacturer's recommendations in accordance with the following minimum specifications:

    a. The area to be repaired must be clean and free of debris per the requirements set forth elsewhere in these specifications.

    b. Once cleaned, prepare crack or hole by chipping out loose material to a minimum depth of 1/2 to 1 inch or as recommended.

    c. As recommended by the manufacturer, place a generous amount of the hydraulic water plug material to the active leak, with a smooth fast motion, maintaining external pressure as recommended by the manufacturer, repeat until leak is stopped.

    d. Proper application should not require special mixing of product or special curing requirements after application.

    e. Oil-free oakum water plugs are made by saturating oakum with chemical grouts following approved submittals and using additives as required. Place and cure following manufacturer's recommendations.

    f. Injection grouting shall consist of the injection of chemical grouts following approved submittals to stop active infiltration installed in accordance with ASTM F2414.

G. Repair and Resurfacing

1. Repair irregularities in manhole using materials compatible with proposed SYSTEM materials and as recommended by the manufacturer.

2. Repair products shall be used to fill voids, bug holes, and/or smooth transitions between components prior to the installation of the SYSTEMS. Repair materials must be properly cured and must be compatible with the SYSTEMS and shall be used and applied in accordance with the manufacturer's recommended requirements.

3. Large voids shall be filled using products consistent with the original construction.

4. All repair and resurfacing materials should be properly cured and prepared for SYSTEM top coated application. When the repair or resurfacing material is to be top coated, the cure required shall be as recommended by the topcoat SYSTEM manufacturer.
5. Trim and grout incoming laterals and pipes as required to install the specified SYSTEMS.

H. Remove debris from manhole and incoming sewer connections.

1. Handle cleaning water to prevent water and residue from causing damage.
2. Do not discharge debris downstream through the sewer system.
3. Filter solids-laden water through a de-silting device.
4. Properly dispose of debris and residue from cleaning and other construction operations in accordance with regulations of the Owner and authority having jurisdiction over area where work site is located.

I. Invert Repair and Rebuild

1. Use approved repair materials to fill large voids and repair manhole channels prior to installation of SYSTEMS. For invert repairs, flow must be temporarily removed or diverted prior to cleaning.
    a. The area to be repaired must be cleaned and free of debris.
    b. Mix water used with cementitious patching materials shall be clean potable water.
    c. Cementitious material shall be mixed per manufacturer’s specifications.
    d. Once mixed to proper consistency, the materials shall be applied to the invert or void areas by hand or trowel. For in invert applications, care should be taken to not apply excessive material in the channel, which could restrict flow. Once applied, materials should be smoothed either by hand or trowel to facilitate flow, minimize turbulence, and avoid the collection of debris.
    e. Flow shall be released when material has set or cured in accordance with manufacturer's requirements.

3.3 REHABILITATION

A. Provide all materials, labor, and equipment required to perform the work as recommended by the SYSTEMS manufacturer and as required by these specifications.

B. Inspect each manhole to determine active infiltration has been stopped and repairs performed in accordance with the requirements of the rehabilitation SYSTEMS to be installed or applied.

3.4 CEMENTITIOUS SYSTEMS

A. The work consists of troweling, spray applying and/or spincasting cementitious materials to the inside of the existing manhole.

B. Flow shall be controlled or removed from application surfaces until the cementitious SYSTEM is set and cured in accordance with the requirements of the material manufacturer.

C. Surfaces shall be prepared in accordance with the requirements of the SYSTEM manufacturer. Material shall be applied only when manhole is in a damp to wet or saturated surface dry (SSD) state, or in accordance with the requirements by the SYSTEM manufacturer.

D. Active infiltration shall be stopped prior to application of the cementitious SYSTEMS.

E. Cementitious material shall not be applied during freezing weather conditions where the ambient temperature is 37°F (3°C) and falling, or when the temperature is anticipated to fall below 32°F (0°C) within the ensuing 24 hours.

F. Cementitious material shall be mixed with potable water in accordance with the requirements of the SYSTEM manufacturer. Once mixed to proper consistency, the cementitious mortar shall be pumped to the nozzle or rotating applicator head.

G. Application of cementitious SYSTEMS shall be in accordance with the requirements of the SYSTEM manufacturer and ASTM F2551.

H. Manhole steps shall be removed flush to the manhole surface prior to installation of the cementitious SYSTEM unless otherwise specified in the contract documents.

I. Application

1. Spray or spincast application methods shall be executed in accordance with the requirements of the SYSTEM manufacturer.

2. Spraying shall be performed by starting at the manhole invert and progressing up the wall to the chimney.

3. The spincast device used for application is raised and lowered at a controlled retrieval speed conducive to centrifugally casting the mortar to produce a uniform application to the interior surfaces of the manhole.

4. Cementitious material shall be applied at a uniform minimum thickness as approved in the design submitted in accordance with the contract documents and/or as follows:

a. **Infiltration & Corrosion Protection only**: 1/2 to 3/4 inch. This thickness shall seal joints, stop low-level groundwater seepage, and provide a fresh barrier against mild sewer gases.

b. **Structural Rehabilitation:** 1 to 2 inches. This thickness shall create a self-supporting structure that can withstand external groundwater pressure and heavy loading.

c. **Severe Restoration/Deep Voids:** up to 3 inches. This thickness shall be applied in at least two coats but no more than three coats. The first coat shall be a profile or patch coat to fill deep pockets and level the wall. The second coat will apply the structural top layer followed by a third coat if necessary following the same thickness of coat two.

5. Cementitious material shall be applied to the bench area in such a manner as to provide for proper drainage.

6. Cementitious material thickness may be verified using a depth gauge. If additional material is required, the rotating applicator head shall be placed at that level and application shall recommence until that area is thickened.

7. Spray and spincast application methods may be used in conjunction to facilitate application of the mortar material to irregularities in the contour of the manhole walls and bench areas.

J. Once spray application has completed, the cementitious material shall be troweled to densify and smooth out the surfaces while compacting the material into voids. A brush or broom finish may be conducted as required by the SYSTEM manufacturer specified for top coating.

K. For the proper cure, the manhole cover shall be replaced no more than 10-20 minutes after troweling is completed to avoid moisture loss in the material due to sunlight and wind.

L. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration and that the surface appears uniform, free of cracks or loose material.

2. Perform a vacuum test to verify the integrity of fully rehabilitated manholes in accordance with ASTM C1244.

3. Obtain cube or cylinder samples of the cementitious material for each manhole or batch of material, as required by the Owner. The samples shall be prepared by the Contractor and sent to the Owner, through a chain of custody, to an independent laboratory for testing of compressive strength at 28 days in accordance with ASTM C39 or ASTM C109.

3.5 POLYMERIC SYSTEMS

A. The work consists of troweling, spray applying and/or spincasting polymeric materials to the inside of the existing manhole.

   1. Contractors qualified in accordance with these specifications shall perform the application or installation of the polymeric SYSTEMS.

B. Flow shall be controlled or removed from application surfaces until the polymeric material is applied and cured in accordance with the requirements of the material manufacturer.

C. Surfaces shall be cleaned and prepared as required by the polymeric material manufacturer and defined in SSPC SP-13/NACE No. 6 to acceptable moisture levels within the substrate and with a uniform, sound clean neutralized surface having sufficient profile to promote a mechanical bond with the polymeric coating. Oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants which may affect the performance and adhesion of the coating to the substrate shall be removed. Concrete and/or mortar damaged by corrosion, chemical attack or other means of degradation shall be removed so that only sound substrate remains.

   1. Epoxy polymeric SYSTEMS shall be applied only when manhole surfaces are in a saturated surface dry (SSD) state, with no visible water dripping or running over the manhole walls, or as required by the SYSTEMS manufacturer. The prepared surface profile shall meet ICRI 310.2R CSP 3-5, or as required by the SYSTEMS manufacturer.

   2. Polyurethane, polyurea, and hybrid polymeric SYSTEMS shall be applied only when manhole surfaces are in an oven-dry or air-dry state, with the surface feeling dry to the touch, or as required by the SYSTEMS manufacturer. The prepared surface profile shall be to ICRI 310.2R CSP 3-5, or as required by the SYSTEMS manufacturer.

D. Active infiltration shall be stopped prior to application of polymeric SYSTEMS.

E. Repair materials compatible with the polymeric SYSTEMS shall be used to fill voids, bugholes, and other surface defects which may affect the performance or adhesion of the polymeric SYSTEMS and to repair, smooth or rebuild surfaces providing a concrete or masonry substrate suitable for application of the polymeric SYSTEMS. These materials shall be designed and installed to minimum thickness as recommended within the polymeric SYSTEMS manufacturer's published guidelines. Should resurfacing or rebuilding be necessary, these products shall be installed to a thickness as specified in these specifications, submitted and approved in accordance with the contract documents.

   1. Areas where corroded rebar is observed shall be cleaned and prepared in accordance with ICRI 310.1R and coated with the specified or approved polymeric material as recommended by the polymeric SYSTEMS manufacturer.

   2. Repaired or resurfaced surfaces shall be inspected for cleanliness and suitability prior to application of the polymeric SYSTEMS. Additional surface preparation may be required prior to application.

F. Specified surfaces shall be shielded to avoid exposure to direct sunlight or other intense heat source throughout the application process. Where varying surface temperatures exist, coating application shall be scheduled when the temperature is falling and not rising as recommended by the polymeric material manufacturer.

G. Manhole steps shall be removed flush to the manhole surface prior to application of a polymeric SYSTEM unless otherwise specified in the contract documents as required by the Owner.

H. Portland cement-based precast or poured-in-place structures shall have cured a minimum of 28 days since manufacture or installation date prior to commencing with application of a polymeric SYSTEM, or as recommended by the manufacturer.

I. The polymeric SYSTEMS shall be terminated at the joint between the manhole chimney and frame, or as recommended by the SYSTEMS manufacturer and submitted as a part of the PWS.

J. Spray Application

1. Spray or spincast application methods shall be executed in accordance with the requirements of the SYSTEMS manufacturer.

2. The spincast device used for application is raised and lowered at a controlled retrieval speed conducive to centrifugally casting the polymeric material to produce a uniform application to the interior surfaces of the manhole.

3. Polymeric material shall be applied to the uniform minimum thickness as approved in the design submitted in accordance with the contract documents, provided by the manufacturer or a minimum of 125 mils (1/8 inch).

4. Subsequent top coating or additional coats of a polymeric material shall occur within the material's recoat time. Additional surface preparation procedures will be required if this recoat time is exceeded. Requirements from the polymeric SYSTEMS manufacturer for the specific application, in consideration of temperature and project conditions, shall be followed by the Contractor.

5. When the polymeric materials rely on a mechanical bond with adjoining construction materials throughout the manhole structure to effectively seal and protect concrete or masonry substrates from infiltration and attack by corrosive elements, requirements by the polymer SYSTEMS manufacturer shall be followed.

K. Hand Applied Reinforced Application

1. The components of the epoxy resin system are measured and mixed according to the material manufacturer's requirements. The mixed epoxy resin is hand applied uniformly using a roller or trowel forcing the epoxy into the prepared surface filling gaps or voids to attain a smooth surface. The fiberglass fabric is then laid up into the epoxy base coat by hand and the use of rollers to push the fabric into the epoxy. Each fabric sheet should overlap the adjacent one slightly to ensure continuous and uniform reinforcement. Once the fabric is in place, additional epoxy resin is applied on top of it to fully saturate the fabric with resin. Rollers are then used to remove air bubbles and ensure contact between the wet composite and the substrate. The finished surface shall not have fiberglass fibers exposed.

L. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, the installed SYSTEM uniformly covers specified surfaces, and is free of pinholes, or defects that could reduce its intended performance.

2. Measure the installed thickness of the SYSTEM to confirm it meets the minimum value required in these specifications. Wet film thickness shall be measured in accordance with ASTM D4414.

3. Inspect surfaces of the installed SYSTEM using holiday detection or spark testing equipment in accordance with NACE SP0188 to identify holidays and pinholes. Repair the identified defects and re-test.

4. Conduct adhesion testing in accordance with ASTM D7234 to verify that the SYSTEM is bonded to the manhole substrate, as evidenced by substrate failure during testing. Repair damage from testing, following the SYSTEM manufacturer's recommendations.

3.6 CURED-IN-PLACE MANHOLE (CIPM) SYSTEMS

A. The work consists of installation of a reinforced fabric tube saturated with a polymer resin into a manhole that is expanded to conform to the existing manhole using air pressure and cured in place using controlled steam. Installation shall be performed in accordance with the requirements of the SYSTEM manufacturer or ASTM F3033.

1. Contractors qualified in accordance with these specifications shall perform the installation of the CIPM SYSTEM.

B. Flow shall be controlled or removed from installation surfaces until the CIPM is installed and cured in accordance with the requirements of the CIPM SYSTEMS manufacturer.

   1. When the CIPM is not extended within the channel, a bridge or flow through tube shall be installed within the channel. After installation, the bottom of the CIPM shall be cut near the flow line in the channel and the pipe connections opened to restore flow.

   2. When the CIPM is extended within the channel, the pipe openings shall be plugged prior to CIPM installation. Plug the pipes entering the manhole and line the flow channel to the edge of the pipe. Trim pipe openings and restore the flow in the channel.

C. Surfaces shall be cleaned and prepared as required by the CIPM SYSTEMS manufacturer to acceptable moisture levels within the substrate and with a sound clean neutralized surface having sufficient profile to promote a mechanical bond with the liner when specified. Fats, oils, and grease shall be removed using hot water and an environmentally safe detergent when pressure washing the surfaces. The existing casting shall be prepared using a grinder or abrasive blasting.

D. SYSTEMS shall be installed only when manhole surfaces are in a saturated surface dry (SSD) state, with no visible water dripping or running over the manhole walls. The prepared surface profile shall be to ICRI 310.2R CSP 3-5, or as required by the CIPM SYSTEMS manufacturer.

E. Manhole steps shall be removed flush to the manhole surface prior to installation of a CIPM SYSTEM unless otherwise specified in the contract documents.

F. Active infiltration shall be stopped prior to installation of the CIPM SYSTEMS.

G. Repair materials compatible with CIPM SYSTEMS shall be used to fill holes, missing bricks, and voids larger than a baseball as recommended by the CIPM SYSTEMS manufacturer.

H. Remove loose grout and rubble of existing channel. Rebuild the channel by shaping and repairing slope of shelves or benches. Work shall include alignment of incoming and outgoing pipe flow in such manner to prevent the deposition of solids at the transition point(s). Structure invert shall follow the grades of the pipe entering the manhole.

I. CIPM Premade-Liner Installation

   1. The Contractor shall furnish materials, equipment, tools, and labor as required for the rehabilitation of the manholes specified, including the installation of the Premade-Liner.

   2. Line bench area with CIPM material placed in the bottom of the manhole and extending a minimum of 6 inches (150 mm) up the manhole wall.

   3. Saturate the Premade-Liner with resin. Insert it into the manhole, pressurize using air and cure with steam or hot air, or pressurize using water and cure with hot water following the requirements of the CIPM SYSTEMS manufacturer.

J. CIPM Tube Installation

   1. The Contractor shall measure the manhole depth and cut the Tube from a bulk roll to match the depth of the manhole.

   2. Using a controlled vacuum impregnation process, the resin is manually measured and mixed and introduced into the Tube following the requirements of the CIPM SYSTEMS manufacturer.

   3. The resin impregnated Tube is inverted through the center of the retaining ring until the liner is fully turned inside out and positioned within the manhole.

   4. An inflation bladder inserted within the Tube is pressurized to expand the Tube against the interior surfaces of the manhole and maintained until cured.

   5. After cure is complete, the inflation bladder is removed and the CIPM Tube is trimmed at the top of the manhole frame flush with the manhole cover seat.

K. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration through the installed SYSTEM, and that it is free from severe wrinkles, areas deficient from uncured resin, delamination of the fabric layers, hollow areas behind the liner, or other defects that could reduce the intended performance of the SYSTEM.

2. Inspect surfaces of the installed SYSTEM using holiday detection or spark testing equipment in accordance with NACE SP0188 or ASTM D4787 to identify holidays and pinholes. Repair the identified defects and re-test. Conduct adhesion testing in accordance with ASTM D7234 to verify that the SYSTEM is bonded to the manhole substrate, as evidenced by substrate failure during testing. Repair damage from testing, following the SYSTEM manufacturer's recommendations.

3. Remove a core sample or measure the SYSTEM thickness from the adhesion test dolly, if scored and removed, to verify the wall thickness and confirm it meets the minimum value required in these specifications.

3.7 POURED-IN-PLACE CONCRETE LINER

A. The existing manhole shall be cleaned to remove loose material and debris. Existing steps which interfere with the erection of the forms shall be removed. Precautions shall be taken to prevent foreign material from entering the active lines. Active infiltration shall be stopped or reduced as required by the SYSTEMS manufacturer.

B. Installation

1. Segmented, stackable steel forms shall be bolted together in cylindrical and conical sections with either eccentric or concentric cones or flat top ceilings and conform to the interior shape of the existing manhole.

2. Pipe extensions shall be placed through the new concrete wall at the base and at higher points of entry, such as drop inlets, to maintain flows during the procedure.

3. The form shall be sized and erected to conform to the existing interior dimensions and shape. The space between the forms and the existing wall shall be of sufficient thickness, as specified. The finished opening shall have a minimum diameter of 20 inches (500 mm).

4. The form shall be positioned, sealed and finished at the manhole base to ensure concrete does not enter the sewer.

5. The concrete shall be placed from the bottom up in such a manner as to prevent segregation of the cement and aggregate. The concrete shall be consolidated to fill pockets, seams and cracks within the existing wall.

6. When the concrete has sufficiently cured to preclude slump or damage, the form shall be disassembled and removed.

7. The bench shall receive an overlay of concrete as proposed by the Contractor at a minimum thickness as specified in the contract documents or a minimum of 2 to 3 inches.

8. Prior to installation of the new concrete wall, a water stop shall be placed around the circumference of the bench where it meets the vertical wall (bench/wall joint) and around pipe penetrations to form a water stop.

9. The resultant concrete interior wall shall be smooth and free of honeycomb and areas of segregated aggregate.

C. Testing and Acceptance

1. Perform a visual inspection to verify there is no active infiltration and that the surfaces are smooth and free of honeycombs or areas of segregated aggregate.

2. Perform a vacuum test to verify the integrity of the SYSTEM, when it includes the rehabilitation or rebuild of the entire manhole, including the bench and channel, in accordance with ASTM C1244.

3. Obtain cube or cylinder samples of the concrete material for each manhole or batch of material, as required by the Owner. The samples shall be prepared by the Contractor and sent to the Owner, through a chain of custody, to an independent laboratory for testing of compressive strength at 28 days in accordance with ASTM C39.

3.8 PANEL LINERS

A. Surfaces shall be prepared in accordance with the manufacturer's requirements.

B. High-Density Polyethylene (HDPE)

1. Manhole steps shall be removed flush to the manhole surface prior to installation of the SYSTEM unless otherwise specified in the contract documents.

2. A bonding agent compatible with grout or concrete shall be applied to manhole wall before placing liner sheets.

3. Adequate annular space between the liner sheet and manhole wall shall be provided to allow placement of concrete or grout.

4. The liner sheet supports shall be secured to the manhole walls.

5. The liner sheets shall be inserted into the manhole and supported as per the manufacturer's recommendations.

6. Secure the liner sheets to the installed supports.

7. Form liner sheet seams in accordance with the manufacturer's recommendations.

8. Place the concrete or grout, as recommended by the material manufacturer, with no wrinkling of the liner. Vibrate, as required, to prevent voids.

9. After the concrete or grout has cured, remove the internal forms or supports and finish all seams as recommended by the PANEL LINER SYSTEMS manufacturer.

C. Polyvinyl Chloride (PVC)

1. Apply mastic primer to manhole wall and cure following the material manufacturer's requirements.

2. Apply mastic to primed manhole wall.

3. Apply liner to mastic.

4. Embed anchoring extensions in mastic.

5. Wrinkling of liner not permitted.

6. Finish liner seams following PVC SYSTEMS manufacturer's requirements.

D. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, and there are no cuts, tears, loose panels, or other areas that could reduce its intended performance.

2. Inspect seams and welds of the installed SYSTEM using holiday detection or spark testing equipment in accordance with NACE SP0188 or ASTM D4787. Repair the identified defects and re-test.

3. Perform a vacuum test to verify the integrity of the SYSTEM, when it includes the rehabilitation or rebuild of the entire manhole, including the bench and channel, in accordance with ASTM C1244.

3.9 MECHANICAL CHIMNEY SEAL

A. Loose and protruding mortar, brick or other material that could interfere with the installation of the seal shall be removed. The contact surfaces for the sleeve and/or extensions shall be clean and smooth, circular and free from excessive voids or defects. If the masonry surface is rough or irregular and will not provide an effective sealing surface, it shall be smoothed with a single

component non-shrink quick set repair mortar designed for vertical and overhead use. The manhole frame and cover must be realigned if the offset is greater than 3 inches (75 mm) between the frame and top of the manhole structure.

B. After surface preparation is completed and the rubber sleeve has been placed in the proper position, the lower band is positioned in the band recess and expanded as required to provide a watertight seal. If an extension or extensions are being used, place the extension in the proper position, insert the band into the lower band recess and expand as required to provide a watertight seal.

C. Extension flap shall be placed into or behind the expansion band recess to allow for the compression of both the extension flap and sleeve against the manhole surface by the expansion band. Continue by placing the upper band or bands in the recess, ensuring the seal is properly placed on the manhole cone, chimney and frame and expand as required to provide an effective seal.

D. Installation procedures shall be in accordance with the manufacturer's requirements and ASTM C923.

E. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, the SYSTEM has been properly installed, and no damage is observed to the SYSTEM that could reduce its intended performance.

2. Perform a leakage test following the expansion of the lower band in accordance with ASTM C923 to verify effective sealing following manufacturer's recommendations. The sealing shall be considered effective if no water leaks from behind the seal at the lower sealing area.

3.10 APPLIED POLYMER CHIMNEY SEAL

A. Manhole castings and chimney surfaces shall be cleaned and prepared in accordance with SSPC-SP 10 / NACE No. 2 and SSPC-SP 13 / NACE No. 6 to ICRI 310.2R CSP 3-5. SYSTEMS shall be applied only when the prepared surfaces are in an air dry and saturated surface dry (SSD) state, with the surface feeling dry to the touch and no visible water dripping or running over the surfaces, or as required by the SYSTEMS manufacturer.

B. Loose and protruding mortar and brick shall be removed. Lips for gravel pan supports shall be cut off flush with the manhole casting. Missing mortar, loose bricks, and large voids shall be repaired using compatible repair materials, as recommended by the SYSTEMS manufacturer.

C. Active leaks shall be stopped prior to installing the polymer chimney seal SYSTEMS.

D. Polymer chimney seal SYSTEMS may be applied in multiple layers or coats using spray, trowel, or brush application methods. The SYSTEM manufacturer's instructions for application, recoat window, and curing shall be submitted as a part of the PWS and followed during application. The polymer chimney seal SYSTEMS shall be applied uniformly over the entire chimney area, including the frame joint or casting above the manhole cone, as well as extensions to the chimney area.

E. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, the installed SYSTEM uniformly covers specified surfaces, and is free of pinholes, or defects that could reduce its intended performance.

2. Measure the installed thickness of the SYSTEM to confirm it meets the minimum value required in these specifications. Wet film thickness shall be measured in accordance with ASTM D4414.

3. Inspect surfaces of the installed SYSTEM using holiday detection or spark testing equipment in accordance with NACE SP0188 to identify holidays and pinholes. Repair the identified defects and re-test.

4. Conduct adhesion testing in accordance with ASTM D7234 to verify that the SYSTEM is bonded to the manhole substrate, as evidenced by substrate failure during testing. Repair damage from testing, following the SYSTEM manufacturer's recommendations.

3.11 HAND APPLIED REINFORCED POLYMER CHIMNEY SEAL

A. Manhole castings and chimney surfaces shall be cleaned and prepared in accordance with SSPC-SP 10 / NACE No. 2 and SSPC-SP 13 / NACE No. 6 to ICRI 310.2R CSP 3-5. SYSTEMS shall be applied only when the prepared surfaces are in an air dry and saturated surface dry (SSD) state, with the surface feeling dry to the touch and no visible water dripping or running over the surfaces, or as required by the SYSTEMS manufacturer.

B. Loose and protruding mortar and brick shall be removed. Lips for gravel pan supports shall be cut off flush with the manhole casting. Missing mortar, loose bricks, and large voids shall be repaired using compatible repair materials, as recommended by the SYSTEMS manufacturer.

C. Active leaks shall be stopped prior to installing the reinforced polymer chimney seal SYSTEMS.

D. Reinforced polymer chimney seal SYSTEMS are to be installed in multiple layers using trowel, roller, and hand lay-up application methods. The SYSTEMS manufacturer's instructions for application, recoat window, and curing shall be submitted as a part of the PWS and followed during application. The reinforced polymer chimney seal SYSTEMS shall be applied uniformly over the entire chimney area, including the frame joint or casting above the manhole cone, as well as extensions to the chimney area.

E. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, the installed SYSTEM uniformly covers specified surfaces, and is free of pinholes, or defects that could reduce its intended performance.

2. Measure the installed thickness of the SYSTEM to confirm it meets the minimum value required in these specifications. Wet film thickness shall be measured in accordance with ASTM D4414.

3. Inspect surfaces of the installed SYSTEM using holiday detection or spark testing equipment in accordance with NACE SP0188 to identify holidays and pinholes. Repair the identified defects and re-test.

4. Conduct adhesion testing in accordance with ASTM D7234 to verify that the SYSTEM is bonded to the manhole substrate, as evidenced by substrate failure during testing. Repair damage from testing, following the SYSTEM manufacturer's recommendations.

3.12 CURED-IN-PLACE CHIMNEY SEAL

A. The work consists of constructing a CIPM Chimney that is constructed to fit the inside diameter of the manhole from the bottom of the frame to a point on the cone just below the chimney.

1. Contractors qualified in accordance with these specifications shall perform the SYSTEM installation.

B. Manhole steps shall be removed flush to the manhole surface prior to application of the SYSTEM unless otherwise specified in the contract documents as required by the Owner.

C. Active infiltration shall be stopped prior to installation of CIPM Chimney SYSTEMS.

D. Repair materials compatible with CIPM Chimney SYSTEMS shall be used to fill holes, missing bricks, and voids larger than a baseball as recommended by the CIPM Chimney SYSTEMS manufacturer.

E. The coated non-woven textile fabric shall be vacuum impregnated (saturated) on-site under controlled conditions. The resin shall be pre-measured at the manufacturing plant prior to shipment. The volume of resin used shall be sufficient to fill voids in the fabric material at

nominal thickness and diameter. No dry or unsaturated areas in the resin impregnated fabric (i.e., liner) shall be acceptable upon visual inspection.

F. Installation

1. The liner is placed with the saturated resin side facing the substrate. Once the liner is placed in the manhole and rested on the spacing rings, the installation device is inserted inside of the liner. The spacing rings located on top of the manhole allow the installation device to rest at the correct depth. Once the installation device has been inserted, the bladder is pressurized. The installation device stays in place and is pressurized until the liner is cured.
2. The liner is cured at ambient temperatures as it is pressed firmly against the structure. The curing time must take into consideration the resin system, ground conditions (temperature and moisture level), and weather conditions.
3. Once cure has been completed, the installation device is removed and the CIPM Chimney is trimmed at the manhole cover seat.

G. Testing and Acceptance

1. Perform a visual inspection to verify that there is no infiltration, the installed SYSTEM is free from areas of deficient or uncured resin, delamination of the fabric layers, and hollow areas behind the liner, has a smooth surface free from cracks, and is tightly adhered to the manhole surface at terminations.
2. Conduct adhesion testing in accordance with ASTM D7234 to verify that the SYSTEM is bonded to the manhole substrate, as evidenced by substrate failure during testing. Repair damage from testing, following the SYSTEM manufacturer's recommendations.

PART 4 INSPECTION

4.1 DEFECT REMEDIATION

A. Issues that may not affect the operation and long-term life of the product shall be identified and defined by the manufacturer.

B. Repairable issues that may occur in the SYSTEMS shall be specifically based on manufacturer’s recommendations, including repair procedure, resulting in a finished product meeting the estimated life cycle of the component and requirements of these contract documents.

C. Unrepairable issues that may occur in the SYSTEMS shall be clearly defined based on the manufacturer’s recommendations. The Contractor together with the manufacturer shall define the best recommended procedure for the total removal and replacement of the SYSTEMS.

D. The Contractor shall receive no additional compensation for the repair or replacement of SYSTEMS deemed non-conforming to the requirements of these contract documents and unacceptable by the Owner.

PART 5 MEASUREMENT AND PAYMENT

5.1 GENERAL

A. Measurements for each item furnished and installed to the satisfaction of the Owner shall be at the units of measure contained in the Bid Proposal.

B. Payment for each SYSTEM furnished and installed, in accordance with the contract documents and to the satisfaction of the Owner, will be at the unit prices in the Bid Proposal.

END OF ITEM 2580

ITEM 2590
TRENCH SAFETY SYSTEMS

0.10 GENERAL

This item shall govern for the Trench Safety Systems required for the construction of all trench excavation and backfill necessitated by the safety system. A trench shall be defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.

0.20 CONSTRUCTION METHODS

Trench safety systems shall be accomplished in accordance with the detailed specifications set out in the provisions of Excavations, Trenching, and Shoring, Federal Occupational Safety and Health Administration (OSHA) Standards, 29 CFR, Part 1926, Subpart P, as amended. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-653. The Contractor is responsible for obtaining a copy of this document for his use.

If the contractor elects to use a trench protective system that, in the Proposed Rules, requires "Design by a qualified person or a qualified engineer," [For example see 1926.652 (b)(3) and 1926.652 (c) (4)], "a qualified person or a qualified engineer" shall be a Professional Engineer registered in the State of Texas.

0.30 SAFETY PROGRAM

The Contractor shall submit a safety program specifically for the construction of trench excavation. The trench safety program shall be an accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

0.40 INSPECTION

The Contractor shall make daily inspections of the Trench Safety Systems to ensure that the systems meet OSHA requirements. Daily inspection is to be made by a "competent person" provided by the Contractor.

If evidence of possible cave-ins, or slides, is apparent, all work in the trench shall cease until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the Contractor, not the owner or the Engineer, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project. The Contractor shall maintain a permanent record of daily inspections.

0.50 INDEMNIFICATION

The Contractor shall indemnify and hold harmless the Owner, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this contact. The Contractor acknowledges and agrees that this indemnity provision provides indemnity for the Owner in case the Owner is negligent either by act of omission in

providing for trench safety, including, but not limited to inspections, failure to issue stop work orders, and the hiring of the Contractor.

0.60 MEASUREMENT

Trench Safety Systems shall be measured by the linear foot along the centerline of trench including manholes, fittings, and other line structures.

0.70 PAYMENT

"TRENCH SAFETY SYSTEMS " as set out above shall be included in the Linear Foot price bid by the Contractor.

Payment of all work prescribed under this item shall be full compensation for the Trench Safety Systems including any additional excavation and backfill required, for furnishing, placing, maintaining and removing all shoring, sheeting, or bracing; for dewatering or diversion of water; for all jacking and jack removal; and for all other labor, materials, tools, equipment and incidentals necessary to complete the work.

No extra compensation will be made for any and all other construction as described in this item.

END OF ITEM 2590

ITEM 2622

EXCAVATION AND BACKFILL FOR SANITARY SEWERS

1.10 GENERAL

This item shall govern for all excavation required for the construction of sanitary sewers, sewer structures, appurtenances and connections, and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines, and grades shown on the plans or as given by the Engineer, and in accordance with these specifications. This item shall govern, also, for the necessary pumping or bailing and drainage, and all sheathing and bracing of trench walls. Unless otherwise provided, this item shall govern for the removal and disposition of tree stumps and other obstructions of old structures or portions thereof (such as house foundations, old sewers, and sewer appurtenances), the blocking of the ends of abandoned sewers cut and left in place, and the restoration of existing utilities damaged in the process of excavation. It shall include the cutting and restoration of pavement and base courses and special operations involved in crossing railroads, the furnishing and placing of cement stabilized backfill, and hauling and disposition of surplus materials, and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.

1.11 CONSTRUCTION METHODS

A. Trenches

Unless otherwise permitted by the Engineer or specified on the drawings, all sewer shall be constructed in open cut trenches with vertical sides. Trenches shall be sheathed and braced to the extent necessary to maintain the sides of the trench in vertical position throughout the construction period. Adequacy of the sheathing and bracing shall be the responsibility of the Contractor but will be subject to the approval of the Engineer.

Trenches for precast concrete pipe sewers shall have a width of the pipe outside diameter plus two feet for sewers 42 inches or less nominal diameter. For pipe more than 42 inches in nominal diameter, the trenches shall have a width of the pipe outside diameter plus 4 feet.

For pipe sewers of all types, where the soil encountered at established footing grade is a quicksand, muck, or similar unstable material, the following procedure shall be used. All unstable soil shall be removed to a depth of 2 feet below bottom of sewer for sewers 2 feet or more in height and to a depth equal to the height of sewer for sewers less than 2 feet in height. Such excavation shall be carried at least 1 foot beyond the horizontal limits of the structure on all sides. All unstable soil so removed shall be replaced with suitable stable material, placed in uniform layers of suitable depth as directed by the Engineer, and each layer shall be wetted, if necessary, and compacted by mechanical tamping as required to provide a stable foundation for the structure. Soil which is considered to be of sufficient stability to sustain properly the adjacent section of the roadway embankment will be considered a suitable foundation material for the sewer.

For unstable trench conditions requiring outside forms, seals, sheathing, and bracing, or where ground water is encountered, any additional excavation and backfill required shall be done at the Contractor's expense.

B. Dewatering Trench

Sewers shall not be constructed or laid in a trench in the presence of water. All water shall be removed from the trench sufficiently prior to the sewer placing operation to insure a dry, firm bed on which to place the sewer and the trench shall be maintained in such un-watered condition until all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping, or by a well-point installation as conditions warrant.

C. Removal and Replacement of Street Base & Surface

The work to be performed under this specification shall consist of the removal of existing base and surface materials and the replacing of such base and surface materials removed in connection with the construction of sewers and appurtenances. During the time lapse between installation of pipe and replacement of surfacing, the Contractor is to maintain all such crossings both public and private, by filling ruts, pot-holes, etc., with flexible base material.

Where construction requires the removal of an existing asphalt surface, the Contractor shall remove such pavement by cutting the surface in a neat straight line along the limits of the trench width. All asphaltic material is to be removed and disposed of off-site by the Contractor. After the trench has been backfilled, the base material shall be replaced in layers not to exceed six (6") inches in depth, loose measurement, and each layer compacted by wetting and tamping until no further settlement is noticeable. Materials for resurfacing are to be as follows:

1. Asphaltic Surface - This item shall consist of a wearing surface composed of one application of asphaltic material, covered with aggregate, constructed on the prepared base in accordance with these specifications. The surface treatment shall not be applied when general weather conditions, in the opinion of the Engineer, are not suitable. The asphaltic material shall be oil asphalt, homogeneous, free from water and shall not foam when heated to 347 F. The aggregate shall be composed of sound and durable particles of gravel, crushed gravel, crushed stone, crushed slag, burned shale or clay or natural limestone rock asphalt. These materials shall contain less than l% total by weight of organic matter, clays or loam and less than 5% total by weight of slate, shale, schist or soft particles of sandstone. When properly tested by Standard Laboratory Methods, the aggregate shall meet the following requirements:

	% By Weight
Retained on 7/8 inch Sieve	0
Retained on 3/4 inch Sieve	0-2
Retained on 1/2 inch Sieve	20-35
Retained on No. 4 Sieve	85-100
Retained on No. 10 Sieve	98-100

2. Road Base – Cement Stabilized Sand - Shall consist of a foundation course for surface material and be composed of sand, cement and water as described below, and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown in Details.

   The sand shall be coarse graded sand, containing less than 8% objectionable material including, but not limited to clay lumps, coal, shale, and organic matter. The cement shall conform to A.S.T.M. C 150, Type I.

   The mixture shall not be less than 2 sacks of cement per ton of total mixture. Use potable water as required to develop a mix suitable for mechanical tamping and mixing in an approved mixer. Any material not in placed within 1-1/2 hours after mixing or that which has obtained an initial set will be rejected and removed from the site.

D. Removing Old Structures

When abandoned masonry structures or foundations are encountered in the excavation, such obstructions shall be removed for the full width of the trench and to a depth of 1 foot below the bottom of the trench. When old inlets or manholes are encountered and no plan provision is made for adjustment or connection to the new sewers, such manholes and inlets shall be removed completely to a depth 1 foot below the bottom of the trench. In each instance, the bottom of the trench shall be restored to grade by backfilling and compacting by the methods provided hereinafter for backfill. Where the trench cuts through storm or sanitary sewers which are known to be abandoned, these sewers shall be cut flush with

the sides of the trench and blocked with a concrete plug or capped in a manner satisfactory to the Engineer.

E. Protection of Utilities

The Contractor shall conduct his work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of water and gas lines. Such lines, if broken, shall be restored promptly by the Contractor and at his expense. When active sanitary sewer lines are cut in the trenching operations, temporary flumes shall be provided across the trench, while open, and the lines shall be restored when the backfilling has progressed to the original lines of the sewer so cut.

The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours or to make other adjustments to utility lines in order that the Contractor may proceed with his work with a minimum of delay and expense. The Contractor shall cooperate with all utility owners concerned in effecting any utility adjustments necessary and shall not hold the Owner liable for any expense due to delay or additional work because of conflicts.

F. Surplus Excavated Materials

All materials from excavation operations not required for backfilling the trench shall be placed in embankments if considered suitable. All material not suitable for use will be declared surplus by the Engineer and shall become the property of the Contractor to dispose of as he wishes, without injury to the Owner or any individual. Such surplus material shall be removed from the work promptly following the completion of the portion of the sewer involved.

G. Backfill

Unless otherwise provided, backfill above the pipe zones as follows:

Trenches shall be backfilled with material selected from the trench excavation, or obtained from other sources, which is free from stones of such size as to interfere with compaction and is free from large lumps which will not break down readily under compaction. The Engineer shall have the right to reject any material containing more than 20 percent by weight of material retained on a 3-inch sieve, or material excavated in such a manner as to produce large lumps not easily broken down or which cannot be spread in loose layers. In general, material excavated by means of a trenching machine will meet the requirements provided above.

The backfill shall be placed in layers not more than 12 inches in depth (loose measurement) and shall be compacted to 95% standard proctor density. The backfill shall be level with natural ground. After the backfill takes its initial settlement, and if the settlement is below the original ground surface, more earth backfill shall be placed to bring the backfill up to natural ground. Poor compaction of the backfill resulting in densities less than 95% standard proctor shall be removed, replaced and re-compacted at the Contractor's expense.

When the pipe trench crosses paved surfaces, or if directed by the Engineer, the trench shall be backfilled to the bottom of pavement or natural ground with cement stabilized sand. The stabilized backfill shall contain a minimum of 2 sacks of standard Portland Cement per cubic yard of material placed. The material for the stabilized backfill shall conform to the requirements of Spec. "CEMENT STABILIZED SAND".

Backfill below the top of pipelines, manholes or other structures and appurtenances shall be placed and compacted equally along both sides of the structure so as to prevent strain on, or displacement of, the structure. Measurement and payment for "CEMENT STABILIZED SAND" shall be directed in Spec. "CEMENT STABILIZED SAND".

1.12 BASIS OF PAYMENT

No separate payment will be made for any work described in this item, each item's cost being included in the unit price bid of which the work is a component, and shall be full compensation for furnishing all material, equipment and labor necessary to perform the work in accordance with these specifications.

END OF ITEM 2622

ITEM 2790

CEMENT STABILIZED SAND

0.10 CONSTRUCTION MATERIALS

Cement Stabilized Sand shall consist of sand, cement, and water as described below.

The sand shall be coarse graded sand, containing less than 8% objectionable material including, but not limited to clay lumps, coal, shale, and organic matter. The cement shall conform to A.S.T.M. C 150, Type I.

The mixture shall not be less than 2 sacks of cement per ton of total mixture. Use potable water as required to develop a mix suitable for mechanical tamping and mixing in an approved mixer. Any material not in place within 1-1/2 hours after mixing or that which has obtained an initial set will be rejected and removed from the site.

0.11 CONSTRUCTION METHODS

Place Cement Stabilized Sand in pipe trenches crossing street pavements, as pavement base for resurfacing, around manholes and wet wells, and in other excavation if directed by the Engineer. Under no circumstances is mixture to be placed around concrete structures until such structures have been allowed to cure for 24 hours and then only upon the direction of the Engineer. Compact mixture as directed by the Engineer.

Backfill up to original ground or bottom of pavement shall be backfilled in layers and compacted to a density of not less than 95% of compaction ratio density.

0.12 METHOD OF MEASUREMENT

Measure "CEMENT STABILIZED SAND" by cubic yard compacted in place. "CEMENT STABILIZED SAND" will be measured from spring line to the finished grade on the basis of maximum trench dimensions for pipelines. Where excavation is greater than limits set out previously, the Contractor will backfill such excavation in its entirety but will receive no extra payment for the excess.

0.13 BASIS OF PAYMENT

No separate payment will be made for any work described in this item, each item's cost being included in the unit price bid of which the work is a component, and shall be full compensation for furnishing all material, equipment and labor necessary to perform the work in accordance with these specifications.

END OF ITEM 2790

ITEM 2932
SODDING

1.0 GENERAL

This item includes the placement of topsoil and sodding of areas not covered by structures, sidewalks, or roads within the project area with St. Augustine grass.

2.0 MATERIALS

A. Sod shall be provided in blocks approximately square containing not less than nine square inches of live grass material, free from noxious weeds or other grasses. There shall be sufficient moist earth in each block to maintain growth. Sod shall be planted within three days from excavation of the sod materials.

B. Fertilizer shall be pellet or granular fertilizer with analysis of 16 percent nitrogen, 20 percent phosphoric acid, and zero percent potash (or 10-10-5) unless otherwise required. Percentage shall be computed by methods of the Association of Agricultural Chemists. Container labels shall show analysis. Powdered or caked fertilizer will not be permitted.

3.0 PLACEMENT

After area to receive fertilizing and sodding has been completed to lines, grades, and sections shown on the PLANS, a minimum or 2 inches of topsoil shall be placed on the surface and fertilizer shall be applied at a uniform average rate of 500 pounds per acre. The upper 3 inches of the topsoil shall be thoroughly mixed with the fertilizer until a uniform mixture of fertilizer and topsoil is obtained. Areas to be seeded shall be sprinkled with water using a fine spray to avoid washing or erosion of the soil.

Sod shall be placed after the completion of all grading operations and after application of fertilizer to the topsoil. Sod blocks shall be placed adjacent to each other to provide full coverage of the disturbed areas. The top of the sod shall match the finish grade elevations and in no case shall be more than 1/2 inch below final grade. Sodded areas shall be watered frequently and maintained in good condition until final acceptance of the work.

4.0 MEASUREMENT AND PAYMENT

No separate payment will be made for any work described in this item, this item's cost shall be being included in the unit price bid of which the work is a component, and shall be full compensation for furnishing all placement of topsoil, fertilizer, sod, material, equipment and labor necessary to perform the work in accordance with these specifications.

END OF ITEM 2932

ITEM 3050
CONCRETE

0.10 General

These specifications shall govern the materials used; for the storing, measuring, and handling of materials; and for the proportioning and mixing of concrete for appurtenances and incidental construction.

0.11 Construction Materials

The concrete shall be composed of Normal Portland Cement or High Early Strength Portland Cement, fine aggregate, coarse aggregate, and water, proportioned and mixed as hereinafter provided in these specifications.

A. Cement and Admixtures

Only one brand of cement shall be used in any one structure, except by written permission of the Engineer.

Portland Cement shall meet the requirements prescribed in the Standard Specifications for Portland Cement, A.S.T.M. C-150.

Cement shall be delivered in bags which shall be marked plainly with the brand and name of the manufacturer. In general, a bag shall contain ninety-four (94) pounds net. All bags shall be in good condition at time of use.

Bags varying more than five (5) per cent from the specified weight may be rejected; and, if the average weight of bags in any shipment, as shown by weighing fifty (50) bags taken at random is less than ninety-four (94) pounds, the entire shipment may be rejected.

All cement shall be properly protected against dampness, and no cement will be accepted which has become caked.

An air-entraining agent may be used in the concrete. The air-entraining agent used shall be one of those permitted under specifications for Air-Entraining Admixtures for Concrete A.S.T.M. C-260.

The amount of agent used shall be such as will effect the entrainment of 3 to 6 per cent of air by volume of concrete. The agent shall be added to the batch in solution in a portion of the mixing water. This solution shall be batched by means of a mechanical batcher capable of accurate measurement and in such a manner as will ensure uniform distribution of the agent throughout the batch curing the specified mixing period.

B. Mixing Water

Water for use with cement shall be reasonable clean and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

When comparative tests are made with water of known satisfactory quality, any indication of unsoundness, marked change in the time of set, or reduction of more than ten (10) per cent in mortar strength shall be sufficient cause for the rejection of the water under test.

Water which is suitable for drinking or for ordinary household use may be accepted for use with cement without being tested.

Water from doubtful sources shall not be used until tested and approved. The Contractor shall not take water for use in concrete from shallow, muddy or marshy sources unless provision is made for the intake of the suction pipe to be enclosed in such manner as to exclude silt, mud, grass and other foreign materials. The depth of the water shall be maintained at least (2) feet below the intake of the suction pipe. In case the water is not reasonably clear, the Contractor shall make provision to free it of suspended silt before use.

C. Coarse Aggregate

The coarse aggregate shall consist of gravel or crushed stone. The maximum permissible percentages of deleterious substances shall not exceed the following percentages by weight:

Material removed by decantation A.S.T.M. C 117	1.0%
Shale, slate or other similar materials	1.0%
Clay Lumps	0.25%
Soft Fragments	3.0%
Other deleterious substances including friable, thin, elongated or laminated pieces	3.0%

The sum of all deleterious ingredients, exclusive of material removed by decantation, shall not exceed 5% by weight.

The aggregate shall be free from an excess of salt, alkali, vegetable matter, or other objectionable materials either free or as adherent coatings.

Gravel shall consist of durable particles of gravel, crushed, or uncrushed.

Crushed stone shall consist of durable particles of rock of reasonable uniform quality throughout.

When tested by approved methods, the coarse aggregate shall conform to the following grading requirements:

	% By Weight
Retained on 1-1/2" screen	0 to 5%
Retained on 3/4" screen	25 to 60%
Retained on 1/4" screen	95 to 100%

D. Fine Aggregate

Fine aggregate shall consist of sand or a combination of sand and not more than fifty (50) per cent of stone screenings.

Sand shall be composed of clean, hard, durable uncoated grains.

Stone screenings shall consist of clean, hard, durable uncoated fragments resulting from the crushing of stone.

The maximum amount of deleterious substances shall not exceed the following percentages by weight:

Material removed by decantation (A.S.T.M. C 117)	3.0%
Clay lumps	0.5%
Other deleterious substances such as coal, shale, coated grains and soft flaky particles	2.0%

The aggregates shall be free from an excess of salt or alkali.

At the time of its use, the aggregate shall be free from frozen material and all foreign material such as wood, hay, burlap, paper, or dirt which may become mixed with the aggregate in stock piles.

When tested by approved methods, the fine aggregate shall conform to the following grading requirements:

	% By Weight
Retained on 3/8" screen	0%
Retained on 1/4" screen	0 to 5%
Retained on 20 mesh sieve	15 to 50%
Retained on 100 mesh sieve	85 to 100%

E. Storage of Cement

Unless otherwise provided, all cement shall be stored in well ventilated, weatherproof buildings which will protect the cement from dampness. The floor supporting the cement shall clear the ground a sufficient distance to prevent the absorption of moisture by the cement. Provisions for storage shall be ample, and the shipments of cement shall be segregated in such a manner as to provide easy access for identification and inspection of each shipment.

The Engineer may permit small quantities of cement to be stored in the open for a short period of time (maximum of 48 hours) if a raised storage platform and adequate waterproof covering are provided.

No cement shall be used which has become lumped or caked.

F. Storage of Aggregate

The handling and storage of concrete aggregate shall be such as to prevent the admixture of foreign materials. If the aggregates are stored on the ground, the sites for the stock piles shall be grubbed, cleared of all weeds and grass, and leveled off. The bottom layer of aggregate shall not be disturbed or used without recleaning.

When the contract requires the use of two (2) or more sizes of aggregates, the difference sizes shall be stored in such a manner as to prevent intermixing.

Material in all stock piles shall be handled and placed in such a manner that segregation of materials within the pile will be avoided.

0.12 Classification and Proportions

Concrete shall be proportioned as determined by the Engineer, by absolute volume and in accordance with the requirements hereinafter set forth. For placements of concrete involving twenty-five (25) cubic yards or less in one continuous placement, the requirements for absolute volume batch design may be waived by the Engineer, and a mix proportion may be determined by trial mixes; however, the requirements for weighing and measuring materials shall not be waived. The concrete shall be uniform and workable. The minimum cement content, maximum allowable water content, and the maximum slump for the various classes of mixes shall conform to the following:

	Min. Cement Bags per C.Y. class	Min. 28-Day Compressive Strength Lbs./Sq. In.	Max. Water Gals. per Bag. (Net)	Max. Slump Inches
A	5.25	3,000	6.25	2 1/2 - 4 l/2
B	4.25	2,000	8.5	2 1/2 - 4
C	3.0	l,500	11.0	3 - 5
D	4.0	-	-	-

The maximum amount of coarse aggregate (dry loose volume) per cubic foot of finished concrete shall not exceed 0.82 cubic feet.

The net amount of water will be the amount added at the mixer, plus the free water in the aggregates. No water allowance will be made for evaporation after batching.

The concrete mix will be designated with the intention of producing concrete which will have compressive strengths, when tested on test specimens cured under field laboratory conditions, equal to or greater than the values in the table.

The Contractor shall be responsible for the concrete design and proportioning; the minimum cement content, maximum allowable water to be added at the mixer, and the maximum slump for the various classes of mixes shall conform to the values in the table.

A. Consistency

The quantity of water to be used will be determined by the Engineer and shall be such as to give a mixture containing the minimum amount of water consistent with the required workability. The quantity of water shall be varied only by the Engineer. In general, the consistency of concrete mixtures shall be such that:

(1) The mortar will cling to the coarse aggregate.

(2) The concrete is not sufficiently fluid to segregate when transported to the place of deposit.

(3) The concrete, when dropped directly from the discharge chute of the mixer, will flatten out at the center of the pile; but the edges of the pile will stand up and not flow.

(4) The mortar will show no free water when removed from the mixer.

(5) The concrete will settle into place when deposited in forms; and when transported in metal chutes at an angle of thirty (30) degrees with the horizontal, it will slide and not flow into place.

(6) The surface of the finished concrete will be free from a surface film of free water.

Any concrete mix failing to meet the above-outlined consistency requirements, although meeting the slump requirements, will be considered unsatisfactory; and the mix shall be changed to correct such unsatisfactory conditions. In cases where the characteristics of the aggregates furnished are such that, with the maximum allowable amount of water the specified slump and consistency requirements are not met, the Contractor may provide aggregates of an improved grading, or the Engineer will modify the mix design to meet the slump and consistency requirements by adding cement as may be necessary.

The slump test will be made in accordance with the methods outlined in A.S.T.M. C 143.

B. Quality of Concrete

Concrete made of acceptable materials, of the proportions specified by the Engineer, and in complete accordance with the requirements of the construction methods and details specified for the class of work involved, will be considered as of satisfactory quality.

During the progress of the work, the Engineer will cast test cylinders of the number and type he may desire for testing to maintain a check on the strength of the concrete actually being placed.

The Contractor shall provide and maintain curing facilities approaching job conditions for the purpose of curing concrete test specimens. The cost of all materials used in test specimens and the cost of providing and maintaining curing facilities shall be included in the unit price bid for concrete of the various classes.

0.13 Construction Methods

A. Placing Concrete, General

The Contractor shall give the Engineer sufficient advance notice before starting to place concrete in any unit of the structure to permit the inspection of forms, the reinforcing steel placement, and preparations for casting. Unless authorized by the Engineer, no concrete shall be placed in any unit prior to the completion of the form work and the placement of the reinforcement.

Concrete placing shall be so regulated as to permit finishing operations to be completed in the daylight hours.

The Engineer reserves the right to order postponement of the placing operations when, in his opinion, impending weather conditions may result in rainfall or low temperatures which will impair the quality of the finished work. In case rainfall should occur after placing operations are started, the Contractor shall provide ample covering to protect the work. In case of drop in temperature, the provisions set forth in subsection B. "Placing Concrete in Cold Weather", of this item, shall be applied.

The sequence of placing concrete shall be as directed by the Engineer. The operation of depositing and compacting the concrete shall be conducted so as to form a compact, dense, impervious mass of uniform texture which shall show smooth faces on all surfaces. The placing shall be so regulated that the pressures caused by the plastic concrete shall not exceed the loads used in the design of forms.

The method and manner of placing shall be such as to avoid the possibility of segregation or separation of the aggregate or the displacement of the reinforcement. Concrete shall not have a free fall of more than

three (3) feet. The spattering of forms or reinforcement bars shall be prevented if the concrete so spattered will dry or harden before being incorporated in the mass.

Each part of the forms shall be filled by depositing concrete directly as near its final position as possible. The coarse aggregate shall be worked back from the face of the forms and concrete shall be forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point in the forms and running or working it along the forms will not be allowed.

After the concrete has taken initial set, the forms shall not be jarred or any strain placed on projecting reinforcement.

Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms, or the ends of such chutes shall terminate in vertical down spouts. All chutes, troughs, and pipes shall be kept clean and free from coating of hardened concrete by a thorough flushing with water before and after each placement. Water used for flushing shall be discharged clear of the concrete in place. The use of chutes in excess of thirty-five (35) feet total length for conveying concrete will not be permitted except by specific authorization from the Engineer.

All concrete shall be well compacted and the mortar flushed to the surface of the forms by continuous working with concrete spading implements or mechanical vibrators of an approved type. Vibrators of the type which operate by attachment to forms or reinforcement will not be permitted. The vibrators shall be applied to the concrete immediately after deposit and shall be moved throughout the mass, thoroughly working the concrete around the reinforcement, embedded fixtures, and into the corners and angles of the forms until it has been reduced to a plastic mass. The mechanical vibrator shall not be operated so that it will penetrate to disturb layers placed previously which have become partially set or hardened. The vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures but shall not be done to an extent that will cause segregation. Vibration shall be supplemented by hand spading if necessary to insure the flushing of mortar to the surface of all forms.

B. Placing Concrete in Cold Water

No concrete shall be placed when the atmospheric temperature is at or below 40 F. (taken in the shade away from artificial heat) unless permission to do so is given in writing by the Engineer. When such permission is given or in cases where the temperature drops below 40 F. after the concreting operations have been started, the Contractor shall furnish sufficient canvas and framework or other type of housing to enclose and protect the structure in such way that the air around the forms and fresh concrete can be kept at a temperature not less than 50 F. for a period of five days after the concrete is placed. Sufficient heating apparatus such as stoves, salamanders, or steam equipment and fuel to furnish all required heat shall be supplied.

It is understood that the Contractor is responsible for the protection of concrete placed under any and all weather conditions. Permission given by the Engineer to place concrete during freezing weather will in no way relieve the Contractor of the responsibility for satisfactory results. Should concrete placed under such conditions prove unsatisfactory, it shall be removed and replaced at the expense of the Contractor.

0.14 Method of Measurement

Unless otherwise specified, concrete furnished under this item, including all work set out herein and incidental to the furnishing, mixing, forming, placing, finishing, and curing concrete, will not be paid for

directly. The Contractor will include the cost of same in the unit price bid for other items of work of which this item is a component part.

Where prices are requested on the bid sheet for "EXTRA CONCRETE" and where it is specifically authorized for use by the Engineer, such concrete will be measured by the cubic yard of the acceptable concrete, complete in place, for types specified.

0.15 Basis of Payment

"EXTRA CONCRETE" measured as set out above will be paid for at the unit price bid per cubic yard for "EXTRA CONCRETE". This price shall be full compensation for furnishing all labor, equipment, materials, hauling, mixing, forming, placing, finishing, curing, and incidentals necessary to furnish one cubic yard of concrete complete in place.

END OF ITEM 3050

ITEM 3211
REINFORCING STEEL

1.10 GENERAL

This item shall provide for the furnishing and placing of reinforcing steel of the type, size and quantity designated for use in sewers and appurtenant sewer structures as shown on the plans and in accordance with these specifications.

1.11 CONSTRUCTION MATERIALS

All bar reinforcement shall be open hearth new billet steel of structural, intermediate, or hard grade.

New billet steel shall conform to the requirements of the Standard Specifications for Billet-Steel Concrete Reinforcement Bars, A.S.T.M. A-15-39.

Unless otherwise shown on the plans, all reinforcing bars shall be deformed bars conforming to the requirements of A.S.T.M. A-305.

Wire for fabric reinforcement shall be cold-drawn from rods hot-rolled from open-hearth billets. Wire shall conform to the requirements of the Standard Specifications for Cold-Drawn Wire for Concrete Reinforcement, A.S.T.M. A-82.

In cases where the provisions of this item are in conflict with the provisions of the A.S.T.M. designations, to which reference is made, the provisions of this item shall govern.

The nominal size area and the theoretical weight of reinforcing steel bars covered by this specification are as follows:

NUMBER	NOMINAL DIAMETER INCHES	NOMINAL AREA SQUARE INCHES	WEIGHT PER LINEAR FOOT
2	1/4"	0.05	0.167
3	3/8"	0.11	0.376
4	1/2"	0.20	0.668
5	5/8"	0.31	1.043
6	3/4"	0.44	1.502
7	7/8"	0.60	2.044
8	1"	0.79	2.670
9	1.128"	1.00	3.397
10	1.270"	1.27	4.307
11	1.410"	1.56	5.308

The weight of any lot of bars shall not vary more than three and one-half (3-1/2) per cent under the theoretical weight for bars three-eighths (3/8") inches and over in nominal size or diameter; nor more than five (5) per cent under theoretical weight for bars under three-eighths (3/8") inch in nominal size or diameter. The weight of an individual bar shall not vary more than six (6) per cent under the theoretical weight for bars three-eighths (3/8") inch and over in size or diameter; nor more than ten (10) per cent under the theoretical weight for bars under three-eighths (3/8") inch in size or diameter. The theoretical weight of deformed bars shall be the same as the theoretical

weight of plain round or square bars of the same nominal size. Bars or lots which vary more than the limits shown in the preceding page shall be rejected.

Where wire is ordered by gauge number, the following relation between number and diameter, in inches, shall apply unless otherwise specified.

GAUGE NUMBER	EQUIVALENT DIAMETER INCHES	GAUGE NUMBER	EQUIVALENT DIAMETER INCHES
0	.3065	8	.1620
1	.2830	9	.1483
2	.2625	10	.1350
3	.2437	11	.1205
4	.2253	12	.1055
5	.2070	13	.0915
6	.1920	14	.0800
7	.1770		

The dimensions of the wire on any diameter shall not vary more than 0.003 inches from the specified nominal diameter. The difference between the maximum and minimum diameters, as measured on any given cross section of the wire, shall not be greater than 0.003 inches. Wire not meeting these requirements shall be rejected.

A. Storing

Steel reinforcements shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. Where placed in the work, it shall be free from dirt, scale, dust, paint, oil, or other foreign material.

1.12 CONSTRUCTION METHODS

A. Bending

The reinforcement shall be bent cold to shapes indicated on the plans. Bends shall be true to the shapes indicated, and irregularities in bending shall be cause for rejection. Unless otherwise shown on the plans, bends for stirrups and ties shall be made around a pin having a diameter of not less than two (2) times the minimum thickness of the bar.

B. Splices

No splicing of bars, except when shown on the plans, will be permitted without the written approval of the Engineer. Splices which are permitted shall have a lapped length of not less than forty (40) times the nominal size or diameter of the reinforcement except for bars meeting A.S.T.M. A-305 for which laps may be reduced to 20 diameters. Laps shall be well distributed or located at points of low tensile stress. No splices will be permitted at points where the section is not sufficient to provide a minimum distance of two inches between the splice and the nearest adjacent bar or the surface of the concrete. Bars shall be rigidly clamped or wired at all splices in a manner approved by the Engineer.

C. Placing

Steel reinforcement shall be placed in the exact position as shown on the plans and held securely in place during the placing of the concrete. Vertical stirrups shall always pass around the main tension members and be securely attached thereto. All horizontal reinforcing steel shall be spaced vertically by means of approved galvanized metal spacers or approved precast mortar or concrete blocks.

All reinforcing steel shall be wired together at all intersections. Before any concrete is placed, all mortar shall be cleaned from the reinforcement. Precast mortar or concrete blocks to be used for holding steel in position adjacent to formed surfaces shall be cast in individual molds meeting the approval of the Engineer and shall be cured by covering with wet burlap until aged sufficiently to be removed from the molds, at which time the blocks shall be immersed in water for the remainder of at least a four-day curing period. The blocks shall preferably be cast with the sides beveled and in such manner that the size of the block increases away from the area to be placed against the forms. Blocks in the form of a frustum of a cone or pyramid are preferred. A suitable tie wire shall be provided in each block, such wire to be used for anchoring the block to the steel in order to avoid displacement in placing the concrete. Except in unusual cases, and when specifically otherwise authorized by the Engineer, the size of the surface to be placed adjacent to the forms shall not exceed two and one-half inches square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be accurately cast to the thickness required, and the surface to be placed adjacent to the forms shall be a true plane free of surface imperfections.

Sheets of wire mesh or fabric shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges.

No concrete shall be deposited until the Engineer shall have inspected the placing of the reinforcing metal and given permission to place concrete.

1.13 METHOD OF MEASUREMENT

The measurement of the quantities of bar or fabric reinforcement furnished and placed will be based on the calculated weights of the steel actually placed in accordance with the plans and these specifications, with no allowance made for added bar lengths for splices requested by the Contractor nor for extra metal used when bars larger than those specified are substituted with the permission of the Engineer. The wires and supporting devices will not be included in the calculated weights. The calculated weight for bar reinforcement will be determined, using the theoretical bar weights set forth above, with no allowance for overruns or underruns. The calculated weight for fabric reinforcement will be based on the theoretical weight of the fabric based on the nominal gauge of the wires and on the basis of steel weighting 0.2833 pounds per cubic inch. No allowance will be made for overruns or underruns due to variations from the nominal gauges.

1.14 BASIS OF PAYMENT

Reinforcing steel for slabs, and other structures will not be paid for directly. The cost of this reinforcing steel shall be included in the Lump Sum price bid for other items of work of which this item is a component part. The price bid for these items shall be full compensation for furnishing, bending, fabricating, and placing the reinforcement, for all clips, blocks, metal spacers, ties, wire or other materials used for fastening reinforcement in place, and for all tools, labor, equipment, and incidentals necessary to complete the work.

END OF ITEM 3211

APPENDICES

APPENDIX II
AFFIDAVIT OF WARRANTY

AGREEMENT &
CONDITIONS OF AGREEMENT

BID FORM &
STATEMENT OF BIDDER QUALIFICATIONS

BONDS