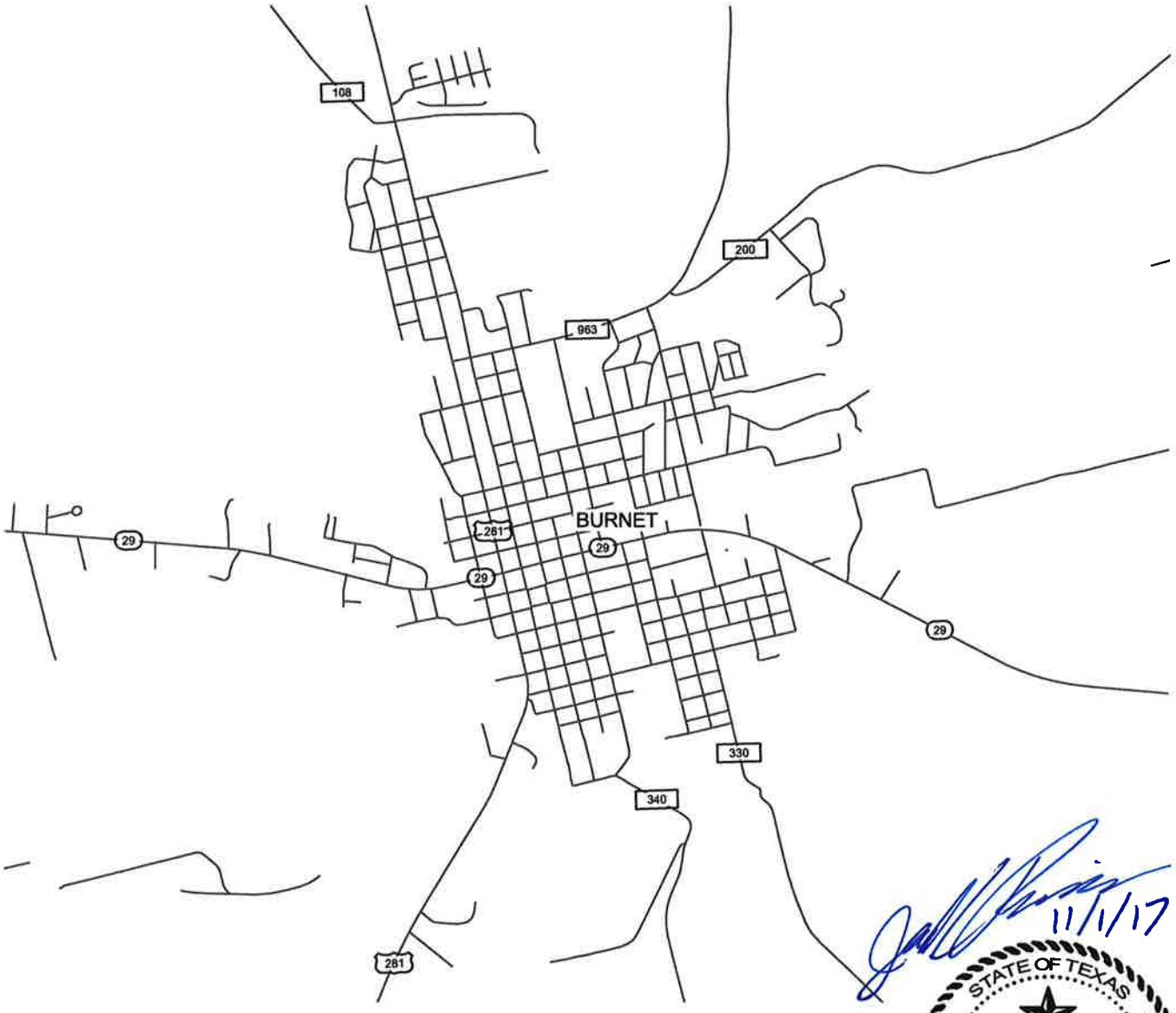
CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS FOR CONSTRUCTION OF SANITARY SEWER REHABILITATION FOR THE CITY OF BURNET BURNET COUNTY, TEXAS

JONES & CARTER, INC. PROJECT NUMBER 0A737-0004-00



11/1/17

STATE OF TEXAS
JARED L. BIERMANN
123291
LICENSED PROFESSIONAL ENGINEER

NOVEMBER 2017

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6415 Reading Road • Rosenberg, Texas 77471 • 281.342.2033

CITY OF BURNET

CONTRACT DOCUMENTS
AND
TECHNICAL SPECIFICATIONS
FOR
CONSTRUCTION OF
BURNET SANITARY SEWER REPLACEMENTS
BURNET COUNTY, TEXAS
NOVEMBER 2017

TABLE OF CONTENTS

02 – Site Work

02110 – Demolition
02220 – Excavation, Trenching and Backfilling for Utilities
02221 – Cement-Sand Backfill
02226 – Trench Safety System
02227 – Waste Material Disposal
02514 – Manholes
02560 – Sanitary Sewers
02561 – Sewer Flow Control
02562 – Sewer Line Cleaning
02563 – Television Inspection
02564 – Service Reconnection
02565 – Point Repairs to Sanitary Sewers
02567 – Removal and Replacement of Sanitary Sewers
02603 – Cured-in-Place Pipe (CIPP) Rehabilitation of Gravity Sewers
02613 – Manhole Rehabilitation
02616 – Pavement Repair and Resurfacing
02678 – Pipebursting

03 – Concrete

03350 – Grouting

INVITATION TO BID

Sealed bids in duplicate addressed to Mr. David Vaughn, City Manager, and will be received at City of Burnet City Hall, 1001 Buchanan Drive Suite 4, Burnet, Texas 78611, until 2:00 p.m., November 29, 2017. Bids will be publicly opened and read aloud at that time for furnishing all labor, material and equipment and performing all work required for the construction of: **Burnet Sanitary Sewer Replacement**.

The project is located inside the City Limits of Burnet, along various sanitary lines throughout the city.

For construction contracts $50,000 and over but less than $250,000, the bidder shall submit a certified or cashier's check on a responsible bank in the State equal to two percent (2%) cashier's check or five percent (5%) bid bond of the maximum total bid amount. For construction contracts over $250,000, the bidder shall submit either a 2% certified or cashier's check or a five percent (5%) bid bond of the maximum total bid amount. Make the cashier's check or bid bonds payable to the Owner.

Plans, specifications, and bidding documents are available at www.civcastusa.com and www.cityofburnet.com Said documents may be examined without charge in the office of Jones & Carter, Inc., 3100 Alvin Devane Boulevard, Suite 150, Austin, Texas 78741 or at City of Burnet City Hall, 1001 Buchanan Drive Suite 4, Burnet, Texas 78611.

There will be a pre-bid conference at City of Burnet City Hall, 1001 Buchanan Drive Suite 4, Burnet, Texas 78611 at 2:00 p.m., November 15, 2017. Attendance is mandatory.

The Owner reserves the right to reject any or all bids and waive any or all irregularities. No bid may be withdrawn until the expiration of 60 days from the date bids are open.

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INSTRUCTION TO BIDDERS

1.0 INVITATION

a. The Work. Bids are invited on a general contract for construction of Burnet Sanitary Sewer Replacements.

b. The Owner.

City of Burnet
1001 Buchanan Drive, Suite 4
Burnet, Texas 78611
Attention: Mr. David Vaughn, City Manager
Telephone: (512) 756-6093

c. The Engineer.

Jones & Carter, Inc.
6415 Reading Road
Rosenberg, Texas 77471
Attention: Mr. Jared Biermann, P.E.
Telephone: (281) 342-2033

2.0 RECEIPT OF BIDS

a. Sealed bids, in duplicate, will be addressed to Mr. David Vaughn and will be received until 2:00 p.m., November 29, 2017 at City of Burnet City Hall, 1001 Buchanan Drive Suite 4, Burnet, Texas 78611.

b. Bids received after this time will not be opened and will be delivered to the Owner for its consideration.

c. There will be a pre-bid conference in the City Hall of the City of Burnet, 1001 Buchanan Drive, Burnet, Texas 78611 on November 15, 2017 at 2:00 p.m. Attendance is mandatory.

d. Bid opening will be held immediately after the time for receipt of bids has expired.

e. Bids will be opened publicly and read aloud. All interested parties are invited to attend.

3.0 BIDDING DOCUMENTS

a. Bidding documents include all documents available during the bidding period, including the instruction to bidders, contract forms, conditions of the contract, specifications, drawings and addenda, if any.

b. Bidders may purchase copies of the bidding documents at www.civcastusa.com. Said documents may be examined without charge in the office of Jones & Carter, Inc. at 3100 Alvin Devane Boulevard, Suite 150, Austin, Texas 78741.

c. Bidding documents may be examined by appointment at the office of the Engineer.

4.0 SEPARATED CONTRACT PROVISIONS

a. Contractor must abide by all state and local laws regulating sales tax exemption for work being performed for tax exempt entities. Provisions are provided in Section 5.03 of the Special Conditions.

b. Contractor is responsible for obtaining all permits required by the work at no additional cost to the Owner, except as may specifically be exempted in the Special Conditions.

5.0 EXAMINATION

a. Bidder shall carefully examine the bidding documents and the site to determine the actual conditions under which work will be done.

b. Data in the bidding documents pertaining to existing conditions is for convenience only and does not supplant obtaining firsthand information at the site.

c. Adjusting payments will not be authorized for work that could have been foreseen by a careful examination of the site.

d. Submission of a bid constitutes acceptance by the bidder of existing site conditions as a part of the requirements of this work.

6.0 COMPLETION TIME

a. The work shall be substantially completed within calendar days bid from date of Notice to Proceed.

b. Submission of a bid constitutes acceptance by the bidder of the completion time as a part of the requirements of this work.

7.0 QUESTIONS

a. In ample time to permit consideration before reply, submit questions about bidding instruments to the Engineer.

b. Necessary replies will be issued to bidders of record as addenda, which becomes a part of the bidding instruments. Oral instructions do not form a part of the bidding instruments.

c. Bidders should contact the Engineer not less than 72 hours before bid opening to secure any addenda that may affect bidding.

8.0 SUBMITTAL

a. Submit bid and other required data in an opaque, sealed envelope. If submitted by mail, enclose bid envelope in another envelope addressed for mailing. Plainly identify the sealed envelope with the following information:

Do not open before 2:00 P.M. November 29, 2017
Bid for: Sanitary Sewer Rehabilitation
Owner: City of Burnet
Bidder: _____

b. Submit bid on the bid form provided. Fill in all blanks. If no amount is to be included, insert three zeros in the space. Include all unit cost items and all alternatives shown on the bid form; failure to comply may be cause for rejections. No segregated bids or assignments will be considered.

c. Do not alter the bid form with written memoranda or qualifications. Any explanation, alteration, or other statements proposed by the bidder must be written separately, signed independently, and included in the bid envelope. Bids may not be modified after submittal.

d. Sign in longhand below the typed name of the person authorized to bind the bidder to a contract. When the bidder is a corporation, the bid must be signed with the legal name of the corporation followed by the name of the State of Incorporation and the legal signature of a person authorized to bind the corporation to a contract.

9.0 BID SECURITY

a. For construction contracts $50,000 and over but less than $250,000, the bidder shall submit a certified or cashier's check on a responsible bank in the State equal to two percent (2%) cashier's check or five percent (5%) bid bond of the maximum total bid. For construction contracts over $250,000, the bidder shall submit either a 2% certified or cashier's check or a five percent (5%) bid bond of the maximum total bid amount. Make the cashier's check or bid bonds payable to the Owner.

b. The bid security will be forfeited to the Owner by the bidder as damages as default if the bidder fails to execute and deliver a contract and bonds as required.

10.0 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

Bidder must be capable of executing a satisfactory performance bond and payment bond for 100 percent (100%) of the contract sum in accord with the conditions of the contract.

11.0 WITHDRAWAL

a. Bids may be withdrawn any time before bid opening but may not be resubmitted.

b. Bids may not be withdrawn or modified after bid opening time unless the award of the contract has been delayed more than 90 days.

12.0 QUALIFICATIONS OF BIDDERS

a. The Owner may make any investigations deemed necessary to determine the bidder's ability to perform the work. When requested, furnish such information and data necessary for this purpose.

b. The Owner reserves the right to reject any bid if evidence submitted by or investigation of the bidder indicate that the bidder is not properly qualified in the opinion of the Owner, to complete the work satisfactorily.

13.0 AWARD OF CONTRACT

The Owner is not obligated to accept the lowest bid or any bid. The Owner reserves the right to reject any or all bids and to waive any informalities in bids or in bidding. The Owner may accept any bid deemed advantageous. The contract award may include full consideration of unit prices, alternates, and time of completion.

14.0 RETURN OF SIGNED CONTRACTS

By submitting a bid, the Contractor agrees to return signed contracts with proper bonds and insurance certificates within 14 calendar days after the Engineer has given the unsigned contracts to the Contractor. Should the Contractor fail to return properly executed contracts within 14 days, the Engineer may disqualify that Contractor and recommend that the Owner enter into contracts with the next highest bidder.

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BID FORM

DATE: _____

Bid of _____ an individual proprietorship, a corporation organized and existing under laws of the State of Texas, a partnership of _____ for Construction of Burnet Sanitary Sewer Replacements.

To: The City of Burnet
1001 Buchanan Drive, Suite 4
Burnet, Texas 78611
Attention: Mr. David Vaughn, City Manager

Ladies and Gentlemen:

The undersigned bidder has carefully examined the Instructions to Bidders, this Proposal, the General Conditions of Agreement, the Technical Specifications and the drawings for the work herein above described and referred to in the Invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to complete all the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts below.

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
BASE BID					
1.	Move-in and start-up, including permits, performance bond, and payment bond for 100 percent (100%) of the contract amount. @ _____ _____ Per Lump Sum	L.S.	1	$ _____	$ _____
SANITARY SEWER					
2.	Pre-construction cleaning and televising of sanitary sewer, 6-inch (6") diameter, complete as specified. @ _____ _____ Per Linear Foot	L.F.	7,500	$ _____	$ _____

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
3.	Pre-construction cleaning and televising of sanitary sewer, 8-inch (8") diameter, complete as specified. @ Per Linear Foot	L.F.	7,100	$	$
4.	Pre-construction cleaning and televising of sanitary sewer, 10-inch (10") diameter, complete as specified. @ Per Linear Foot	L.F.	900	$	$
5.	Pre-construction cleaning and televising of sanitary sewer, 12-inch (12") diameter, complete as specified. @ Per Linear Foot	L.F.	350	$	$
6.	6-inch (6") sanitary sewer rehabilitation by PIPEBURSTING METHOD, all depths, replacing 6-inch (6") sanitary sewer with 8-inch (8") HDPE, including installation, testing, sewer flow control and cleanup, complete in place. @ Per Linear Foot	L.F.	7,200	$	$
7.	8-inch (8") sanitary sewer rehabilitation by CURED-IN-PLACE PIPE (CIPP) METHOD all depths, including installation, testing, sewer flow control and cleanup, complete in place. @ Per Linear Foot	L.F.	7,400	$	$

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
8.	10-inch (10") sanitary sewer rehabilitation by CURED-IN-PLACE PIPE (CIPP) METHOD all depths, including installation, testing, sewer flow control and cleanup, complete in place. @ _____ _____ Per Linear Foot	L.F.	900	$ _____	$ _____
9.	12-inch (12") sanitary sewer rehabilitation by CURED-IN-PLACE PIPE (CIPP) METHOD all depths, including installation, testing, sewer flow control and cleanup, complete in place. @ _____ _____ Per Linear Foot	L.F.	350	$ _____	$ _____
10.	Rehabilitation of existing manholes (all depths), to include cleaning, preparation, sewer flow control, and sealing by application of a protective coating per Specification No. 02613, complete in place. @ _____ _____ Per Vertical Foot	V.F.	437	$ _____	$ _____
11.	Removal and replacement of end of the line clean-out, complete in place. @ _____ _____ Per Each	EA.	9	$ _____	$ _____
12.	Internal reconnection of sanitary services, all depths, complete in place. @ _____ _____ Per Each	EA.	90	$ _____	$ _____

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
13.	External reconnection of sanitary sewer service line, including bedding, backfill and pavement, complete in place. @ _____ _____ Per Each	EA.	60	$ _____	$ _____
14.	8-inch (8") pipe point repair (Using 8-inch SDR-26 PVC) by excavation, (0-12 foot depth) including post-construction cleaning and televising, excavation, sewer flow control, installation, testing, bedding, backfill, and site restoration, complete in place, ONLY as directed by Engineer. (See Spec. No. @ _____ _____ Per Each	EA.	20	$ _____	$ _____
15.	10-inch (10") pipe point repair (Using 10-inch SDR-26 PVC) by excavation, (0-12 foot depth) including post-construction cleaning and televising, excavation, sewer flow control, installation, testing, bedding, backfill, and site restoration, complete in place, ONLY as directed by Engineer. (See Spec. No. 2565) @ _____ _____ Per Each	EA.	20	$ _____	$ _____
16.	Additional linear feet of 8-inch (8") pipe point repair (using 8-inch SDR-26 PVC) associated with Base Bid Item No. 14, complete in place, as directed by Engineer. @ _____ _____ Per Linear Foot	L.F.	50	$ _____	$ _____

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
17.	Additional linear feet of 10-inch (10") pipe point repair (using 10-inch SDR-26 PVC) associated with Base Bid Item No. 15, complete in place, as directed by Engineer. @ _____ _____ Per Linear Foot	L.F.	50	$ _____	$ _____
18.	Post-construction cleaning and televising of sanitary sewer, 8-inch (8") diameter, complete as @ _____ _____ Per Linear Foot	L.F.	14,600	$ _____	$ _____
19.	Post-construction cleaning and televising of sanitary sewer, 10-inch (10") diameter, complete as specified. @ _____ _____ Per Linear Foot	L.F.	900	$ _____	$ _____
20.	Post-construction cleaning and televising of sanitary sewer, 12-inch (12") diameter, complete as specified. @ _____ _____ Per Linear Foot	L.F.	350	$ _____	$ _____
21.	Final vertical adjustment of sanitary sewer manholes, complete in place. @ _____ _____ Per Each	EA.	15	$ _____	$ _____
ADDITIONAL					
22.	Extra bank sand, as directed by the Engineer. @ _____ _____ Per Cubic Yard	C.Y.	20	$ _____	$ _____

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
23.	Extra cement sand, as directed by Engineer. @ _____ _____ Per Cubic Yard	C.Y.	20	$ _____	$ _____
24.	Site restoration, complete in place. @ _____ _____ Per Lump Sum	L.S.	1	$ _____	$ _____
25.	Obstruction removal by excavation, all sizes, all depths, complete in place. @ _____ _____ Per Each	EA.	20	$ _____	$ _____
26.	Remove and replace asphalt pavement per TxDOT specifications, as directed by engineer. @ _____ _____ Per Square Yard	S.Y.	30	$ _____	$ _____
27.	Traffic control plan, complete as specified. @ _____ _____ Per Lump Sum	L.S.	1	$ _____	$ _____

TOTAL BASE BID (ITEMS 1-27) $ _____

TOTAL CALENDAR DAYS BID _____

Item No.	Description of Item with Unit Bid Price in Written Words.	Unit	Approx. Quantity	Unit Amount	Total Price
ALTERNATE A					
A1.	In lieu of item 6, 6-inch (6") sanitary sewer rehabilitation by CURED-IN-PLACE PIPE (CIPP) METHOD all depths, including installation, testing, sewer flow control and cleanup, complete in place. @ _____ _____ Per Linear Foot	L.F.	7,100	$ _____	$ _____
A2.	In lieu of item 13, internal reconnection of sanitary services, all depths, complete in place. @ _____ _____ Per Each	EA.	60	$ _____	$ _____
				TOTAL ALTERNATE A (ITEMS A1-A2)	$ _____
				TOTAL BASE BID PLUS ALTERNATE A (ITEMS 1-5,7-12,14-27, A1-A2)	_____

The total value of the work equals the total of the following items, each of which shall be billed separately by Contractor to Owner:

a.	Incorporated Material	$	_____
b.	Non-Incorporated Material	$	_____
c.	All Other Costs and Fees	$	_____
	TOTAL BASE BID	$	_____
			(Must equal Total Base Bid above)

The amounts set forth above are current estimates by Contractor of the amounts that will be determined during the progress of the Work. The separated progress billings from Contractor to the **Owner/Engineer** shall reflect the actual amounts expended for the items enumerated in (a), (b), and (c), above.

SUBSTITUTIONS: If necessary, attach detailed

1. _____
   (Add) (Deduct) $ _____

2. _____
   (Add) (Deduct) $ _____

It is understood and agreed that the work shall be complete in full within ___ calendar days after the date on which work is to be commenced as established by the Contract Documents.

It is agreed that the contract price may be increased or decreased to cover work added or deleted by order of the Engineer, in accordance with the provisions of the General Conditions of Agreement.

The award may be made on the Base Bid alone or the Base Bid and any or all of the Items listed under Alternates or Substitutions, if any.

The undersigned agrees that the amounts bid in this proposal will not be withdrawn or modified for **90** days following date of bid opening.

It is understood that the bid security accompanying this proposal shall be returned to the undersigned unless, in case of the acceptance of this proposal the undersigned should fail to enter into a construction contract and execute bonds as provided in the specifications. In the event the undersigned should fail to enter into a construction contract and execute bonds as required within 14 calendar days after the Engineer has given unsigned contracts to the Contractor, it is understood and agreed that the bid security shall be forfeited to the Owner and shall be considered as payment for damages due to delay and other inconveniences suffered by the Owner as a result of such failure on the part of the undersigned.

It is understood that the Owner reserves the right to reject any and all bids.

In the event of Award of the Contract to the undersigned, the undersigned agrees to furnish Performance and Payment Bonds as provided in the Specifications.

The undersigned certifies that the bid prices contained in this proposal have been carefully checked and are submitted as correct and final.

Date _____ Signed _____
(Company)

By _____
(Title)

_____

_____
(Address)

_____
(Telephone Number)

_____
(Witness)

SEAL (if Bidder is a Corporations)

Acknowledge receipt of Addenda Below:

Addendum No. _____ _____ _____ _____ _____

Date Received _____ _____ _____ _____ _____

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Issued and Published Jointly by

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

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These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

National Society of Professional Engineers

1420 King Street, Alexandria, VA 22314-2794

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(202) 347-7474

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

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

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

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

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision

regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Engineer*—The individual or entity named as such in the Agreement.

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

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

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

34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

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

36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

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

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

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

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

46. *Unit Price Work*—Work to be paid for on the basis of unit prices.

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

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives*:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

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

D. *Defective*:

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

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide*:

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

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

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

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

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

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

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

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

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

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

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*:

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

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

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

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

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

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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

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

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste

materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

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

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

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

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

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

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or

2. is of such a nature as to require a change in the Drawings or Specifications; or

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

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

    a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

    b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

    c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

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

    b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site

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

c. Contractor failed to give the written notice as required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

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

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

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

a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and

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

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

d. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer,

or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

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

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

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond

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

C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

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

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor

to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

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

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

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

2. claims for damages insured by reasonably available personal injury liability coverage.

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

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial

Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

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

6.05 *Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

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

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this

Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

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

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by,

arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

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

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

4) it is not objectionable to Owner.

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

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

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

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

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

    a. shall certify that the proposed substitute item will:

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

        2) be similar in substance to that specified, and

        3) be suited to the same use as that specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

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

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

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

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the

Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

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

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

7.07 *Patent Fees and Royalties*

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

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the

performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

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

7.08 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

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

7.10 *Laws and Regulations*

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

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

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

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

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

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

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

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly

or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

1. Before submitting a Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

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

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

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

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

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

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings*:

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

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

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and

Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures*:

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

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;
2. recommendation by Engineer or payment by Owner of any progress or final payment;
3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal;
6. the issuance of a notice of acceptability by Engineer;
7. any inspection, test, or approval by others; or
8. any correction of defective Work by Owner.

D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

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

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

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

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

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

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or

alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. an itemization of the specific matters to be covered by such authority and responsibility; and

3. the extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual

rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

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

the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in

contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents

governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

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

a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

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

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

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

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

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal

and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing

Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Supplemental costs including the following:

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

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

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

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

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

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or

indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

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

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

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

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

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

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

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

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

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

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

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

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

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

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

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

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

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

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

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

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

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

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

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

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

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

C. *Review of Applications*:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

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

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon

Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

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

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

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

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

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

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

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

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

   a. the Work is defective, requiring correction or replacement;

   b. the Contract Price has been reduced by Change Orders;

   c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

   d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

   e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

    b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

    c. Contractor has failed to provide and maintain required bonds or insurance;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

    e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

    f. the Work is defective, requiring correction or replacement;

    g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    h. the Contract Price has been reduced by Change Orders;

    i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

    j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

    k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

    l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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

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

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

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

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

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

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

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

    a. all documentation called for in the Contract Documents;

    b. consent of the surety, if any, to final payment;

    c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

    d. a list of all disputes that Contractor believes are unsettled; and

    e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

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

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

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

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

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

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When

exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

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

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

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

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

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

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

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

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

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

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

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

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

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

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

Bond No. _____

PERFORMANCE BOND

STATE OF TEXAS §
§
COUNTY OF BURNET §

KNOW ALL PERSONS BY THESE PRESENTS:

THAT (**CONTRACTOR NAME)** of the City of _____, County of _____, and State of _____, as Principal, and **(SURETY CO. NAME)** authorized under the Laws of the State of _____ to act as surety on bonds for principals, as Surety, are held and firmly bound unto **(OWNER/DISTRICT NAME)** (Owner), in the penal sum of _____ ($_____.___) for the payment whereof, the said Principal and Surety bind themselves, and their officers, directors, shareholders, partners, successors and assigns, jointly and severally, pursuant to the following:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the ____ day of _____, 2017, for: Construction of Burnet Sanitary Sewer Replacements which contract is hereby referred to and make a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform the Work, as defined in and in accordance with the plans, specifications and contract documents, then this obligation shall be void; otherwise to remain in full force and effect;

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said statute to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract, or to work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in any way 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 the work to be performed thereunder, or the plans, specifications or drawings accompanying same.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument the _____ day of _____, 2017.

_____	_____
Principal	Surety
By: _____	By: _____
Title: _____	Title: _____
Address: _____	Address: _____
_____	_____
_____	_____
(SEAL)	(SEAL)

The name and address of the Resident Agent of Surety is:

_____

_____

_____

The name, mailing address, physical address and telephone number, including the area code, of the Surety to which any notice of claim should be sent:

_____

_____

_____

_____

Agency Name: _____

Agent: _____

Address: _____

_____

Telephone: (___) _____

STANDARD FORM OF AGREEMENT

STATE OF TEXAS §

COUNTY OF BURNET §

THIS AGREEMENT, made and entered into this ____ day of _____, A.D. 2017, by and between **The City of Burnet** of the County of Burnet and State of Texas, acting David Vaughn thereunto duly authorized so to do, Party of the First Part, hereinafter termed OWNER, and _____ _____ of the City of _____, County of _____ and State of _____ _____, Party of the Second Part, hereinafter termed CONTRACTOR.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Party of the First Part (OWNER), and under the conditions expressed in the bond bearing even date herewith, the said Party of the Second Part (CONTRACTOR), hereby agrees with the said Party of the First Part (OWNER) to commence and complete the construction of certain improvements described as follows:

Construction of
Burnet Sanitary Sewer Replacements
$_____.___

and all extra work in connection therewith, under the terms as stated in the General Conditions of the Agreement and at his (or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said construction, in accordance with the conditions and prices stated in the Proposal attached hereto, and in accordance with the Notice to Contractors, General and Special Conditions of Agreement, Plans and other drawings and printed or written explanatory matter thereof, and the Specifications and addenda therefor, as prepared by Jones & Carter, Inc., 6330 West Loop South, Suite 150, Bellaire, Texas 77401, herein entitled ENGINEER, each of which has been identified by the CONTRACTOR and the ENGINEER, together with the CONTRACTOR'S written Proposal, the General Conditions of the Agreement, and the Performance and Payment Bonds hereto attached; all of which are made a part hereof and collectively evidence and constitute the entire contract.

The CONTRACTOR hereby agrees to commence work within ten (10) days after the date written notice to do so shall have been given to him, and to substantially complete the same within calendar days bid after the date of the written notice to commence work, subject to such extensions of time as are provided by the General and Special Conditions.

The OWNER agrees to pay the CONTRACTOR in current funds the price or prices shown in the proposal, which forms a part of this contract, such payments to be subject to the General and Special Conditions of the contract.

IN WITNESS WHEREOF, the parties of these presents have executed this Agreement in the year and day first above written.

CITY OF BURNET, TEXAS	
Party of the First Part (OWNER)	Party of the Second Part (CONTRACTOR)
By:	By:
David Vaughn, City Manager	Agent of the Second Part (CONTRACTOR)
ATTEST:	ATTEST:

STATE OF TEXAS §

COUNTY OF BURNET §

BEFORE ME, the undersigned authority, on this day personally appeared_____ _____, known to me to be the persons whose names are subscribed to the foregoing instrument and acknowledged to me that they executed the same for the purposes and considerations therein expressed and in the capacity therein and herein stated, and as the act and deed of said corporation.

GIVEN UNDER MY HAND and seal of office, this _____ day of _____, 2017.

_____
Notary Public - Signature

STATE OF TEXAS §

COUNTY OF BURNET §

BEFORE ME, the undersigned authority, on this day personally appeared_____ _____, known to me to be the persons whose names are subscribed to the foregoing instrument and acknowledged to me that they executed the same for the purposes and considerations therein expressed and in the capacity therein and herein stated, and as the act and deed of said corporation.

GIVEN UNDER MY HAND and seal of office, this_____ day of _____, 2017.

_____
Notary Public - Signature

STATE OF TEXAS §

COUNTY OF BURNET §

BEFORE ME, the undersigned authority, on this day personally appeared_____ _____, known to me to be the persons whose names are subscribed to the foregoing instrument and acknowledged to me that they executed the same for the purposes and considerations therein expressed and in the capacity therein and herein stated, and as the act and deed of said corporation.

GIVEN UNDER MY HAND and seal of office, this_____ day of _____, 2017.

_____

Notary Public - Signature

STATE OF TEXAS §

COUNTY OF BURNET §

BEFORE ME, the undersigned authority, on this day personally appeared_____ _____, known to me to be the persons whose names are subscribed to the foregoing instrument and acknowledged to me that they executed the same for the purposes and considerations therein expressed and in the capacity therein and herein stated, and as the act and deed of said corporation.

GIVEN UNDER MY HAND and seal of office, this _____ day of _____, 2017.

_____

Notary Public - Signature

Bond No. _____

PAYMENT BOND

STATE OF TEXAS §
§
COUNTY OF BURNET §

KNOW ALL PERSONS BY THESE PRESENTS:

THAT **(CONTRACTOR NAME)** of the City of _____, County of _____, and State of _____, as Principal, and **(SURETY CO NAME)** authorized under the Laws of the State of _____, to act as surety on bonds for principals, as Surety, are held and firmly bound unto **(OWNER NAME)** (Owner), in the penal sum of _____ ($_____.___) for the payment whereof, the said Principal and Surety bind themselves, and their officers, directors, successors and assigns, jointly and severally, pursuant to the following:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the ____ day of _____, 2017, for: Construction of Burnet Sanitary Sewer Replacements which contract is hereby referred to and make a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants supplying labor and material to it or to a subcontractor in the prosecution of the work provided for in said contract, then, this obligation shall be void; otherwise to remain in full force and effect;

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said statute to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract, or to work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in anyway 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 the work to be performed thereunder, or the plans, specifications or drawings accompanying same.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument the _____ day of _____, 2017.

_____	_____
Principal	Surety
By:_____	By:_____
Title:_____	Title:_____
Address:_____	Address:_____
_____	_____
_____	_____
(SEAL)	(SEAL)

The name and address of the Resident Agent of Surety is:

_____

_____

_____

The name, mailing address, physical address and telephone number, including the area code, of the Surety to which any notice of claim should be sent:

_____

_____

_____

_____

Agency Name: _____

Agent: _____

Address: _____

_____

Telephone: (___) _____

ONE-YEAR MAINTENANCE BOND

THE STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF BURNET §

THAT WE, **(Contractor Name)**, as Principal, hereinafter called "Contractor" and the other subscriber hereto as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Burnet, a municipal corporation, in the sum of _____($_____.___) for the payment of which sum, well and truly to be made to the City of Burnet, and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the said Contractor has on or about this day executed a contract in writing with the City of El Campo for:

CONSTRUCTION OF SANITARY SEWER REPLACEMENTS
JONES & CARTER, INC. PROJECT NUMBER 0A737-0004-00

all of the work to be done as set out in full in said contract and plans and specifications therein referred to and adopted by the City of Burnet, all of which are made a part of this instrument as fully and completely as if set out in full herein.

NOW, THEREFORE, if the said Contractor shall comply with the provisions of the General Conditions, and correct Work not in accordance with the Contract Documents discovered within the established one-year period, then this obligation shall become null and void, and shall be of no further force and effect; otherwise, the same is to remain in full force and effect.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually received or, if earlier, on the third day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other party at the address prescribed in the contract documents, or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

Executed this _____ day of _____, A.D. 2017.

CONTRACTOR

By: _____
Name:
Title:

ATTEST/WITNESS: (Seal)

By: _____
Name:
Title:

SURETY COMPANY

By: _____
Name:
Title:

ATTEST/WITNESS: (Seal)

By: _____
Name:
Title:

REVIEWED AS TO FORM:

_____
City Attorney

THE FOREGOING BOND IS APPROVED AND ACCEPTED ON BEHALF OF THE CITY OF BURNET:

_____
David Vaughn, City Manager

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party. ☐

6 AFFIDAVIT

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

_____
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20 _____ , to certify which, witness my hand and seal of office.

_____ _____ _____
Signature of officer administering oath | Printed name of officer administering oath | Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

METRO

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

CMTA APPLICATION FOR PERMIT TO BE ON RAILROAD RIGHT-OF-WAY

Permit Applicant:_____Address:_____

City:_____State:___Zip: _____

Contact Person:_____Title:_____

Phone #:_____Fax #: _____

E-Mail Address: _____

Emergency Contact Person:_____24/HR Emergency Phone #: _____

Work being performed for:

Company Name:_____Address: _____

City:_____State:__Zip: _____

Contact Person:_____Phone #: _____

E-Mail Address:_____Contractor's License Number_____

Work being performed by:

Company Name:_____Address: _____

City:_____State:_____Zip: _____

Contact Person:_____Phone #: _____

E-Mail Address:_____Contractor's License Number_____

Project Location: _____

Start Date:_____Completion Date: _____

The permit evaluation process usually takes approximately 21 business days from the date that a complete application is received.

SUBMIT APPLICATION PACKAGE TO:
Capital Metropolitan Transportation Authority
624 Pleasant Valley Road c/o Vincent Sandoval
Austin, Texas 78702
TEL. 512-369-6049

By signing this application form, the Permit Applicant agrees to all of the terms and conditions contained herein and to any provisions set forth in the Railroad Right-of-Way Permit.

Authorized Signature:_____Date:_____

Print Name:_____Phone #: _____

TERMS AND CONDITIONS OF CMTA PERMIT TO BE ON RAILROAD RIGHT-OF-WAY

I. THE FOLLOWING ITEMS OR CONDITIONS ARE REQUIRED FOR ALL PERMIT APPLICATIONS:

a. Completed and signed Application Form with the initial application fee of $750.00. **The final permit fee of $2,500 will be due after review and approval of the application and/or plans**. Payment may be made by check payable to Capital Metropolitan Transportation Authority (CMTA). For further information regarding permit fees call Vincent Sandoval at (512)369-6049. Applicant agrees to reimburse CMTA for all actual and direct costs expended by CMTA, including costs to process this application and inspect the permit work.

b. Applicant to provide below a detailed description of the work to be performed on CMTA's Right-of-Way. Applicant's description of the work must include:

1. Type of Project
2. Requested Work Windows
3. Requested Work Dates
4. Scope of Work
5. Distance from the Nearest Tracks or Mile Post
6. If the work to be performed is within the foul zone (25ft or less from center of track) the Contractor must provide proof that they successfully completed CMTA'S Roadway Worker Protection and Certificate Safety training class, before receiving their ROW permit.
7. Detailed Schedule and Work Plan in ½ hr. increments of activities taking place on or near the tracks.
8. Any and all cables/ wires (above and underground) on the CMTA property must be identified and marked properly within the work area. (any damage to property or impact to Rail Operations by Contractor's actions, liquidated damages will be assessed)
9. Impact on CMTA Rail and contingency plan to return infrastructure back to its normal state if work cannot be completed within contractor's schedule.
10. Schematics and drawings of the activity on or near the tracks
11. Specs of all equipment that will be used on or near the tracks.
12. Traffic Plan (if applicable)
13. Other Use of CMTA's Right-of –Way [Explain]

_____

_____

_____

_____

_____

_____

_____

_____

c. Two (2) sets of Plans and Specifications signed and sealed by a licensed engineer in the State of Texas. All plans submitted to CMTA must show, CMTA property lines, tracks, stations, facilitates and all known underground utilities, and show the distance from the nearest railroad milepost(s) or road intersection, measured in feet.

d. Two survey plats with metes and bound description signed and sealed by a registered professional land survey in the State of Texas of the location of the proposed project and all contiguous landowners.

e. Two Copies of recorded deeds showing the current ownership of all contiguous property.

f. Do you have a cooperative or other agreement with CMTA concerning this project?
___Yes____No: If so please provide a copy of the agreement with your application.

g. Prior to final approval of the permit, Applicant must provide CMTA with evidence of the following insurance coverage: Risk Management will determine Insurance coverage

Insurance Coverage:

- General Liability $1,000,000
- Automobile Liability $1,000,000
- Worker's Compensation $1,000,000
- Employer Liability $1,000,000
- Railroad Protective Liability Ins. $5,000,000
- CMTA Shown as Additional Insured

All public agencies that are self-insured must provide to CMTA evidence of self-insurance prior to issuance of the permit.

Authorized Signature:_____Date:_____

Print Name:_____Phone #: _____

TERMS AND CONDITIONS OF CMTA PERMIT TO BE ON RAILROAD RIGHT-OF-WAY

II. THE FOLLOWING ITEMS OR CONDITIONS ARE REQUIRED WHEN APPLICABLE:

a. When workers or their equipment are working within or have the potential of working within the Right-of-Way, the contractor is required to obtain a Permit.
b. All workers, on CMTA's Railroad Right-of-Way, are required to complete CMTA's Roadway Worker Protection and Certificate Safety training class prior to beginning any work on the project. Call Herzog at 512-284-3954.
c. When workers or their equipment working within or have the potential of working within the foul zone (25' from center of track), the contractor is required to have an Employee in Charge (EIC). Contact Rail Operations at 512- 852-7296.
d. The Contractor/Applicant is responsible for arranging and paying for an EIC.
e. For construction work, a copy of the Prime Contractors Insurance Certificate is required. Prior to final approval of the permit, Applicant must provide CMTA with evidence of **REQUIRED** insurance coverage. CMTA and Herzog (HTSI) must be specifically listed on all policies.
f. Once final approval has been given, the ROW permit will be in effect only during the approved work dates. If it's determined that the work will extend past the approved work dates, or if the work plan changes from the approved work plan, the contractor must give CMTA a five (5) day notice of such changes. If it's determined by CMTA that the work plans changed and/or the work extended past the approved dates, the contractor will be removed from the property immediately. The contractor will have to re-apply for a new ROW permit, and will have to pay the application and permit fee again.
g. Applicants wishing to install a utility or a facility on property owned by CMTA must submit a copy of a document such as a License Agreement that allows Applicant to enter, construct, install, maintain or operate upon CMTA Right-of-Way. If no such document exists, Applicant must enter into such an Agreement with CMTA prior to receiving a Permit.

Authorized Signature:_____Date:_____

Print Name:_____Phone #: _____

1.0 DESCRIPTION

a. The Work. The work consists of providing the necessary labor, materials, equipment, supervision, and plant to construct *Burnet Sanitary Sewer Replacements.*

b. The Project Site. The project is located in The City of Burnet, Burnet County, Texas.

c. The Owner.

The City of Burnet
1001 Buchanan Drive, Suite 4
Burnet, Texas 78611
Attention: Mr. David Vaughn, City Manager
Telephone: (512) 715-3208

d. The Engineer.

Jones & Carter, Inc.
6415 Reading Road
Rosenberg, Texas 77471
Attention: Mr. Jared L. Biermann, P.E.
Telephone: (281) 342-2033

2.0 WORK SEQUENCE

Within 10 days from the date of the Notice to Proceed, the Contractor shall submit a construction schedule to the Engineer for approval. The schedule shall indicate the order in which the work is to be performed. The sequence and interdependence of all major activities must be shown.

The schedule shall be drawn to a calendar time scale. The commencement and completion dates for each activity shall be shown, as well as the duration in calendar days, for each activity. The schedule shall show not only the activities for actual physical construction of the project, but also the activities such as the Contractor's submittal of shop drawings and the Engineer's review and approval of the shop drawings. Failure to include any element of work required to complete the project within the scheduled contract time shall not release the Contractor from his obligation to complete the work in accordance with the contract documents.

When making out the schedule, the Contractor should make special considerations for the operation of the sanitary sewer system during construction. The system service may be interrupted for short durations and then restored; longer durations are allowed as approved by the Engineer only. All temporary pumping and piping methods must be approved by the Engineer. **All temporary pumping and piping shall be at the Contractor's expense and should be included in the base bid.**

The Contractor shall update the construction schedule monthly to reflect the progress of the work. The updated schedules shall be submitted to the Engineer for approval. Monthly partial payments will be dependent upon submission of an updated construction schedule satisfactory to the Engineer.

If the actual progress of the work falls behind the Contractor's approved construction schedule, the Owner may elect to deduct the value of work scheduled but not completed from progress payments due. The value of the work will be determined from the Contractor's approved schedule of values. These deductions will continue until the Contractor has taken steps to bring the progress of the project back in line with the approved construction schedule.

3.0 PROGRESS REPORTING

Progress meetings shall be held on dates mutually agreed to by the Engineer and the Contractor as needed. These meetings may be held at the project site, the Engineer's office, or City Hall as agreed to by the Engineer and the Contractor. Items to be discussed at this meeting include progress of the work, upcoming work items, status of submittals, monthly pay estimates, etc.

4.0 USE OF PREMISES

a. To the extent practicable the Contractor shall perform the work within the confines of existing utility easements, alleys, and public rights-of-way. Where it is necessary to cross private property to access the work or locate manholes the Contractor shall notify the property owner.

b. The Contractor shall return all areas disturbed by this contract to original condition or better. This includes, but is not limited to, filling and sodding ruts, repairing damaged curbs, inlets, and manhole tops, repairing or replacing pavement, and repairing any and all other damage caused by the Contractor. If, in the course of the work, the Contractor discovers any pre-existing damage to the work area or the City's facilities, he shall immediately notify the Field Project Representative.

c. The Contractor shall place door hangers at each building or residence that may be affected by the work of this contract. The door hangers shall inform the occupants of the type of work being done and the expected duration of the work. The door hanger shall give the contractor's name, address, a 24-hour phone number, and the name of a contact. The door hangers shall be placed a minimum of 48 hours and not more than 72 hours before the work is to commence in the affected area.

5.0 OWNER OCCUPANCY

During construction, the Owner must be able to use the existing facilities as much as possible without interruption. If the Owner occupies a part of the project, the one-year maintenance period of that part does not begin. The one-year maintenance period begins only after the Engineer has issued a Certificate of Substantial Completion.

6.0 DISPOSAL OF EXCESS MATERIAL

The Contractor must haul off all excess material to be disposed.

7.0 AREA CLEANLINESS

The utility easements, alleys, public rights-of-way, and the surrounding streets must be returned to original condition or better upon completion. The streets shall be cleaned daily. Should the Owner or Engineer instruct the Contractor to clean the streets, the Contractor shall do so by the end of the same working day. If the Contractor fails to clean the streets by the end of the same working day, the Owner may hire a separate Contractor to clean the streets. The amount of that street cleaning may be deducted from the next Pay Estimate due to the Contractor.

8.0 SAFETY

The Contractor shall be responsible for the safety of himself, his employees, and other persons during construction operations. All work shall be done in accordance with Occupational Safety and Health Administration, safety and health regulations of the United States Government for construction, State of Texas laws and regulations, Burnet County regulations, and City of Burnet ordinances.

9.0 COORDINATION

The Contractor is responsible for all coordination with all utility companies, pipeline companies, ambulance, police, residents and fire departments during construction. The Contractor shall contact the Engineer at (281) 342-2033, 48-hours before commencing work and 24-hours before any testing, pipe bursting, or CIPP. The Contractor shall give a minimum of 48-hours advance notice before working on weekends or holidays.

10.0 PERMITS

Permits, fees, and licenses necessary for the pursuit of the work shall be obtained and paid for by the Contractor.

11.0 WORKING HOURS

The Contractor is responsible for notifying the Engineer and any adjacent landowners at least 48 hours in advance of any 24-hour operations. Should disputes about 24-hour operation occur, the Contractor is responsible for the handling of such disputes to the satisfaction of the adjacent landowners and the Owner. The Engineer shall be given at least 48 hours notice by the Contractor prior to any work performed on weekends or holidays.

12.0 WORKING HOURS & PRIVATE RESIDENCES

The existing sanitary sewer system lines are within an existing subdivision and primarily located within easements, alleys, public rights-of-way, and city streets. Working hours shall be from 7:00 a.m. to 6:00 p.m., Monday through Friday and 9:30 a.m. to 6:00 p.m. Saturday and Sunday as to not cause a disturbance to the neighborhood.

The Contractor is responsible for contacting private homeowners to gain access to the utility easements inside private fences for pipe bursting, CIPP, and service reconnects. The Contractor shall notify residents a minimum of two (2) days prior to commencing work in the utility easements. **The Contractor is responsible for any damage to fences, private residences and any other existing utilities and shall repair them to their original condition with no separate pay.**

13.0 PRE-CONSTRUCTION PREPARATION

Pre-construction preparation of sanitary sewer lines before rehabilitation efforts shall include, but not be limited to, sewer line cleaning and television inspections.

- - o 0 o - -

1.0 GENERAL

1.1 RELATED WORK

a. Division 1, General Requirements. Summary of Work.

1.2 DESCRIPTION

a. Execute cutting (including excavating and backfilling), fitting or patching of the work required to:

(1) Make several parts fit properly.

(2) Uncover work to provide for installation of ill-timed work.

(3) Remove and replace defective work.

(4) Remove and replace work not conforming to requirements of the contract documents.

(5) Remove samples of installed work as specified for testing.

(6) Install specified work in existing construction.

b. In addition to contract requirements, upon written instruction of the Engineer:

(1) Uncover work to provide for observation of covered work.

(2) Remove samples of installed materials for testing.

(3) Remove work to provide for alteration of existing work.

c. Do not endanger any work by cutting or altering the work or any part of it.

d. Do not cut or alter the work of another Contractor without written consent by the Engineer.

e. Prior to cutting which affects structural safety of the project, or the work of another Contractor, secure written approval by the Engineer.

1.3 PAYMENT FOR COSTS

a. Costs caused by ill-timed or defective work or work not conforming to the contract documents, including the cost of additional services of the Engineer, will be borne by the Contractor.

b. Work done on written instructions of the Engineer, other than defective or non-conforming work, will be paid by the Owner.

2.0 PRODUCTS

Materials required for replacement of the work removed must conform to the specifications for the type of work to be done.

3.0 EXECUTION

3.1 PREPARATION BEFORE CUTTING

a. Provide shoring, bracing, and support as required to maintain structural integrity of the project.

b. Provide protection for other portions of the project.

c. Provide protection from the elements.

3.2 PERFORMANCE

a. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.

b. Execute cutting and demolition by methods which will prevent damage to other work and will prevent settlement.

c. Execute excavating and backfilling by methods which will prevent damage to other work and will prevent settlement.

d. Restore work which has been cut or removed and install new products to provide completed work in accord with requirements of the contract documents.

e. Refinish entire surfaces as necessary to provide an even finish. On continuous surfaces, refinish to the nearest intersections. For an assembly, refinish the entire item.

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1.0 PRIOR TO BEGINNING WORK

Submit the following items with the signed agreement form as a prerequisite to starting the work. Prepare the number of copies, which the Contractor requires for distribution, plus three (3) copies to be distributed by the Engineer. For structural and electrical shop drawings and calculations, provide one (1) extra copy for distribution by the Engineer. The location of information concerning each submittal is referenced. Failure to make any required submittal in acceptable form within the time frame specified may be grounds for withholding payment.

a. Performance Bond. Bidding Documents, Contract Forms, General and Special Conditions.

b. Labor and Material Payment Bond. Bidding Documents, Contract Forms, General and Special Conditions.

c. Certificate of Insurance. General and Special Conditions.

d. List of Subcontractors. General and Special Conditions.

e. Material and Equipment List. Special Conditions and specification sections.

f. Construction Schedule. General Conditions and as specified in the section - SUMMARY OF WORK.

2.0 DURING CONSTRUCTION

During the progress of the work make the following submittals in a timely manner to prevent any delay in the work.

a. Work Schedules. Submit progress schedules monthly and evidence that the project will be ready for occupancy by the date of substantial completion. Four (4) copies are required.

b. Shop Drawings, Product Data, and Samples. Submit, in accordance with the section on Shop Drawings, Product Data and Samples included in Division 1, General Requirements. At a minimum submit the following:

DIVISION 2 - SITE WORK

Cement Sand Backfill
- Certification of cement sand's compliance with specifications

Sanitary Sewers
- Vendor specific technical data on pipe and pipe properties
- Certification of pipe materials compliance with specifications

Television inspection
- Pre-construction Television Inspection Videos
- Post-construction Television Inspection Videos

Manhole Rehabilitation
- Vendor specific technical data on cementations liner material
- Certification of cementations liner materials compliance with specifications
- Vendor specific technical data on epoxy coating material
- Certification of epoxy coating materials compliance with specifications

DIVISION 3 – CONCRETE

Grouting

Vendor specific technical data on grout material
Certification of grouting materials compliance with specifications

c. Application for Payment. Submit applications for partial payment as specified in the General and Special Conditions and within the time specified in the agreement.

d. Change Order Proposal. A proposal for change order may be submitted to the Engineer whenever a need arises. The request must be in writing and must include sufficient information to assess the need for a change in the work, the contract time, or the contract sum.

3.0 PROJECT CLOSEOUT

With a written notice of completion submit the following items in the proper form as a condition of final acceptance of the work:

a. Project Record Documents. Submit in accordance with the section on Project Record Documents included in Division 1, General Requirements.

b. Guarantees, Warranties and Bonds. As required in the General and Special Conditions and listed in various sections of the specifications.

c. Spare Parts and Maintenance Materials. As specified in various sections of the specifications.

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1.0 GENERAL

a. Submit shop drawings, product data, and samples required by specification sections.

b. Shop drawings, product data, and samples are not considered a part of contract documents.

c. Schedule submissions at least 15 days before reviewed submittals will be needed.

2.0 CONTRACTOR RESPONSIBILITIES

a. Review shop drawings, product data and samples prior to submission. Verify:

(1) Field measurements

(2) Field construction criteria

(3) Catalog numbers and other data

(4) Conformance with submission requirements

b. Coordinate each submittal with contract documents and work schedules to prevent any delay in the work.

c. Contractor's responsibility for errors and omissions is not relieved by the Engineer's review of submittals.

d. At time of submission, and in writing, notify the Engineer of submittal deviations from contract documents. Contractor's responsibility for deviations from contract documents is not relieved by the Engineer's review of submittals unless the Engineer gives written acceptance of specific deviations.

e. Begin no work related to submittals until return of submittals with the Engineer's stamp and initials or signature indicating review.

f. Distribute copies after the Engineer's review.

3.0 ENGINEER'S DUTIES

a. Review submittals with reasonable promptness to prevent any delay in the work. Review for conformance with:

(1) Design concept of project

(2) Contract documents

b. Review of a separate item does not constitute review of an assembly in which the item functions.

c. Return to Contractor those submittals, which do not meet the requirements and require correction and resubmission.

d. Affix stamp and initials or signature certifying review of submittal.

e. Return reviewed submittals to Contractor for distribution.

4.0 PREPARATION REQUIREMENTS

4.1 SHOP DRAWINGS

a. Preparation by a qualified detailer is required.

b. For Mechanical and Electrical work use the same sheet size as contract drawings.

c. Where necessary for clarity, identify details by reference to sheet and detail numbers on contract drawings.

d. Include on the drawing all information required for submission or submit transmittal letter containing required information.

e. Prepare the number of copies, which the Contractor requires for distribution, plus three (3) copies to be distributed by the Engineer. For electrical and structural shop drawings, provide one (1) extra copy for distribution by the Engineer.

4.2 PRODUCT DATA

a. Modify the manufacturer's standard schematic drawings to delete or supplement information as applicable.

b. For manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data:

(1) Clearly mark each copy to identify pertinent materials, products, or models.

(2) Show dimensions and clearances required.

(3) Show performance characteristics and capacities.

(4) Show wiring diagram and controls.

c. Include on the data all information required for submission or submit transmittal letter containing required information.

d. Prepare the number of copies, which the Contractor requires for distribution, plus three (3) copies to be retained by the Engineer. For electrical and structural product data, provide one (1) extra copy for distribution by the Engineer.

4.3 SAMPLES

a. Submit office samples of sufficient size and quantity to clearly illustrate:

(1) Functional characteristics of project or materials with integrally related parts and attachment devices.

(2) Full range of color samples.

b. Erect field samples and mock-ups at the project site in an acceptable location. Construct each sample complete, including work of all trades required in finished work.

c. Include in transmittal letter all information required for submission.

d. Prepare the number of samples specified.

5.0 SUBMISSION REQUIREMENTS

a. Accompany submittals with a transmittal letter in duplicate.

b. Include the following information for each submittal:

(1) Date and revision dates

(2) Project title and number

(3) The names of the

(a) Engineer

(b) Contractor

(c) Subcontractor

(d) Supplier

(e) Manufacturer

(4) Identification of project or material

(5) Relation to adjacent structure or materials

(6) Field dimensions clearly identified as such

(7) Specification section number

(8) Applicable standards, such as ASTM number or Federal Specification

(9) A blank space on each shop drawing, approximately 5" x 5", for the Engineer's stamp.

(10) Identification of deviations from contract documents

(11) Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements and compliance with contract documents.

c. Submit all required shop drawings, product data and samples for the following work at one time. Suitably organize and index 8½" x 11", 11" x 17" and other compatibly sized material in the three (3) ring binder. Larger shop drawings may be submitted together either rolled or folded. Include an index.

(1) Mechanical: Division 15

(2) Electrical: Division 16

6.0 RESUBMISSION REQUIREMENTS

6.1 SHOP DRAWINGS

a. Revise initial drawings as required and resubmit as specified for initial submittal.

b. Indicate on drawings any changes, which have been made other than those, requested by the Engineer.

6.2 PRODUCT DATA AND SAMPLES

Submit new data and samples as required for initial submission.

7.0 DISTRIBUTION AFTER REVIEW

a. Distribute copies of shop drawings and product data which carry the Engineer's stamp to:

(1) Contractor's file

(2) Job site file

(3) Record document file

(4) Other prime contractors

(5) Subcontractors

(6) Supplier

(7) Fabricator

b. Distribute samples as directed. After review, samples may be used in construction.

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1.0 GENERAL

1.1 SCOPE

a. Submit a schedule of values with the contract documents.

b. Submit quantities of designated materials. List quantities of materials specified under unit price allowances.

c. Payment for materials stored on-site will be limited to those materials listed in a schedule of unit material values.

2.0 FORM OF SUBMITTAL

Submit typewritten schedule of values on 8½" x 11", plain bond, white paper. Use the table of contents of this project manual as a format for listing costs of work by sections under Divisions 2 through 16.

3.0 PREPARATION

3.1 PREPARING SCHEDULE OF VALUES

a. Itemize separate line item cost for each of following general cost items:

(1) Performance and payment bonds

(2) Field supervision and layout

(3) Temporary facilities and controls

b. Itemize separate line item cost for work required by each section of this specification.

c. Breakdown installed costs into:

(1) Delivered cost of product, with taxes unpaid, The City is tax exempt.

(2) Total installed cost, with overhead and profit.

d. Breakdown costs to list major products or operations for each line item which has an installed value of more than $500.00.

e. Make sum of total costs for all items listed in the schedule equal to the total contract sum.

3.2 PREPARING SCHEDULE OF UNIT MATERIAL VALUES

a. Submit separate schedule of unit prices for materials to be stored on which partial payments will be made.

b. Make a submittal form parallel to the schedule of values, with line items identified the same as line items in the schedule of values.

c. Include in unit prices only:

(1) Cost of material

(2) Delivery and unloading at site

d. Make sure that the unit price multiplied by the quantity given equals the material cost of that item in the schedule of values.

3.3 REVIEW AND RESUBMITTAL

After review by the Engineer, revise and resubmit the schedule of values or material values, if required. Resubmit revised schedules in the same manner as the original schedules.

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1.0 GENERAL

1.1 PAYMENT

a. The Contractor will employ and pay for services of an independent testing laboratory to perform specified testing.

b. Employment of testing laboratory in no way relieves the Contractor of his obligations to perform the work according to the contract documents.

1.2 RELATED WORK

a. General Conditions of the Contract for Construction. Inspections and testing required by laws, ordinances, rules and regulations, or orders of public authorities are the responsibility of the Contractor.

b. Specification Sections. Contained in the various specification sections are requirements for certification of products, testing, adjusting and balancing of equipment, and other tests and standards.

c. Division 2, Site Work. Subsurface exploration.

1.3 WORK INCLUDED

Testing is required in accordance with standard Specifications.

2.0 TESTING LABORATORY

2.1 QUALIFICATIONS

a. Standards.

(1) Meet "Recommended Requirements for Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories.

(2) Meet basic requirements of ASTM E-329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

(3) Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection, with memorandum of remedies of any deficiencies reported by inspection.

2.2 DUTIES

a. Cooperate with the Engineer and Contractor and provide qualified personnel promptly on notice.

b. Perform specified inspections, sampling and testing of materials and methods of construction:

(1) Comply with specified standards, ASTM, other recognized authorities, and as specified.

(2) Ascertain compliance with requirements of the contract documents.

c. Promptly notify the Engineer and Contractor of irregularities or deficiencies of work which are observed during performance of services.

d. Promptly prepare and distribute reports of inspections and tests as follows:

(1) Engineer: Two (2) copies

(2) Contractor: One (1) copy

(3) Owner: One (1) copy

e. Include the following information for each test as well as additional data specified in the applicable section:

(1) Date of Test

(2) Location of Test

(3) Specified Standards

(4) Test Results

(5) Remarks

2.3 LIMITS OF AUTHORITY

The laboratory is not authorized to:

a. Release, revoke, alter, or enlarge on requirements of the contract documents.

b. Approve or accept any portion of the work.

c. Perform any duties of the Contractor.

3.0 CONTRACTOR'S RESPONSIBILITIES

a. Cooperate with laboratory personnel, provide access to the work, or to manufacturer's operations.

b. Provide to laboratory, preliminary representative samples of materials to be tested, in required quantities.

c. Furnish labor and equipment:

(1) To provide access to the work to be tested.

(2) To obtain and handle samples at the site.

(3) To facilitate inspections and tests.

(4) For laboratory's exclusive use for storage and curing of test samples.

d. Notify the laboratory at least 48 hours in advance of operations to allow for his assignment of personnel and scheduling of tests.

e. Arrange with the laboratory and pay for additional samples and tests required for the Contractor's convenience.

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1.0 GENERAL

1.1 SCOPE

This section summarizes the duties, responsibilities, and limitations of authority of the Field Project Representative (FPR) in connection with his observation of the work.

1.2 AUTHORITY

a. The definition of the Engineer's duties provides authority for observation of the work.

b. The FPR's authority to require special inspection or testing in connection with rejected work is also provided in the General Conditions. Furthermore, the provisions that, upon request by the Contractor, the FPR observe and accept or reject any material furnished are also granted in the General Conditions.

c. The provision for removing work for observation by the FPR is set forth in the General Conditions in the paragraph concerning uncovering of work.

2.0 DEFINITIONS

a. FPR. A representative of the Engineer or Owner will be assigned authority to observe the work.

b. Working Day. FPRs are generally not required to work on Saturdays, Sundays, or legal holidays. If the Contractor plans work on a Saturday or legal holiday, prior arrangements should be made for a FPR not later than two (2) days prior to the Saturday or legal holiday.

c. Unobserved Work. Any work performed on a Saturday, Sunday, or legal holiday without benefit of an observation by FPR may require removal and replacement if so directed by the FPR. Removal and replacement will be completed at no additional cost to the Owner.

3.0 DUTIES OF THE FIELD PROJECT REPRESENTATIVE

a. Assist the Contractor's superintendent in understanding the intent of the contract documents.

b. Conduct on-site observations of the work in progress as a basis for determining conformance of work, materials, and equipment with the contract documents.

c. Consider and evaluate suggestions or recommendations which may be submitted by the Contractor to the Engineer and report them with recommendations for the Engineer's final decision.

d. Be alert to the construction schedule and to conditions which may cause delay in completion, and report same to the Engineer.

e. Maintain liaison with the Contractor and all Subcontractors on the project only through the Contractor's superintendent.

f. Attend conferences held at the project site as directed by the Engineer. Report to the Engineer the results of such meetings.

g. Advise the Engineer in advance of the schedules of tests and observe that tests at the project site, which are required by the contract documents, are actually conducted. Observe, record, and report to the Engineer all details relative to the test procedure.

h. If inspectors representing local, state, or federal agencies having jurisdiction over the project visit the site, accompany such inspectors during their trips through the project. Record and report to the Engineer's office the results of these inspections.

i. Receive samples, which are required, to be furnished at the site; record date received, from whom, and notify the Engineer of their readiness for examination; record Engineer's approval or rejection; and maintain custody of approved samples.

j. Review applications for payment submitted by the Contractor and forward them with recommendations to the Engineer for disposition.

k. After substantial completion, check each incomplete or defective item as it is corrected.

l. If a situation arises during construction which requires that work be rejected, report such situation immediately to the Engineer.

m. The field project representative shall not:

(1) Authorize deviations from the contract documents.

(2) Personally conduct any tests.

(3) Enter into the area of responsibility of the Contractor's superintendent.

(4) Expedite the work for the Contractor.

(5) Advise on or issue directions relative to any aspect of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work.

(6) Authorize or suggest that the Owner occupy the project, in whole or in part, prior to substantial completion.

(7) Issue a recommendation for payment.

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1.0 GENERAL

1.1 RESPONSIBILITY

a. The Contractor is responsible for cleaning and adjusting the work. If the Contractor fails to clean and adjust the work, the Owner may do so and charge the resulting costs to the Contractor.

b. Detailed cleaning and adjusting requirements for specific trades or work are specified in sections pertaining to that trade or work.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

a. Fire Protection. Store volatile waste in covered metal containers and remove from premises daily.

b. Pollution Control. Conduct cleaning and disposal operations in compliance with local ordinances and antipollution laws.

(1) Burning or burying of rubbish and materials on the project site is NOT permitted.

(2) Remove waste materials, rubbish, and debris from the site and legally dispose at public or private dumping areas off the project site.

(3) Disposal of volatile fluid wastes and other chemical wastes in storm or sanitary sewer systems or into streams or waterways is not permitted.

c. Safety Standards. Maintain the project in accordance with safety and insurance standards.

2.0 PRODUCTS

Use only cleaning materials recommended by the manufacturer of the surface to be cleaned. Employ cleaning materials as recommended by the cleaning material manufacturer.

3.0 EXECUTION

3.1 DURING CONSTRUCTION

a. Oversee cleaning and insure that the premises are maintained free from accumulations of waste material and rubbish. Do not allow waste materials, rubbish, and debris to accumulate and become unsightly or create a hazard. Provide containers and locate on site for collection of waste material, rubbish and debris.

b. At reasonable intervals during progress of the work, collect and dispose of waste material, rubbish, and debris. Handle waste in a controlled manner. Do not drop or throw materials from heights.

3.2 FINAL CLEANING AND ADJUSTING

a. Use experienced workmen or professional cleaners for final cleaning.

b. Remove grease, dust, dirt, stains, paint, oil, labels, fingerprints, and other foreign materials from interior and exterior surfaces. Repair, patch, and touch-up marred surfaces to match adjacent finishes.

c. Broom clean paved surfaces; rake clean other surfaces of grounds.

d. If installed features of the work fail to operate or operate improperly, make the necessary adjustments to permit and insure proper operation. Remove and repair or replace maladjusted items if necessary for proper adjustment.

e. Remove all waste material and rubbish from the project area, as well as all tools, construction equipment, machinery, surplus materials, and temporary facilities.

f. Immediately prior to acceptance or occupancy, conduct a final inspection of exposed interior and exterior surfaces to verify that the work is properly cleaned. Maintain cleaning until the premises are occupied by the Owner.

g. Clean and service all air filters and pipe strainers. Replace disposable air filters if dirty.

3.3 ADJACENT AREAS

To the Owner's satisfaction, clean or repair adjacent areas affected by the construction. Remove dust and debris in the adjacent area. Repair, patch, and touch-up marred surfaces to match adjacent finishes.

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1.0 GENERAL

Prepare and maintain record documents for the project to accurately reflect the locations of the facilities encountered in the field. Documents must be submitted at work completion as a condition of final acceptance.

2.0 MAINTENANCE OF RECORD DOCUMENTS

a. Maintain at the job site, one (1) copy of:

   (1) Contract drawings

   (2) Complete set of specifications

   (3) Addenda

   (4) Change orders and field orders

   (5) Other contract modifications

   (6) Correspondence

b. Store record documents in an approved location apart from documents used for construction. Do not use record documents for construction purposes. Provide files and racks for orderly storage. Maintain documents in clean, dry, legible condition. Make documents available at all times for inspection by the Engineer.

3.0 MARKING DEVICES

Mark all changes with red pencil.

4.0 RECORDING

a. Keep record documents current. Do not permanently conceal any work until required information has been recorded.

b. Label each document "PROJECT RECORD" in two-inch (2") high printed letters. Legibly mark contract drawings to record actual construction:

   (1) Missing manholes.

   (2) Existing manholes not shown on plans.

   (3) Sanitary sewer lines shown incorrectly on plans.

   (4) Sanitary sewer service leads.

   (5) Changes made by change order or field order.

   (6) Additional details not on original contract drawings.

c. Legibly mark specifications and addenda to record:

(1) Changes made by change order or field order.

(2) Other matters not originally specified.

5.0 SUBMITTAL

a. At project completion, deliver record documents to the Engineer. Place all letter-sized material in a three (3) ring binder, neatly indexed. Bind contract drawings and shop drawings in rolls of convenient size for ease of handling.

b. Accompany the submittal with a transmittal letter in duplicate, containing:

(1) Date

(2) Project title and number

(3) Contractor's name and address

(4) Title number of each record document

(5) Certification that each document as submitted is complete and accurate.

(6) Signature of Contractor

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1.0 GENERAL

1.1 DESCRIPTION

The work includes demolition of materials and equipment. Demolition work includes removal of the following items:

a. General Work Items and Utilities.

(1) Portion of Existing Force Main

(2) Existing Lift Station Top

b. Mechanical Work Items.

(1) Existing Lift Station Piping

(2) Existing Valves and Piping at Wastewater Treatment Plant

c. Electrical Work Items.

Existing Lift Station Controls

1.2 PAYMENT

No separate payment will be made. Include the cost of this work in contract unit prices. If the designated items are damaged during demolition, handling or storage, the items must be restored satisfactorily at no expense to the Owner. Materials and equipment not designated for reuse or salvage become the Contractor's property.

a. Reuse. Certain items may be reused if they are compatible with the work and will provide performance equal to new materials. Materials and equipment designated for reuse will be stored and protected until time of installation. Permission to reuse must be obtained in writing from the Engineer.

2.0 PRODUCTS

Obtain approval for equipment and materials before beginning demolition.

3.0 EXECUTION

3.1 PROTECTION OF PERSONS AND PROPERTY

a. Provide protection of persons and property, including safe working conditions throughout work progress.

b. Minimize the spread of dust and flying particles. Execute demolition in a manner to prevent damage from falling debris or other sources to Owner's property or adjacent property.

c. Do not interfere with use of adjacent buildings; maintain free and safe access at all times. Guard against movement or settlement of adjacent buildings. The Contractor is responsible for safety and integrity of adjacent structures and, consequently, is liable for any movement or settlement and any resulting injuries or damage. Provide proper bracing and shoring necessary for support. If safety of adjacent buildings appears to be endangered, cease operations. Do not resume demolition until proper protective measures have been taken.

3.2 BLASTING

Blasting is not permitted on this project.

3.3 FIRES

Fires are not permitted on this project.

3.4 UTILITY SERVICES

a. Interruption. When temporary interruption of utility service to an occupied building is required by the work, properly coordinate the outage to prevent untimely or damaging interruptions.

3.5 GENERAL WORK ITEMS

a. Operational procedures are at the Contractor's option but must not interfere with the execution of other work. Materials or equipment designated for reuse or salvage will be carefully removed, transported and stored in approved storage areas.

b. Structures. Remove structures as indicated on construction drawings.

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1.0 GENERAL

1.1 SCOPE

This section provides for excavation, trenching and backfilling for sanitary sewers, water distribution mains, and other utility systems and appurtenances.

1.2 RELATED WORK

a. Division 2, Site Work.

(1) Sanitary Sewers

(2) Cement-Sand Backfill

(3) Manholes

(4) Trench Safety System

1.3 MEASUREMENT AND PAYMENT

No separate payment will be made for work performed under this section. Include the cost of such work in contract prices for the items listed in the bid form and specified in other sections of this work.

2.0 PRODUCTS

2.1 CEMENT-SAND BACKFILL

Prepare cement-sand backfill as specified in the section on Cement-Sand Backfill, Division 2, Site Work.

2.2 BANK SAND

Obtain bank sand from an approved source. Use sand that is free from clay lumps, organic and other deleterious material, and having a plasticity index (PI) of four (4) or less.

3.0 EXECUTION

3.1 EXCAVATION

a. Procedure. Excavate to indicated or specified depths.

(1) During excavation, pile material suitable for backfilling in an orderly manner far enough from the bank of the trench to avoid overloading, slides or cave-ins.

(2) Remove any waste as indicated or directed including all excavated materials not required or suitable for backfill.

(3) Grade as necessary to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating in trenches or other excavations, using pumping or other approved means.

(4) Excavate by open cut with trenching machine or backhoe. Where machines other than ladder or wheel type trenching machines are used, do not use excavated material composed of large chunks or clods for back-fill, but dispose of such material and provide other suitable material for backfill without additional expense.

b. Trench Excavation.

(1) Dig the trench the proper width for laying pipe, as shown. Trench width in the pipe zone shall not exceed pipe O.D. plus 24 inches. Cut banks of pipe trench as nearly vertical as practical. Remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil from the trench bottom to permit construction of a more stable bed for pipe.

(2) Backfill the trench to the proper grade with granular material.

(3) Be careful not to over excavate. Accurately grade the trench bottom to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its entire length, except where necessary to excavate for bell holes and for proper sealing of pipe joints. Dig bell holes and depressions for joints after the trench bottom has been graded. Make bell holes and depressions for joints no deeper, longer or wider than needed to make the joint properly.

c. Sheeting and Bracing. Install in trenches and other excavations with vertical sides, sheeting and bracing necessary to support the sides. Sheeting may be pulled after excavation has been backfilled, but not without approval.

d. Pipe Bedding.

(1) Class AA Bedding. 36-inch (36") diameter pipe and smaller. Accurately grade the bottom of the trench four-inches (4") below the bottom of the pipe. Place cement stabilized sand seven-inches (7") deep and shape to conform to the bottom of the pipe. The minimum cement sand thickness under the pipe shall be four-inches (4"). After the pipe has been installed, backfill with thoroughly rodded cement stabilized sand, to a level of six-inches (6") above the top of the pipe.

(2) FORCE MAIN Bedding. Accurately grade the bottom of the trench six-inches (6") below the elevation of the normal pipe installation and to the width shown. Place and compact six-inches (6") of bank sand in the trench before the pipe is laid. After the pipe is laid, place a minimum compacted depth of 12-inches (12") over the top of the pipe to provide a compacted encasement surrounding the pipe.

3.2 UTILITY INSTALLATION

a. Storm and Sanitary Sewers. Limit clear space on either side of the pipe to twelve inches (12") at and below the top of the pipe. Above the pipe, cut as wide as necessary to sheet and brace and properly perform the work. Provide bedding as per City of Burnet Design Standards & Details, and as shown on the drawings.

d. Excavation of Appurtenances. Excavate sufficiently for manholes and similar structures to leave at least two-feet (2') clear between the outer surfaces and the embankment or timber that may be used to hold and protect the banks. Any over-depth excavation below such appurtenances not directed will be considered unauthorized and will be refilled with sand, gravel or concrete, as directed, at no additional cost.

3.3 PROTECTION OR REMOVAL OF UTILITY LINES

Existing utility lines shown on drawings or known to the Contractor prior to excavation and that are to be retained, as well as utility lines constructed during excavation operations must be carefully protected and satisfactorily repaired if damaged. Any damage to lines not shown should be reported immediately. When utility lines that are to be removed are encountered, notify the Engineer so that measures can be taken to avoid interruption of services.

3.4 BACKFILLING

a. Criteria. Do not backfill trenches until the utility systems that are installed to conform to specified requirements of the appropriate sections. Backfill trenches to ground surface with selected material as specified for embankments under applicable sections in Division 2, Site Work. Reopen trenches improperly back-filled to depth required for proper compaction. Refill and recompact as specified, or otherwise correct the condition in an approved manner. Compaction shall be by mechanical means. Water tamping is not allowed.

b. Open Areas.

(1) In the pipe zone, deposit backfill material in layers no thicker than six-inches (6"). Compact to 95 percent (95%) AASHTO Density, Test Method T-99 at minus three percent (-3%) to plus five percent (+5%) of optimum moisture content, until there is a cover of not less than one-foot (1') over utility lines. Use selected backfill material of optimum moisture content. Take special care not to damage pipe wrapping or coating.

(2) Above the pipe zone, deposit backfill in 12-inch (12") layers. Compact each layer to 90 percent (90%) AASHTO Density, Test Method T-99, at minus three percent (-3%) to plus five percent (+5%) of optimum moisture content.

c. Pavement Sections.

(1) In the pipe zone, deposit cement-sand backfill in layers six inches (6") or thinner. Compact each layer to 95 percent (95%) of AASHTO Density, Test Method T-99, at minus three percent (-3%) to plus five percent (+5%) of optimum moisture content.

(2) Above the pipe zone, deposit cement-sand backfill in 12-inch (12") layers and compact to 95 percent (95%) AASHTO Density, Test Method T-99 at minus three percent (-3%) to plus five percent (+5%) of optimum moisture content. Place compacted cement-sand to within one-foot (1') of proposed subgrade. Cure cement-sand layer at least three (3) days before placing pavement on top of it.

3.5 TEST FOR DISPLACEMENT OF SEWERS

After the trench has been backfilled to two-feet (2') above the pipe and tamped as specified, check the alignment as follows. Flash a light through the sewer between manholes. Use a flashlight or reflect sunlight with a mirror. If the illuminated interior of the pipeline shows poor alignment, pipe displacement, or other defects, remedy them satisfactorily.

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1.0 GENERAL

1.1 SCOPE

This section provides for the use of cement-sand as bedding material under sewer pipes; for backfilling material around sewer pipes, manholes, inlets and drainage structures as required, and for backfill of utilities in pavement sections.

1.2 RELATED WORK

a. Division 2, Site Work.

(1) Sanitary Sewers

(2) Manholes

1.3 PAYMENT

No separate payment will be made for work or materials performed under this section.

2.0 PRODUCTS

2.1 MATERIALS

a. Sand. Use clean durable sand containing not more than the following:

(1) Deleterious materials.

(a) Clay lumps, ASTM C-142; less than 0.5 percent (0.5%)

(b) Lightweight pieces, ASTM C-123; less than five percent (5.0%)

(c) Organic impurities, ASTM C-40; shall not show a color darker than the standard color

(d) Other deleterious materials such as coal, shale, coated grains of soft flakey particles; less than two percent (2.0%)

(2) Plasticity index shall be four (4) or less when tested in accordance with ASTM D-43 and ASTM D-424.

(3)

Gradation Requirements	% Retained
3/8-inch sieve	0%
1/4-inch sieve	0% - 5%
10-mesh sieve	5% - 35%
20-mesh sieve	15% - 55%
40-mesh sieve	35% - 85%
60-mesh sieve	60% - 95%
100-mesh sieve	80% - 97.5%
200-mesh sieve	95% - 100%
270-mesh sieve	100%

(4) Color test ASTM C40-73. Color not darker than standard color.

b. Portland Cement. Furnish Portland cement to conform with ASTM C-150, Type I.

c. Water. Water shall be reasonably clean and free from injurious amounts of oil, acid, alkalies, salt, organic matter, or other deleterious material.

2.2 PROPORTIONING AND MIXING

Add not less than 1½ sacks of Portland cement to stabilize one (1) cubic yard of sand mixture. Add required amount of water and mix thoroughly in an approved pug-mill type mixer. Stamp batch ticket with the time of loading. Material not in place within three (3) hours after loading will be rejected.

2.3 TESTING

Upon request of the Engineer, the Contractor or his supplier will furnish samples of the sand and cement for testing before and/or during project construction. Samples shall be submitted two (2) days prior to stabilized sand being delivered to the project site. If the material source is changed during project construction, new samples shall be submitted.

3.0 EXECUTION

3.1 BEDDING PROCEDURES

a. Place cement-sand in a trench or excavation prepared for sewer pipe to the depth shown on the drawings.

b. After bedding material is in place, set pipes in position to grade.

c. Add additional cement-sand material around pipe, filling to at least six-inches (6") above pipe crown. Place cement-sand material at optimum moisture content, and in layers not to exceed six-inches (6") measured loose.

d. Compact with mechanical hand tamps to at least 95 percent (95%) of AASHTO Density, Test Method T-99.

3.2 FOUNDATIONS

Use cement-sand for stabilizing below the foundation for pre-cast manholes, inlets or concrete structures. Backfill outside the manhole to a minimum of six-inches (6") above the largest pipe crown. With "AA" bedding, continue cement-sand backfill to within one-foot (1') of the finished pavement surface.

3.3 BACKFILL PROCEDURES

a. Place cement-sand in sewer trenches as backfill for sewer lines under existing or future pavement. Backfill to within one-foot (1') of the subgrade with the cement-sand. Use cement-sand material as backfill material around manholes if the structure lies within two-feet (2') of the pavement.

b. Place cement-sand material at optimum moisture content in layers not to exceed 12-inches (12"), measured loose.

c. Compact with mechanical hand tamps to at least 95 percent (95%) of prescribed AASHTO Density, Test Method T-99

3.4 PERFORMANCE

The sand-cement mixture shall produce a minimum unconfined compressive strength of 100 pounds per square inch (100 psi) in 48 hours when compacted to 95 percent (95%) of ASTM D-698 without additional moisture control, cured (ASTM C-31, Item 9), and tested in accordance with ASTM C-31.

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1.0 GENERAL

1.1 SCOPE

This section provides for the installation and maintenance of a trench safety system that meets the minimum requirements of OSHA Safety and Health Regulations, Part 1926, subpart P.

1.2 RELATED WORK

a. Division 2, Site Work

(1) Sanitary Sewers

(2) Cement-Sand Backfill

(3) Manholes

1.3 MEASUREMENT AND PAYMENT

a. All work performed under this section will be paid for at contract unit prices for trench safety system based on the size of pipe and depth of trench. Unit prices shall include all required materials, installation, maintenance, and removal of the trench safety system.

b. The trench safety system shall be measured along the centerline of the excavated trench for the length of system installed. The depth shall be measured from natural ground to the bottom of the excavated trench.

1.4 QUALITY ASSURANCE

a. Trench safety system shall meet the current standards established by the Occupational Safety and Health Administration (OSHA) Safety & Health Regulations, Part 1926, Subpart P - Excavations, Trenching and Shoring.

b. The Engineer's Field Representative will inform the Contractor, the Owner and/or OSHA should the Representative observe actions not in accordance with OSHA regulations. Any construction not in accordance with OSHA regulations may not be eligible for payment, and any delays in construction to bring the project within OSHA regulations will not be the responsibility of the Owner or the Engineer.

1.5 RESPONSIBILITY

Contractor has the sole and exclusive responsibility for the sufficiency of the trench excavation safety systems utilized. The Contractor shall specifically agree that neither the Owner nor the Engineer has such responsibility, and Contractor will not rely on the Owner or the Engineer or any of their representatives for inspection, design, supervision, construction or any other aspect of trench excavation safety protection.

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1.0 GENERAL

1.1 DESCRIPTION

Waste material disposal consists of disposal of trees, stumps, logs, brush, roots, grass, vegetation, humus, rubbish and other objectionable matter from operations such as clearing and grubbing, excavation and grading. Unless otherwise specified, the Contractor is responsible for removal and disposal of waste material.

1.2 PAYMENT

No separate payment will be made. Include cost of work in contract bid prices.

2.0 PRODUCTS

a. Specific products are not required. Use equipment and materials necessary to properly complete disposal of waste materials.

b. Obtain approval for equipment and materials before beginning disposal of waste materials.

3.0 EXECUTION

All waste material becomes the property of the Contractor and is to be removed from the worksite and legally disposed of in a manner not to damage the Owner. All rules of the Texas Commission on Environmental Quality, Texas Air Control Board, and U.S. Environmental Protection Agency shall be followed in the disposal of waste material.

If regulations require, provide "cradle-to-grave" documentation of the disposal including manifests.

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1.0 GENERAL

1.1 SCOPE

This section provides for construction of sewer manholes complete in place, including the furnishing and adjusting to grade of an existing manhole's castings and cover.

1.2 RELATED WORK

a. Division 2, Site Work.

(1) Excavation, Trenching and Backfilling for Utilities

(2) Sanitary Sewers

1.3 MEASUREMENT AND PAYMENT

Manholes will be measured per each and paid for at the unit price bid. The unit price includes excavation, backfill, materials, and construction in accordance with the contract drawings.

2.0 PRODUCTS

2.1 IRON CASTINGS

a. Provide a dual hinge ductile iron ring and cover by PAMREX or a pre-approved equal. Furnish castings, which are clean, perfect, and free from sand or blowholes, or other defects. Holes in the cover must be clean and free from plugs. Cast the word Sanitary Sewer and City of Burnet on each manhole cover.

b. Use 32-inch (32") manhole covers on new manholes and 24-inch (24”) on replacement covers.

2.2 PIPE CONNECTIONS MANHOLES (SANITARY SEWER)

a. Install approved resilient connectors at each pipe entering and exiting sanitary sewer manholes in accordance with manufacturer's instructions.

b. Test connection for watertight seal before backfilling.

2.3 PRECAST CONCRETE PIPE MANHOLE RINGS

Provide precast concrete pipe rings conforming to the requirements of ASTM C-478. Unless otherwise specified, provide risers and cone sections having an inside diameter of not less than 36-inches (36") or more than 48-inches (48").

2.4 CONCRETE CONSTRUCTION

a. Mortar. Use mortar conforming to ASTM C-270, mortar Type "S" using Portland cement.

b. Aggregate. Furnish aggregate conforming to ASTM Specification C-144.

c. Concrete. See Division 2, Concrete Construction for Structures.

d. Reinforcing Steel. See Division 3, Concrete Reinforcement.

2.5 FIBERGLASS MANHOLES

Furnish manholes conforming to ASTM Specification D-3753-79 as manufactured by Owens/Corning, Armco, or equivalent. Contractors must obtain City of Burnet approval for fiberglass manholes.

3.0 EXECUTION

3.1 EXCAVATION

Excavate the pit for a manhole structure no wider than the manhole diameter plus four-feet (4'), allowing two-feet (2') around the structure. Manhole pit excavation is unclassified.

3.2 PRECAST CONCRETE MANHOLES

Install precast concrete pipe structures on prepared foundations. In the case of precast inverts, undercut manhole base by 12-inches (12") and place a full 12-inches (12") of 1-½ sack cement-stabilized sand under manhole base. In the case of cast-in-place inverts, support lower pipe section on bricks or by other suitable means and pour a minimum of 12-inch (12") thick manhole base on undisturbed soil. Lower pipe section to be embedded in concrete base a minimum of six-inches (6"). Conform to the dimensions and location shown. The upper pipe member must have form and dimension to receive the metal frame and cover or grate as required. Provide for any connections with lateral pipe, including drops and leads that may be installed in the structure. Furnish smooth, uniform flowlines.

3.3 CAST-IN-PLACE MANHOLES

a. Slab foundations may be previously poured or poured with the walls of the manhole. Properly brace the pipe to maintain uniform flowline. Grout inverts as necessary.

b. Cover ends of open pipes to prevent concrete from entering them.

c. Pour concrete no higher than one-foot (1') below proposed rim elevation of manhole to allow for adjustment after final grading. Bring manhole to grade using pre-cast adjustment rings.

d. Leave pipe sleeves of appropriate pipe material and size through the forms as the manhole is poured, including all near side and far side sanitary connections.

e. Concrete for cast-in-place manholes shall have a minimum cement content of six (6) sacks per cubic yard.

f. No forms shall be removed prior to the initial set of concrete and in no case sooner than four (4) hours after the completion of the concrete pour. In cold weather, the time until form removal may be extended by the Engineer.

g. Upon removal of the forms, the exterior of the manhole shall be thoroughly coated with Type II curing compound. The interior shall be cured by coating with curing compound or other approved method.

h. Cast-in-place manholes shall not be backfilled for 72 hours after the completion of the concrete pour, or longer in cold weather.

3.4 BACKFILL

Use the same backfill material and procedures for manhole structures as used for sewer pipe connecting to a manhole. See the section on Excavation, Trenching and Backfilling for Utilities in Division 2, Site Work.

3.5 TESTING OF SANITARY MANHOLES

a. After completion of manhole construction, wall sealing, or rehabilitation, test manholes for watertightness using hydrostatic or vacuum testing procedures.

b. Plug influent and effluent lines, including service lines, with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendation. Place plugs a minimum of six-inches (6") outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled.

c. Vacuum testing:

1. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure.

2. Contractor shall plug lifting holes, all pipes entering manhole and may wipe exterior joints with a non-shrink grout.

3. No grout shall be placed in interior horizontal joints before testing.

4. Evacuate manhole with vacuum pump to 10-inches (10") mercury (Hg.), close valves, disconnect pump and monitor vacuum for a total of 2 minutes.

5. If the drop in vacuum exceeds one-inches (1") mercury (Hg.) over the specified time period, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

d. Hydrostatic Testing:

1. Hydrostatic exfiltration testing shall be performed as follows: lines coming into the manhole shall be sealed with an internal plug. Fill manhole with water to top of frame. Add water over a 24-hour period to compensate for absorption and evaporation losses. After 24 hours, refill to top of frame and observe for loss of water. The maximum allowable leakage shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.

The following chart calculates the drop in inches per fifteen (15) minute time span based on the requirement of 0.025 gal / vertical foot depth / inside diameter of manhole / hour of test.

Four (4) Foot Diameter Manhole

Depth of Manhole Vert. Feet	Maximum Allowable Loss Gallons/Hour	Maximum Drop 32" Casting Inches/15 Minutes
0-4	0.4	1/32 in
5	0.5	1/32 in
6	0.6	1/32 in
7	0.7	1/16 in
8	0.8	1/16 in
9	0.9	1/16 in
10	1	1/16 in
11	1.1	3/32 in
12	1.2	3/32 in
13	1.3	3/32 in
14	1.4	3/32 in
15	1.5	1/8 in
16	1.6	1/8 in
17	1.7	1/8 in
18	1.8	1/8 in
19	1.9	1/8 in
20	2	1/8 in
21	2.1	5/32 in
22	2.2	5/32 in
23	2.3	5/32 in
24	2.4	5/32 in
25	2.5	3/16 in

Four (5) Foot Diameter Manhole

Depth of Manhole Vert. Feet	Maximum Allowable Loss Gallons/Hour	Maximum Drop 32" Casting Inches/15 Minutes
0-4	0.5	1/32 in
5	0.625	1/32 in
6	0.75	1/16 in
7	0.875	1/16 in
8	1	1/16 in
9	1.125	3/32 in
10	1.25	3/32 in
11	1.375	3/32 in
12	1.5	1/8 in
13	1.625	1/8 in
14	1.75	1/8 in
15	1.875	1/8 in
16	2	1/8 in
17	2.125	5/32 in
18	2.25	5/32 in
19	2.375	5/32 in
20	2.5	3/16 in
21	2.625	3/16 in
22	2.75	3/16 in
23	2.875	7/32 in
24	3	7/32 in
25	3.125	7/32 in

2. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3.8 MANHOLE ADJUSTMENT

Top of manhole cone shall not exceed the elevation of the top of the adjacent curb unless directed by the Engineer. A maximum of 18-inches (18") of adjustment rings shall be used for final adjustment.

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1.0 GENERAL

1.1 DESCRIPTION

This section describes the complete work necessary to install sanitary sewers and appurtenances, including sanitary manholes, drops, stacks, clean outs, and service connections.

1.2 RELATED WORK

a. Division 2, Site Work.

(1) Excavation, Trenching and Backfilling for Utilities

(2) Cement Stabilized Backfill

(3) Manholes

(4) Trench Safety System

(5) Point Repairs and Obstruction Removals to Sanitary Sewers

(6) Concrete Construction for Structures

(7) Dewatering and Drainage for Structures

(8) Structural Excavation and Backfill

1.3 REFERENCE SPECIFICATION

Except as otherwise specified or as indicated on drawings, workmanship, methods of installation, construction procedures, and materials furnished shall be in strict accordance with City of Burnet Standards.

1.4 MEASUREMENT AND PAYMENT

Paragraphs of the reference specification which describe measurement and payment do not apply unless specifically referenced. Work performed under this section for this project will be paid at unit prices bid for point repairs.

2.0 PRODUCTS

Except as otherwise specified, furnish materials according to requirements of the governing specification.

2.1 SANITARY SEWER PIPE

a. Gravity Sewers. Install the following pipe materials for gravity sanitary sewers. Use of all types listed below in a single project is acceptable.

(1) Polyvinyl-Chloride (PVC) Pipe. For four-inch (4") to 12-inch (12") diameter lines, provide PVC Plastic Gravity Sewer Pipe conforming to ASTM D-3034, SDR-26, for 15-inch (15”) diameter lines, provide Plastic Gravity Sewer Pipe conforming to ASTM D3034, SDR-35. The pipe material shall have a cell

classification of 12454-B, 12454-C, or 13364-B (with minimum tensile modulus of 500,000 psi) as defined in ASTM D-1784. Minimum pipe stiffness at five percent (5%) deflection shall be 46 psi for all sizes when calculated according to ASTM D-2412. Maximum deflection allowed of the inside wall is five percent (5%) of the inside diameter.

(2) Ductile Iron Pipe. Manufactured according to the latest revision of AWWA C-151-86 with polyethylene wrap. Use eight (8) mil, black virgin polyethylene film such as DuPont Alathon or USI Petrothene. Hold wrap in place with Polyken No. 900 plastic backed adhesive tape. Lap tape two-inches (2") at each joint.

(3) Solid Wall Polyethylene Pipe (HDPE)

(a) The replacement pipe shall be manufactured from a high density high molecular weight polyethylene resin which conforms to ASTM D-1248 (Specification for Polyethylene Plastics Molding and Extrusion Materials) and meets the requirements for Type III, Class A, Grade P34, Category 5, and has a PPI rating of PE 3408, when compounded. The pipe produced from this resin shall have a minimum cell classification of 345434D or E (inner wall shall be light in color) under ASTM D3350 (Specification for Polyethylene Plastic Pipe and Fittings Materials).

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.

A Certificate of "Compliance with Specification" shall be furnished for all materials to be supplied.

(b) The Standard Dimension Ratio (SDR) Classification for various depths shall be as follows:

Minimum wall thickness of HDPE pipe shall be SDR 19 where pipe depth is less than 16 feet and SDR 17 where pipe depth is greater than 16 feet. Depth shall be measured from the upstream and downstream rim to the invert of the existing sewer in the pipe segment to be replaced. The SDR shall be selected for the deeper of the two manholes for a given pipe segment.

(3) Polyvinyl-Chloride (PVC) Pipe (C-900). Provide PVC pipe as manufactured by Certainteed, Johns-Manville, Clow, Gifford-Hill, Robintech, or approved equal. The pipe material shall conform to ASTM D-1784 and National Sanitation Foundation Standard No. 14 for a design stress of 2,000 psi. The pipe must also conform to quality control tests as described in ASTM 1599, ASTM 1598, ASTM 2152, and ASTM 2241.

For four-inch (4”) through twelve-inch (12”) water lines, the PVC pipe shall conform to AWWA C-900, DR 18 Class 150 for a working pressure up to 150 psi.

2.2 JOINTS

a. Iron Pipe. Provide rubber O-ring joints conforming to the latest revision of AWWA C-111. Make joints and connections according to manufacturer's printed instructions.

b. PVC Pipe. Provide Fluid-Tite by Certain-teed, Ring-Tite by Johns-Manville, or an approved equal rubber gasket compression joint conforming to ASTM D-3212. The gasket material shall conform to ASTM F-477.

2.3 MANHOLE JOINTS

Provide size-on-size resilient connectors between the pipe and the manhole wall. Connectors shall allow for the differential settlement of the manhole wall and the pipe. Pipe to manhole connectors shall conform to ASTM C-923.

2.4 MANHOLES

Provide manholes in accordance with Division 2 - Manholes. Precast and cast-in-place are acceptable. Brick and fiberglass manholes are not allowed. Bricks shall not be used for manhole adjustment to grade.

2.5 MANHOLE COVERS

Manhole covers as per City Standards.

2.6 MANHOLE STEPS

Manhole steps are not allowed.

3.0 EXECUTION

3.1 PIPE INSTALLATION

Install pipe in accordance with applicable provisions of the reference specification.

3.2 PIPE BEDDING

Provide "AA" bedding for all sanitary sewer pipe.

3.3 SERVICE CONNECTIONS

Locations of existing services are not shown in the Drawings. Contractor to identify service connection locations from preconstruction television work or “pot-holing”. After rehabilitation of a section is complete the Contractor shall re-connect services to the mainline or manhole. Show actual locations on project record drawings by noting the distance to at least two (2) fixed objects (i.e., manholes, inlets, fire hydrants, etc.). Plug service connections after installation.

Locate all connections after paving is complete. Mark the curb by cutting a ¼-inch (¼") deep notch adjacent to the connection and painting the notch with red paint.

3.4 MANHOLE DROPS

Provide manhole drops wherever invert of sewer pipe enters a manhole 2.5 feet or more above the invert of the manhole, or as shown on drawings. Construct drops according to details shown.

3.5 STACKS

Provide stacks wherever top of sewer is eight (8) feet or more below grade. Construct stacks according to details shown. Show actual locations on project drawings.

Locate all stacks after paving is complete. Mark the curb by cutting a ¼-inch (¼") deep notch adjacent to the stack and painting the notch with red paint.

3.6 CLEANOUTS

Construct cleanouts as detailed. After installation, mark clean outs with flagged, 2 x 4 stake. Show locations on project record drawings.

3.7 BACKFILL

Backfill as specified in the section "Excavation, Trenching, and Backfilling for Utilities." Unless otherwise directed, use cement-sand for backfilling sanitary sewer pipe trenches which will be beneath pavement.

3.8 LEAKAGE TEST

a. Truss, Clay, Cast or Ductile Iron, HDPE, and PVC Pipe. After backfilling and removing debris from each section of sewer line, conduct a line acceptance test under observation of the Field Project Representative. Test the sanitary sewer lines in strict accordance with the following leakage test using low-pressure air. If the test results indicate an unacceptable installation, locate the source of leakage, correct the defect, and retest until the installation is proven satisfactory.

(1) Minimum Requirement for Equipment.

(a) Control Panel

(b) Low-Pressure air supply connected to control panel

(c) Pneumatic Plugs of acceptable size for diameter of pipe to be tested; capable of withstanding internal test pressure without leaking or requiring external bracing.

(d) Air hose from control panel to:

(i) Air Supply

(ii) Pneumatic plugs

(iii) Sealed line for pressurizing

(iv) Sealed line for monitoring internal pressure

(2) Testing Pneumatic Plugs. Test plugs before using in actual test installation. Place on length of pipe on ground and seal at both ends with pneumatic plugs to be checked. Pressurize plugs to 25 psig; then pressurize sealed pipe to five (5) psig. The plugs are acceptable if they remain in place against the test pressure without external aids.

(3) Compensating for Ground Water Pressure. Where ground water exists, install a capped pipe nipple at the same time the sewer line is placed. Use a ½-inch (½") capped pipe nipple approximately 10-inches (10") long. Make the installation through the manhole wall on top of the sewer line where the line enters the manhole.

Immediately before performing the line acceptance test, remove the pipe cap, clear the pipe nipple with air pressure, and connect a clear plastic tube to pipe nipple. Support the tube vertically and allow water to rise in the tube. After the water stops rising, measure the height in feet of water over the invert of the pipe. Divide this height by 2.3 feet/psi to determine the ground water pressure to be used in line testing.

(4) Line Testing. After pneumatic plugs have been checked, place plugs in line at manholes and inflate plugs to 25 psig. Introduce low-pressure air into the sealed line until the internal air pressure reaches four (4) psig greater than the ground water pressure. Allow at least two (2) minutes for air pressure to stabilize. If at least 3.5 psig over ground water pressure is maintained disconnect the air hose from the control panel to the air supply and measure the time of the pressure drop between 3.5 and 2.5. psig above ground water pressure.

The installation is acceptable if the air loss rate does not exceed 0.0015 cfm per square foot of internal pipe surface with an average test pressure of 3.0 psig greater than ground water pressure. The line between manholes is within acceptable limits if the time for the one (l) psig pressure drop is not less than the time compiled by the following equations.

T = 0.0850(D)(K)/(Q) where T = time for pressure to drop 1.0 pounds per square inch gauge in seconds
K = 0.000419DL, 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, assume 0.0015 ft.3/min/sq.ft. internal surface.

The minimum testing times for each pipe diameter are as follows:

Pipe Diameter (Inches)	Minimum Time (Seconds)	Length for Minimum Time (Feet)	Time for Longer Length (Seconds)
6	340	398	0.855(L)
8	454	299	1.520(L)
10	567	239	2.374(L)
12	680	199	3.419(L)
15	850	159	5.342(L)
18	1020	133	7.693(L)
21	1190	114	10.471(L)
24	1360	100	13.676(L)
27	1530	88	17.309(L)
30	1700	80	21.369(L)
33	1870	72	25.856(L)

Lines with a 27-inch average inside diameter and larger may be air tested at each joint. Pipe greater than 36 inch diameter must be tested for leakage at each joint. If the joint test is used, a visual inspection of the joint shall be performed immediately after testing. The pipe is to be pressurized to 3.5 psi greater than the pressure exerted by the groundwater above the pipe. Once the pressure has stabilized, the minimum time allowable for the pressure to drop from 3.5 to 2.5 psi shall be ten (10) seconds.

3.9 DEFLECTION TEST

If requested by the Engineer, the Deflection test shall be conducted on all flexible pipe after final backfill has been in place at least 30 days. No pipe shall exceed a deflection of five percent (5%). For pipes with inside diameters less than 27 inches, a rigid mandrel shall be used in running the deflection test. For pipes with an inside diameter 27 inches and greater, a method approved by the Executive Director of TCEQ shall be used to test for vertical deflections.

The test shall be performed without mechanical pulling devices.

The mandrel shall be constructed of steel or rigid plastic able to withstand a minimum of 200 psi without deformation.

The mandrel shall have an outside diameter equal to 95 percent (95%) of the nominal inside diameter of the pipe being tested. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter of the pipe minus two (2) minimum wall thicknesses for O.D.-controlled pipe, and the average inside diameter for I.D.-controlled pipe. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.

The mandrel shall have a minimum of nine (9) runners, each having a minimum length (in inches) equal to the number of runners. The barrel section of the mandrel shall have a length of at least 75% of the inside diameter of the pipe. Contractor shall provide an approved proving ring for the mandrel. Adjustable or flexible mandrels are not acceptable.

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1.0 GENERAL

1.1 SCOPE

a. When sewer line depth of flow at the upstream manhole of the sewer line section being worked is above the maximum allowable for television inspection, joint testing and/or sealing; the flow shall be reduced to the level shown below by operation of pump stations, plugging or blocking of the flow, or by pumping and bypassing of the flow as specified.

b. Depth of flow shall not exceed that shown below for the respective pipe sizes as measured in the manhole when performing television inspection, joint testing and/or sealing.

(1)	Maximum Depth of Flow	Television Inspection
	6" - 10" Pipe	10% of pipe diameter
	12" - 24" Pipe	15% of pipe diameter
	Over 24" Pipe	20% of pipe diameter
(2)	Maximum Depth of Flow	Joint Testing/Sealing
	6" - 12" Pipe	25% of pipe diameter
	15" - 24" Pipe	30% of pipe diameter
	27" & up Pipe	35% of pipe diameter

c. Plugging or Blocking: A sewer line plug shall be inserted into the line upstream of the section being worked. The plug shall be so designed that all or any portion of the sewage can be released. During TV inspection, testing and sealing operations, flow shall be reduced to within the limits specified above. After the work has been completed, flow shall be restored to normal. The normal flow shall be interrupted only as long as necessary to safely complete the work.

d. Pumping and Bypassing: When pumping and bypassing is required the Contractor shall supply the pumps, conduits, fuel, and other equipment to divert the flow of sewage around the line section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypass system. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum.

(1) Piping, joints and accessories shall be designed to withstand twice the maximum system pressure or 50 psi, whichever is greater.

(2) During diversion pumping, do not allow sewage to be leaked, dumped or spilled in or onto any area outside of the sanitary sewer system.

e. Flow Control Precautions: When flow in a sewer line is plugged, blocked, or bypassed; sufficient precautions must be taken to protect the sewer lines from damage that might result from sewer surcharging. Further, precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved. The Contractor shall take into account the variability of the wastewater flow throughout the day and schedule the work to avoid, where possible, times of peak flow.

1.2 PAYMENT

No separate payment will be made for work or materials performed under this section. Include cost of work in related bid items.

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1.0 GENERAL

Intent. The intent of sewer line cleaning is to remove foreign materials from the lines and restore the sewer to a minimum of 95 percent (95%) of the original carrying capacity or as required for television inspection or rehabilitation. Since the success of the other phases of work depends a great deal on the cleanliness of the lines, the importance of this phase of the operation is emphasized. It is recognized that there are some conditions such as broken pipe and major blockages that prevent complete cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the Contractor will notify the Engineer and be required to clean those specific manhole sections. If, in the course of cleaning operations, pipe damage does result, the Contractor will repair the damages at no extra cost. The Contractor shall clear the blockage and receive payment per the bid price.

1.1 SCOPE

a. The existing sanitary sewer segments designated for inspection shall first be cleaned using hydraulically propelled or high pressure water jet cleaning equipment specially designed and manufactured for sanitary sewer cleaning.

b. The Contractor, upon request of the Engineer, shall demonstrate to the Engineer the performance and results obtained by use of the sanitary sewer cleaning equipment proposed for use on the project prior to its use generally on the project. The equipment and methods selected by the Contractor shall be approved by the Engineer.

c. If the results obtained by the proposed sanitary sewer cleaning equipment do not meet Engineer's approval, the Engineer may request different equipment be used until the Contractor employs equipment which meets the Engineer's approval.

d. The Contractor shall be responsible for locating and uncovering all manholes required to complete the job.

1.2 MEASUREMENT AND PAYMENT

a. This item will be measured by one (1) unit for each linear foot of sanitary sewer cleaned to Engineer's approval for each size for all types and all depths, and this item will be paid for by unit price bid.

b. Payment will be based on planned quantities as listed or as shown in Contract Documents for locations and lengths of sanitary sewers between manholes.

c. Includes, as-incidental to work:

   (1) Cleaning out, removing, hauling, and legally disposing of sludge, earth materials, rocks, debris, trash, roots and other solid and semi-solid foreign materials from within sewers.

   (2) Reconstruction of manholes dismantled for cleaning equipment or personal access, and repair of damage caused by dismantling or cleaning.

d. Acceptance of sewer cleaning work is subject to successful completion and review of the television inspection or sanitary sewer rehabilitation work. If inspection footage shows solids, sand, grease, grit or other debris remaining in the line, the cleaning is considered unsatisfactory. Repeat cleaning, inspection and recording of the sewer line until cleaning is acceptable to the Engineer.

1.3 DISPOSAL OF SEWER LINE SLUDGE

Acceptable domestic sludge removed from sanitary manholes may be hauled and disposed of at the City's wastewater treatment plant located south of town. Disposal at any other location within the City, including City manholes or lift stations, is prohibited without approval from City Operator and Engineer. The contractor shall coordinate all disposals with the City's Operator before hauling. The Contractor shall protect the existing wastewater treatment plant facilities. Acceptable sludge includes biodegradable organic solids or a liquid suspension thereof that can be pumped to the wastewater treatment plant bar screen located at the headworks of the plant. Sludge does not include earth materials, rocks, debris, trash, roots, or other solid and semi-solid foreign materials that cannot be pumped to this location or treated by the existing plant process. Debris and other foreign materials not classified as sludge or determined to unacceptable by the Owner, the Engineer, or the Operator become property of the Contractor and shall be legally disposed of by the Contractor at no extra cost to the Owner.

2.0 CLEANING EQUIPMENT

a. Hydraulically Propelled Equipment. The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure effective operation. Sewer cleaning balls or other equipment which cannot be collapsed instantly, will not be considered as acceptable cleaning equipment. Other equipment equally effective that will permit passage of sewage (when in piping) will be permitted when approved.

b. High-Velocity Jet (Hydrocleaning) Equipment. Water jet sewer cleaning equipment shall be truck mounted for ease of operation. The equipment shall have a minimum of 500 feet of one-inch (1") i.d. high pressure hose with a selection of two (2) or more high velocity nozzles. Nozzles shall have a minimum capacity of 60 gpm at the nozzle head and a working pressure of 1,000 to 1,250 psi. The nozzles shall be capable of producing a scouring action from 15 deg. to 45 deg. in all size lines designated to be cleaned. Equipment shall carry its own water tank capable of holding corrosive or caustic cleaning or sanitizing chemicals if required by the Engineer, auxiliary engines and pumps, and hydraulically driven hose reel. Controls shall be located so that the equipment can be operated above ground. Filler piping shall have an air gap to prevent backflow and contamination of City water system.

c. Cleaning Precautions.

(1) During sewer cleaning operations, satisfactory precautions shall be taken to protect the sewer line from damage that might be inflicted by the improper use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, the flow of sewage in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. When additional quantities of water from fire hydrants are necessary to avoid delay in normal working procedures, the water shall be conserved and not used unnecessarily. Water from fire hydrants shall be metered by the Contractor. The City will provide water at no charge. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant. Remove water meters, fittings, and piping from fire hydrants at the end of each working day. Use an appropriately sized backflow preventer when drawing water from a public hydrant.

(2) When hydraulic or high-velocity cleaning equipment is used, install a suitable sand trap, weir, dam or suction device in the downstream manhole so that debris and solids are trapped for removal.

3.0 SEWER CLEANING

a. General. The designated sewer manhole sections shall be cleaned using hydraulically propelled or high-velocity jet equipment. Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to the Engineer. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists. The Contractor and the Engineer shall discuss methods to remove the blockage.

b. Root Removal. Roots shall be removed in the designated sections where root intrusion is a problem. Special attention should be used during the cleaning operation to assure almost complete removal of roots from the joints. Any roots that could prevent the sewer flow, inspection or rehabilitation shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners. Chemical root treatment may be used at the option of the Contractor.

c. Chemical Root Treatment. To aid in the removal of roots and at the option of the Contractor, manhole sections that have root intrusion may be treated with an approved herbicide. The application of the herbicide to the roots shall be done in accordance with the manufacturer's recommendations and specifications in such a manner to preclude damage to surrounding vegetation. Any damaged vegetation so designated by the Engineer shall be replaced by the Contractor at no additional cost to the Owner. All safety precautions as recommended by the manufacturer shall be adhered to concerning handling and application of the herbicide.

d. Material Removal. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted. When hydraulic cleaning equipment is used, a suitable sand trap, weir or dam shall be constructed in the downstream manhole in such a manner that the solids shall be trapped.

e. Disposal of Materials. All solids or semisolids resulting from the cleaning operations shall be removed and disposed. All materials shall be removed from the site no less often than at the end of each workday. Under NO circumstances will the Contractor be allowed to accumulate debris on the site of work beyond the stated time, except in totally enclosed containers and as approved by the Owner. Under NO circumstances shall sewage or solids removed therefrom be dumped onto streets or into ditches, catch basins, storm drains or sanitary sewer manholes.

f. Final Acceptance. Acceptance of sewer line cleaning shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the Engineer. If TV inspection shows the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line until the cleaning is shown to be satisfactory.

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1.0 GENERAL

1.1 SCOPE

a. Immediately upon cleaning the sewer line in one (1) location, the entry manholes and the clean line shall be televised to determine the condition of the manhole and line, observe possible defects and determine the location of existing service connections, etc. The Contractor shall review the inspection footage and provide written recommendations on the condition of the pipe or manhole to be repaired and method of rehabilitation. The inspection footage shall be furnished to the Engineer for review and comments which may require up to **15 calendar days** from the date of submittal. **Repair work shall not begin until the Engineer reviews and comments on the pre-construction inspection footage.** Contractor shall provide inspection footage on Digital Video Disc (DVD) in a file format that is operational for review purposes in standard DVD player unit. Each DVD will be permanently labeled with the following information before furnishing it to the Engineer.

(1) Owner

(2) Date Televised

(3) Manhole Number, Location, and Size

(4) Street/Easement Location

(5) Name of Contractor

(6) Date Submitted

(7) DVD number corresponding to information included in final inspection report

b. DVDs will become property of the City and shall be retained by the City. If the footage is of such poor quality that the Engineer is unable to evaluate the condition of the sewer line or to locate service connections, the Contractor shall be required to re-televise and provide better quality footage of the line at no additional cost to the City. If good footage cannot be provided of such quality that can be reviewed by the Engineer, no payment for televising this portion shall be made. Also, no payment shall be made for portions of lines not televised or portions where manholes cannot be negotiated with the TV camera.

c. The inspection will be done one (1) manhole section at a time and the flow in the section being inspected will be suitable controlled as specified (see SEWER FLOW CONTROL).

d. The television camera used for the inspection shall be one (1) specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the Owner's representative; and if unsatisfactory, equipment shall be removed and no payment will be made for an unsatisfactory inspection.

e. **Upon entering a manhole, the camera shall rotate as it is being lowered to record a 360-degree view of the full depth of the manhole**. Once in the line, the camera shall be moved through the line in either direction at a moderate rate, stopping at all defects, change in pipe material and service laterals to permit proper documentation of the sewer's condition. When stopped, an audio description of the defect shall be made by the camera operator, and a typed video display of the defect shall be shown on the screen. The downstream and upstream manhole inverts shall be shown at the beginning and end of each inspection. In no case will the television camera be pulled at a speed greater than 30-feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment, so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete and no additional inspection work will be required.

f. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two (2) manholes of the section being inspected to insure good communications between members of the crew.

g. The importance of accurate distance measurements is emphasized. The distance measurements shall be displayed on the screen during the inspection. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Owner's Representative.

h. Location records or log shall be made by the Contractor and shall clearly show the location in relation to the centerline of the adjacent manhole of the following:

(1) Service laterals

(2) Crushed, broken, or cracked pipe

(3) Deflection in grade or alignment of pipe

(4) Root intrusion

(5) Debris

(6) Infiltration

(7) Change in pipe material

(8) Other significant defects in the pipe, such as failed gaskets and severe deterioration

i. During TV Inspection of a manhole section, if the camera is unable to pass an obstruction, the Contractor shall, prior to proceeding to the next manhole section, televise the manhole section from the other direction (reverse setup), in order to provide TV inspection footage for the entire manhole section to the Engineer.

j. The City makes no guarantee that all of the sanitary sewers to be entered are clear for the passage of a camera. The methods used for securing passage of the camera are to be at the option of the Contractor

and the costs must be included in the bid price for TV Inspection. The cost of retrieving the TV camera, under all circumstances, when it becomes lodged during inspection, shall be incidental to TV inspection.

k. The Contractor shall include a 360-degree radial view of at least two (2) pipe joints along each section of pipe located between manholes. The pipe joint views shall provide a general example of the condition of the joints within each section of pipe. A 360-degree radial view of any defected joint must be provided.

2.0 MEASUREMENT AND PAYMENT

a. Measure television inspection by the linear foot for each size for all types and all depths.

b. Documentation of the television results shall be as follows:

(1) Television Inspection Logs: Printed location record shall be kept by the Contractor and will clearly show the location in relation to an adjacent manhole of each infiltration point observed during inspection. In addition, other points of significance such as locations of building sewers, unusual conditions, roots, storm sewer connections, broken pipe, presence of scale and corrosion, and other discernible features will be recorded and a copy of such records will be supplied to the Owner. The Contractor shall use the City of Houston television inspection report codes and report format, or other suitably organized report format as approved by the Engineer. The Contractor shall submit a sample inspection report as part of the pre-construction submittals for approval.

(2) Photographs: Instant developing, 35 mm, or other standard-size photographs of the television picture of problems shall be taken by the Contractor upon request of the Owner's Representative. Digital photographs or video “captures” are acceptable.

(3) Recordings: The purpose of DVD recording shall be to supply a visual and audio record of problem areas of the lines that may be replayed. Recording playback shall be at the same speed that is was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor. The Contractor shall provide the City with DVDs of all sewer lines which are televised. The cost of the DVD shall be included in the unit price.

(4) Inspection Report Summary: In addition to the television inspection logs, the contractor shall provide three (3) copies of an overall summary report and Project Manual on the condition of the lines as specified in Section 1300 – Submittals, and as described below. The report shall be qualitative in nature stating the Contractor’s expert opinion and analysis of the condition of the lines. Include in the report the location of each infiltration point observed during inspection, and other points of significance such as unusual conditions, roots, storm sewer connections, broken pipe, presence of scale and corrosion, and other discernible features that affect the performance of the sanitary sewer system. Include details of the location, severity, depth, surface cover, accessibility and possible repair options for each point of significance included in the report. Include color photographs of problems within report. Locate each point of significance in relation to an adjacent manhole. For line sections consisting of sanitary sewer rehabilitation work the inspection report shall mainly consist of noticeable defects prior to rehabilitation and confirmation of rehabilitation work completion.

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1.0 GENERAL

1.1 SCOPE

This section provides for the reconnection of service lines after rehabilitation of gravity sewer by cure-in-place pipe.

1.2 RELATED WORK

Division 2, Site Work

(1) Cure-In-Place Pipe

1.3 CONTRACTOR SUBMITTALS

Submit location records clearly indicating location of service reconnection in relation to centerline of adjacent manhole. Reports shall be typed, bound, and submitted to the Engineer after reconnection.

1.4 MEASUREMENT AND PAYMENT

Measure this item by one (1) unit for each service line reconnected for all sizes, all types, and all depths. This item shall be paid for at the unit price bid for each service reconnection.

1.5 RESPONSIBILITY

The contractor will review videotapes of the designated line segments to determine the exact location and number of service connections. It shall be the Contractor's responsibility to accurately field locate all existing service connections. The Contractor shall be responsible for restoring/correcting, without any delay, all missed or faulty reconnections, as well as for any damage caused to property owners for not reconnecting the services soon enough or for not giving notice to the owners. All services that are reconnected to rehabilitated liner shall be shown on the "As Built Drawings" with the exact distance from the nearest upstream/downstream manhole.

2.0 SERVICE RECONNECTIONS

All existing service connections shall be reconnected by Remote TV Controlled Cutting Device. Experienced operators shall make them so that no blind attempts or holes are made in the liner pipe. Location shall be re-verified carefully with earlier tapes for accuracy, especially where dimples are not defined or clearly ascertained. The Engineer reserves the right to require service connection by excavation at certain or all locations if the quality, workmanship and approval rating for remote cut is poor and is not satisfactory.

The remote cut shall be smooth and circular in nature as seen by a 360 degree TV camera. All remote cuts shall be mechanically brushed to provide the required smooth, circular connection. The hole shall be a maximum of 100% and a minimum of 90% of the service pipe diameter. It shall be properly aligned and be concentric to the existing connection. The locations of all remote cuts shall be verified carefully to match earlier tapes for their exact locations. Excess, wrong holes, or trial cuts shall not be made and must be repaired at not cost to the Owner to the full "satisfaction" of the Engineer. The Engineer may check the completed remote connections for the minimum 90% requirement by excavating the site, in which case payment shall be made for the excavation at the location and for any special backfill, if necessary. Defective connections shall be repaired to the Engineer's satisfaction at no extra cost. If a remote cut connection is to be rectified or replaced with connection "by excavation", only one type payment shall be made, as approved by the Engineer.

Protruding Service Connections: Protruding taps or service connections which are to be reconnected and which will obstruct or hinder the insertion of the liner shall be removed to allow the liner to pass through. It shall be paid for as a service reconnection when completed. No payment shall be made at this location for any other obstruction removal. Abandoned taps/services which are protruding and which must be removed to allow the liner to be inserted into the sewer shall be paid for as an obstruction removal when directed by the Engineer.

3.0 TESTING FOR ACCEPTANCE

Television (TV) tapes shall be required after all service connections have been made at no additional cost to the Owner. The Contractor will provide to the Owner a color video tape taken by a 360 degree radial view camera for close up view showing the completed work, including the condition of the restored taps prior to requesting payment.

Television inspections, tapes and reports, etc., shall be as per relevant Section 02563. Upon completion time of the installation work and testing, the Contractor shall restore/clear the project area affected by his operations. No trash, rubbish, etc., shall be stored at any site, be the work in progress or not.

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1.0 GENERAL

1.1 WORK INCLUDED

a. It is the intent of this Section to specify repair of a sanitary sewer line that has point-failed, and to return the sewer to as good as or better condition as it was before the sewer failed and the repair was made.

b. This Section includes repair of point failures of sanitary sewers involving excavation, point repair/replacement of sewer, placement of bedding and backfilling, disposition of excess materials, and restoration of site.

c. This Section includes standard length and non-standard length of excavation for point repairs of sewer mains and repair of service lines within rights-of-way and easements.

1.2 QUALITY ASSURANCE

a. TV Testing:

(1) Contractor shall perform TV tests or smoke tests on designated line segments to determine location of main line and service line leaks.

(2) Prior to TV or smoke testing, the Contractor shall hand distribute written notice to the area residents two (2) days prior to proposed testing.

b. Service Line Repair:

(1) Contractor will evaluate test results and recommend location and extent of repair. The Engineer will review and comment on the recommendation.

(2) Repairs to service lines may only proceed when specifically authorized by the Engineer.

1.3 MEASUREMENT AND PAYMENT

a. Standard Length of Excavation and Point Repair:

(1) This item will be measured by one (1) unit for each point repair constructed. Measurement will be along centerline of exposed pipe.

(2) Payment will be at unit prices for size and depth of pipe for each point repair. The depth, length of excavation, and minimum length of pipe replaced is listed in this section.

(3) For pipe replacement greater than the minimum length indicated, the additional pipe replaced shall be measured and paid at the unit price as described in Section 02567-1, "Removal and Replacement of Sanitary Sewers."

(4) Depth of sewer will be distance from existing surface to flow line of sewer for included sewers as listed in Contract Documents.

(5) This item includes, as incidental to work, excavation as necessary, select dry native soil backfilling as required, disposal of excess materials, lamping and television inspection.

(6) Removal and restoration of curbs, gutters, sidewalks, driveways, fences, sodding, pavement, pavement base and bedding shall be included in the unit price.

1.4 REPAIR OF SERVICE LINES

a. Smoke Tests.

(1) This item will be measured by one (1) unit for each smoke test conducted on sanitary sewer main between manholes to detect leakage of main line and service lines connected to that segment of sanitary sewer main; and this item will be paid for by unit price bid.

(2) Payment will be based on planned quantities as listed or as shown in Contract Documents.

(3) Includes, as incidental to work, logging of location of test and logging of location of all points of leakage, metal staking, as indicated by test, including indicated points of leakage of sewer and connected service lines outside rights-of-way and easements.

b. Excavation and Point Repairs on Service Lines.

(1) Excavation and point repairs on service lines shall be limited to rights-of-way and easement areas, and no excavation and point repairs shall be made under Contract on private property which is not part of a right-of-way or sanitary sewer easement area.

(2) This item will be measured by one (1) unit for each point repair constructed for each size of sewer for all depths and all types of sewer; and this item will be paid for by unit price bid.

(3) Payment for each point repair will be made only when service line point repair is specifically authorized by the Engineer.

(4) This item includes, as incidental to work, excavation, select dry native soil backfilling as required, and disposal of excess materials.

1.5 CONTRACTOR SUBMITTALS

Submit to the Engineer location records clearly indicating location of TV or smoke tests, all points of service line leaks and service line location referenced to a permanent structure, including locations outside of right-of-ways and easements.

1.6 POINT REPAIR REQUIREMENTS

a. For each point repair, the length of open trench excavation allowed measured along the exposed sewer shall be limited to the following lengths for various depths:

Depth	Length of Excavation	Minimum Length of Pipe Replaced
0 ft. - 12 ft.	12 ft.	9 ft.
12 ft. - 18 ft.	15 ft.	12 ft.
18 ft. - 26 ft.	24 ft.	20 ft.

b. The pipe replacement shall comply with the provisions of the Specifications in related Sections for pipe, materials, and joints for type of pipe used (Section 02220 and 02560).

c. The method of jointing the ends of the replaced pipe with the existing pipe shall be water tight.

d. If the joints cannot be made up to be water tight using rubber gasket jointing, then the pipe ends shall be encased all around with a concrete collar and bedded and backfilled in compliance with the provisions related to pipe bedding and backfill.

1.7 REPAIR OF STACK CONNECTION REQUIREMENTS

a. If upon excavation for a point repair, the Engineer determines that the cause of the sewer failure was a stack failure, the stack shall be replaced.

b. If the failure of the stack was caused by a failure of the tee in the sewer line, the tee and one (1) joint of pipe on each side of the tee shall be replaced.

c. Prior to replacing the stack, tee, and line, the Contractor shall determine the condition of the line 20-feet in each direction by lamping the line or television inspection.

d. If additional joints of pipe must be replaced, the Contractor shall recommend replacement to the Engineer and obtain the Engineer's authorization to replace additional length of line.

e. Minimum pipe diameter for a stack shall be six-inch (6"), otherwise the diameter of the pipe shall be the same as the diameter of the stack replaced.

1.8 REPAIR OF WYE OR TEE CONNECTION REQUIREMENTS

If upon excavation for a point repair, the Engineer determines that the cause of the sewer failure was a wye or tee connection failure, the wye or tee and one (1) joint of pipe on each side so the wye or tee shall be replaced.

1.9 REPAIR OF STUBS REQUIREMENTS

a. Whenever it is determined by the Contractor or Engineer that failure has occurred in a stub, the Engineer will authorize stub repair/replacement.

b. Sewer stubs shall be two-feet (2) long minimum and terminate in bell and plug or a stab-type coupling shall be installed in wall of manhole of same size as original stub and plugged.

1.10 DRY PLACEMENT

a. Pipe replaced shall be placed only in dry trench conditions.

b. When solid sheet piling is required to maintain dry trench condition, the Contractor shall install solid steel sheet piling so that the point repair can be made under dry trench conditions.

1.11 WET SAND CONSTRUCTION

Where required to maintain firm pipe foundation, in unsuitable soil conditions, the Contractor shall use wet sand construction in trench bottom in lieu of Class “AA” bedding, in conformance with the City of Houston Standard Construction Details (Dwg. No. 02317-02).

1.12 UTILITIES

The Contractor will be required to contact the various utility companies and the utility coordinating committee and determine the location of all utilities prior to commencing point repair.

1.13 EXCAVATION IN EASEMENTS

Excavation will be by use of machine operated equipment; however, in easements where machine operated equipment cannot be employed because of lack of accessibility, hand excavation shall be employed when approved by Engineer.

1.14 WELL POINTS

Contractor will provide any necessary dewatering system.

1.15 PUBLIC NOTIFICATION

a. Contractor shall provide written notification to the public 48 hours in advance of intent to turn off public water supply or any other disruption to the sanitary sewer system for sewer rehabilitation work.

b. Written notification shall include date, time and estimated duration of shut off.

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1.0 GENERAL

1.1 WORK INCLUDED

a. This section includes the removal and replacement of existing sanitary gravity flow sewers that exceed standard length for bid point repairs.

b. Removal and replacement of sanitary sewers shall be defined as the excavation and removal of old pipe, reconstruction of subgrade and bedding, laying of new sewer pipe, reconnection of existing service lines and stacks, bedding and backfilling, inspection cleanup, and restoration of ground surface.

c. Before any work is performed under any part of this section the additional required length must be confirmed by the Engineer.

1.2 MEASUREMENT AND PAYMENT

a. Removal and Replacement of Sewer Main.

(1) This item will be measured by one (1) unit for each linear foot of sewer main removed and replaced for each size of sewer for each depth of sewer in increments indicated on the bid form for all types of sewer; and this item shall be paid for by unit price bid.

(2) Depth increment will be based on sewers constructed to the grades called for by the plans in accordance with the depths shown and no field measurement of actual depths will be made for this purpose.

(3) This item includes, as incidental to work in site clearance and site preparation, excavation, as necessary, select dry native soil backfilling as required, disposal of excess materials, television inspection, and testing.

(4) Removal and restoration of curbs, gutters, sidewalks, driveways, fences, sodding, pavement, pavement base and bedding shall be included in the unit price.

b. Reconnection of Service Lines.

(1) This item will be measured by one (1) unit for each reconnection to sewer of existing four-inch (4"), six-inch (6"), and eight-inch (8"), sewer service line for all depths, for all sizes and for all types of sewers, and this item will be paid for by unit price bid.

(2) This item includes, as incidental to work, excavation, as necessary, select dry native soil backfilling as required, and disposal of excess material.

(3) Removal and restoration of curbs, gutters, sidewalks, driveways, fences, sodding, pavement, pavement base and bedding shall be included in the unit price.

c. Reconnection of Stacks.

(1) This item will be measured by one (1) unit for each reconnection to sewer of six-inch (6"), and eight-inch (8") sewer stack including reconstruction of stack as necessary for all depths for all sizes and for all types of sewers, and this item will be paid for by unit price bid.

(2) This item includes, as incidental to work, excavation, select dry native soil backfilling as required, and disposal of excess materials.

(3) Removal and restoration of curbs, gutters, sidewalks, driveways, fences, sodding, pavement, pavement base and bedding shall be included in the unit price.

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1.0 GENERAL

1.1 SCOPE

It is the intent of this specification to define the approved methods and materials for the rehabilitation of existing deteriorated gravity sewer lines or conduits by installation of a thermosetting resin pipe formed to the original conduit and referred to as the Cured-In-Place Pipe (CIPP) method.

1.2 RELATED WORK

a. Division 2, Site Work

(1) Sewer Flow Control

(2) Sewer Line Cleaning

(3) Television Inspection

(4) Point Repairs and Obstruction Removals

(5) Manhole Rehabilitation

1.3 REFERENCED STANDARDS

This specification references the following published ASTM specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

a. ASTM C 581 - Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service.

b. ASTM D 543 - Test Method for Resistance of Plastics to Chemical Reagents.

c. ASTM D 790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

d. ASTM D 3567 - Standard Practice for Determining Dimensions of Reinforced Thermosetting Resin Pipe (RTRP) and Fittings.

e. ASTM D 3681 - Test Method for Chemical Resistance of Reinforced Thermosetting Resin Pipe in a Deflected Condition.

f. ASTM D 5035 - Test Method for Breaking and Elongation of Textile Fabrics (Strip Method).

g. ASTM D 5199 - Standard Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

h. ASTM D 5813- Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe.

i. ASTM E 1252 - Standard Practice for General Techniques for Qualitative Infrared Analysis.

j. ASTM F 1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

k. ASTM F 1743 - Standard Practice for the Rehabilitation of Existing Pipelines and Conduits by the Pulled-In-Place Installation of Cured-In-Place Thermosetting Resin Pipe (CIPP).

1.4 MEASUREMENT AND PAYMENT

a. Unit Prices:

(1) Measurement and payment for cured-in-place pipe is by the linear foot, measured along centerline of pipe from centerline to centerline of pipeline segment manholes, and shall be considered full compensation for all labor and materials required to install the liner to specified requirements. Depth range for payment is based on greatest depth measured at manholes from natural ground level to flow line of sanitary sewer for each pipeline segment.

(2) No separate payment will be made for the following items of work. Include cost in the unit price for installing cured-in-place pipe:

(a) Diversion pumping and sewer flow control as specified in Section 02561 – Sewer Flow Control.

(b) Sealing the liner in manholes.

(c) Reworking inverts and benches for manholes.

(d) Temporary meter and municipal water obtained from a City fire hydrant.

(e) Cleaning of project site and restoration of disturbed grassed or landscaped areas to original condition or better.

(f) Excavation of access pits if required for the completion of the work.

(3) Separate payment will be made for Pre-installation and post-installation cleaning and television inspection as specified in Section 02562 - Sewer Line Cleaning and Section 2563 - Television Inspection of Underground Piping.

(4) Where post-installation thickness measurements or physical property testing is performed, payment for installed cured-in-place pipe shall be made as follows:

(a) Full payment: If thickness, flexural strength and flexural modulus of elasticity of installed CIPP are all 95 percent or better of values specified in paragraph 2.4, full payment shall be made.

(b) Adjusted payment: If thickness, flexural strength or flexural modulus of elasticity are between 90 percent and 95 percent of values specified in paragraph 2.4, payment shall be made based on an Adjusted Unit Price, which shall equal the Unit Price bid, multiplied by a "Value Factor" calculated as follows:

$$\frac{\text{actual thickness}}{\text{specified thickness}} \times \frac{\text{actual flexural strength}}{\text{specified flexural strength}} \times \frac{\text{actual flexural modulus of elasticity}}{\text{specified flexural modulus of elasticity}}$$

"Value Factor" shall not exceed 100 percent.

(5) Payment for point repairs and obstruction removals will be made according to Section 02565 – Point Repairs and Obstruction Removals.

(6) Payment for repair of sags in the line will be made either according to Section 02565 - Point Repairs and Obstruction Removals, or according to the diameter and depth of the pipe if "Remove and Replace" is the method of repair designated by Engineer.

b. Lump Sum: If the Contract is a Lump Sum (Stipulated Price) Contract, payment for work in this Section is included in the total Stipulated Price.

1.5 PROCESS

a. Installation of resin-impregnated flexible tubes inserted into existing sewers or conduit by hydrostatic head, expanded against the existing sewer interior surfaces, and cured by circulating heated water or steam throughout the tube from manhole to manhole.

b. When cured the finished CIPP will be a hard, continuous, tight fitting, impermeable, corrosion-resistant liner of specified thickness and physical properties, with a uniformly smooth interior surface.

c. CIPP Material and Installation: Comply with the latest edition of ASTM D 5813, ASTM F 1216, and ASTM F 1743, as modified by this specification. The Engineer reserves the right to approve materials or installation practices which differ from these standards.

1.6 SUBMITTALS

Make all submittals in accordance with Section 01300 – Submittals.

a. Resin:

(1) Submit product data stating physical and chemical properties.

(2) Submit results of testing performed by resin manufacturer demonstrating compliance with specified chemical resistance requirements.

(3) Submit manufacturer-certified infrared spectrum analysis (chemical fingerprint) of proposed resin system in accordance with ASTM E 1252.

(4) Submit manufacturer-certified curing information for temperature (step cooking temperature/hours at each and final stage) depending upon the sewer or conduit size and liner thickness.

b. Flexible Tube:

(1) Submit product data stating physical properties meeting ASTM D 5035.

(2) Submit tabular summary by sewer segment noting required CIPP thickness specified. Provide certification that liner's "dry" thickness meets or exceeds the required cured laminate thickness(es).

Measure thickness in accordance with ASTM D 5199.

(3) Submit tabular summary by sewer segment of Manufacturer required minimum pressures required to hold the tube tight against the existing pipe producing dimples at side connections and the maximum allowable pressures so as not to damage or overstress the tube material.

c. Cured-In-Place Pipe:

(1) Submit heating and curing schedule/plan to Engineer **at least 24 hours in advance** of installation of pipe.

(2) Submit manufacturer information on CIPP system including Classification Type, Grade, procedures and steps for installation.

(3) Submit field measurements of cured liner thickness for determining payment.

(4) Submit representative sample(s) of the cured liner required for testing in accordance with ASTM D 790.

(5) Submit copies of curing temperature/time log sheets on approved format **immediately after curing** is completed. Temperatures shall be measured at both ends by sensitive and accurate measuring devices, and the initials of the Engineer or his/her representative shall be obtained, if they are present at the site during curing.

(6) Submit pre and post-installation television inspection video as required and specified in Section 02563 - Television Inspection.

1.7 QUALITY ASSURANCE/INSTALLER QUALIFICATIONS

a. During the course of the Work, make no substitutions of materials, design values or procedures for those specified **and** selected on the Bid Form without the prior written approval of the Engineer.

b. The finished CIPP shall be continuous over the entire length of the inversion run between access points and shall be free of visual defects such as wrinkles, bulges, tears foreign inclusions, cracks, dry spots, pinholes or de-lamination.

c. Contractor must have at least **five (5) years minimum** active experience in installation of the exact products bid and have successfully installed at least 50,000 linear feet of the exact products bid in wastewater collections systems similar to the Work.

2.0 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

The following is a list of acceptable manufacturers for materials. Manufacturer's names listed below are used to establish standards of design, performance, quality and serviceability and not to limit competition. Listing as an acceptable manufacturer will not relieve the manufacturer from conforming to these Specifications.

1. First Inliner USA
2. Inliner Technologies
3. Insituform
4. National Liner
5. Novapipe **
6. Masterliner **

2.2 MATERIALS

a. Resin:

(1) The Contractor shall furnish thermosetting polyester or epoxy resin system as selected by the cured-in-place manufacturer to impregnate the flexible tube/liner. The resin must be able to cure in the presence of water and the initiation temperature for cure shall be less than 180° F.

(2) The resin selected shall have proven resistance to normal municipal sewage, including abrasion and corrosion due to solids, grit, sand, acid and gases such as hydrogen sulfide and methane.

b. Flexible Tube/Liner:

(1) Provide flexible tube manufactured and fabricated under process manufacturer's quality-controlled conditions. The tube shall be capable of carrying resin, withstanding installation pressures and curing temperatures. The material should be able to stretch to fit irregular pipe sections and negotiate bends.

(2) Use tube sized so as to snugly fit the internal circumference of the existing sewer and produce specified cured thickness and physical properties. Allowance should be made for circumferential stretching during inversion.

(3) Tube Length: Fully and continuously span the distance between manholes, including sufficient material for sealing at manholes and product sampling (when required).

(4) Fabric tube minimum tensile strength in both longitudinal and transverse directions, when tested in accordance with ASTM D 5035: 750 psi.

(5) Identify all tubes with manufactured thickness when tested in accordance with ASTM D 5199.

(6) The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.

2.3 TESTING REQUIREMENTS

a. Manufacturer's Chemical Resistance Testing: Perform chemical resistance testing of resin in accordance with ASTM C 581, as modified herein. Perform testing to demonstrate chemical resistance to a solution with a pH of 0.5 and a solution with a pH of 10. Use reagents or solutions as required to establish and maintain the minimum and maximum pH values specified for the duration of the testing. Exposure to the minimum and maximum pH values shall produce an average loss of not more than 20 percent in the initial flexural properties for each test interval, and an average loss of not more than 15 percent for a period of one year, as determined according to ASTM D 790. Perform testing at a temperature of 73.4 F (plus or minus 3.6 F). Test specimens shall not have more than 1.5 percent gain or loss in weight over a period of one year. Test frequency and sample preparation: Follow ASTM C 581.

b. Test Results: Submit test results including at least the following:

(1) Raw data for each test specimen for each test interval performed.

(2) Calculated average test results for each test interval.

(3) Using calculated averages for each test interval, calculate the average test result for the duration of testing.

2.4 PHYSICAL PROPERTIES

a. The CIPP final cure thickness shall be calculated and designed based upon the following physical condition of the existing pipe to be rehabilitated:

(1) Pipes shall be considered fully deteriorated.

(2) Pipes shall be subject to full soil load of 120lbs. / c.ft., with applicable live load and water table five (5) feet below the top of the ground.

(3) Pipes shall have a minimum of 2% ovality in the circumference.

Condition 1 and/or 3 may be changed, after the pre-installation television inspection video, for later case-by-case design calculations, if **required** by the Engineer. The Engineer may also add, and/or modify, the conditions based on pertinent field information, Contractor recommendations or other considerations.

Based on the above criteria, Table No. One (1) below was generated for the required liner thickness for the structural values mentioned above. Thickness is rounded to the next higher multiple of 1.5 mm, after adding an allowance of 5% to the design thickness for resin migration. Bidders and Contractors shall verify the thickness table for correctness, and have it changed by the Owner, through an addendum before the bid date, if necessary. After bid, the thickness given in Table No. One (1) shall govern, unless approved otherwise in writing. They, however, may not be reduced without due credit to Owner, and must be approved by Engineer prior to installation.

b. Minimum CIPP Thickness After Curing: As specified below, based on the maximum sewer invert depth for the segment being rehabilitated.

Table No. One (1) Minimum CIPP Thickness (millimeters)				
Nominal Sewer Diameter (inches)	**MAXIMUM PIPE SEGMENT INVERT DEPTH**			
	Up to 10 feet	**10 - 15 feet**	**15 - 20 feet**	**20-25 feet**
6	4.5	4.5	4.5	6.0
8	6.0	6.0	6.0	7.5
10	6.0	6.0	7.5	9.0
12	6.0	7.5	9.0	10.5
15	7.5	9.0	10.5	12.0
18	9.0	12.0	13.5	15.0
21	10.5	13.5	15.0	16.5
24	12.0	15.0	16.5	19.5
30	15.0	18.0	21.0	24.0
36	16.5	21.0	24.0	28.5
42	19.5	24.0	28.5	33.0
48	22.5	28.5	33.0	36.0
54	25.5	30.0	36.0	42.0
60	28.5	34.5	39.0	45

c. CIPP minimum flexural properties, after curing:

Table No. Two (2)		
PROPERTY	**REFERENCE**	**MINIMUM**
Flexural Strength (Modulus of Rupture)	ASTM D 790	4,500 psi
Tangent Modulus of Elasticity	ASTM D 790	250,000 psi

2.5 FIELD TESTING

a. Flexible Tube Thickness: Prior to wet-out; provide access to all flexible tubes intended for the use on the project. Clearly identify flexible tubes with their manufactured thickness. Do not use flexible tubes which fails to meet the specified thickness. Testing will be performed in accordance with ASTM D 5199.

b. Infrared Spectrum Analysis (Chemical Fingerprinting): Provide access to the resin intended for the use on the project for sampling and chemical fingerprint testing. All testing will be performed in accordance with ASTM E 1252. If sample fails test, work is non-conforming.

c. Physical Property Testing: Post installation physical property testing of the cured composite tube will be performed in accordance with ASTM D 790. Provide sufficient samples for conducting the testing required under ASTM D 790. If sample fails test, work is non-conforming.

d. Cured-in-Place Pipe Thickness: Caliper or other suitable measuring device shall be used to test liner thickness. The testing shall be performed on the samples prepared for physical property testing shall be tested for thickness. All calibration tubes or other non-structural linings and coatings shall be removed prior to the testing for thickness. The sample shall be tested at three locations and the average thickness measured shall be taken as the actual thickness of the cured-in-place pipe for the impacted segment. If sample fails test, work is non-conforming.

3.0 EXECUTION

3.1 SAFETY

The Contractor shall carry out his operations in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space. It shall be the Contractor's responsibility to familiarize with OSHA Standard and Regulations pertaining to all aspects of the work. Take suitable precautions to eliminate hazards to personnel near construction activities when pressurized air is being used.

3.2 PRE-INSTALLATION CLEANING AND TELEVISION INSPECTION

a. Perform a pre-installation television inspection in accordance with Section 02563 - Cleaning and Video Inspection of Underground Piping. Verify that sewer is clean and pipe conditions are suitable for installation of the CIPP. Notify Engineer if any conditions exist, which will impact the installation or possibly change the preferred method of rehabilitation (such as CIPP to pipe bursting).

3.3 OBSTRUCTION REMOVAL, POINT REPAIR AND SAG ELIMINATION

a. If pre-installation video inspection reveals an obstruction in the line segment (such as heavy solids, dropped joints, protruding service connections or collapsed pipe) that cannot be removed by conventional sewer cleaning equipment and the obstruction will prevent completion of the insertion process, perform point repairs or obstruction removal prior to CIPP installation. **Obtain the Engineer's written approval for each repair or removal before performing the work**. Follow requirements in Section 02565 - Point Repairs in Sanitary Sewers.

b. If pre-installation video inspection reveals a sag in the sewer that has a vertical displacement greater than one-half the pipe diameter, eliminate the sag by performing a point repair as specified in Section 02565-Point Repairs in Sanitary Sewers, or by removal and replacement of the sewer segment. **Obtain the Engineer's written approval for each repair or removal before performing the work**

3.4 SEWER FLOW CONTROL

a. Maintain commercial and residential sanitary sewer service during the installation process.

b. Install and operate diversion pumping equipment to maintain sewage flow around the segment of pipe being rehabilitated, and to prevent backup or overflow, as specified in Section 02561 – Sewer Flow Control.

3.5 NOTIFICATION

a. Engineer: Contractor to inform the Engineer Project Manager of work schedules for CIPP installation.

(1) Provide 24-hour notice so that the Engineer may witness the "wet-out" procedure.

(2) Provide 24-hour notice so that the Engineer may witness inversion and curing of liner.

b. Public Notification: The Contractor shall place door hangers at each building or residence that may be affected by the work of this contract. The door hangers shall inform the occupants of the type of work being done and the expected duration of the work. The door hanger shall give the Contractor's name, address, a 24-hour phone number, and the name of a contact. The door hangers shall be placed a minimum of 48 hours and not more than 72 hours before the work is to commence in the affected area. In addition, the Contractor shall notify the City of the daily location of construction operations.

3.6 INSTALLATION PROCEDURES

a. Wet-out: Contractor shall designate a local location, accessible to the Engineer, where the flexible tube will be vacuum-impregnated with resin (wet-out) under controlled conditions. The volume of resin used should be sufficient to fill all voids in the tube material at nominal thickness, diameter and thoroughly saturate the tube prior to installation. The volume should be adjusted by adding 5 to 10 % excess resin volume due to polymerization and to allow for any migration of resin into the cracks and joints in the original pipe. Use catalyst systems or additives compatible with resins and flexible tubes complying with manufacturer's recommendations. Handle resin-impregnated flexible tubes to retard or prevent resin setting until ready for curing.

b. Insertion:

(1) The impregnated tube shall be transported and kept in refrigerated equipment until it is to be installed. Insert flexible tubes through existing manholes or other Engineer approved access structures by inversion, pull-in or other Engineer approved procedure.

(2) Before curing the tube manufacturer shall provide the minimum pressure required to hold the tube tight against the existing pipe producing dimples at side connections and the maximum allowable pressure so as not to damage or overstress the tube material.

(3) Once inversion begins, the pressure (hydrostatic head) shall be maintained between the minimum and maximum pressures until the inversion process is completed. **Should the inversion pressure deviate from within the manufacturer's recommended minimum and maximum pressure range, the installed tube is not to be cured and shall be removed at no additional cost to the Owner.**

(4) Lubricants, if used, shall be in accordance with ASTM F 1216 and ASTM F 1743.

c. Curing:

(1) Follow manufacturer's recommended cure schedule in curing of liner.

(2) After insertion is completed, apply a suitable recirculation system capable of delivering steam, hot water or ambient temperature water or air, uniformly throughout the section to achieve consistent cure of the resin. Maintain curing temperature as recommended by the resin/catalyst system manufacturer.

(3) Provide suitable monitors near the heat source to gauge temperatures of incoming and outgoing water or steam supply. Place additional temperature sensors between the impregnated tube and invert of the original pipe at each manhole to monitor the outside temperature of the liner while curing.

(4) After the curing has commenced and dimpling for laterals is completed, the required pressure shall be maintained until the cure is completed. Should the pressure deviate more than 2.3 ft of water (1psi) from the manufacturer required pressure, the installed tube shall be removed from the existing pipe.

(5) Continue uninterrupted heating until the required curing temperature is achieved. Accurately measure temperatures at both ends of the CIPP. Initial cure is considered complete when exposed portions of the flexible tube pipe appear to be cured and the remote temperature sensors have achieved the external temperature recommended by the resin/catalyst system manufacturer.

d. Cool Down: Initiate controlled cool-down of the hardened pipe to a temperature below 110 F, in accordance with the manufacturer's recommended cure schedule. Take care in releasing the water column so that a vacuum does not develop that could damage newly-installed pipe. Do not discharge water hotter than 110 F into the sanitary sewer system.

e. Finished Pipe: Provide a finished CIPP which is continuous and as free as commercially practicable from visual defects such as foreign inclusions, dry spots, pinholes, lifts, delaminations, and areas which have not cured sufficiently.

f. Damage from Construction Debris: Contractor shall prevent construction debris including dirt, grease, rocks, sand, liner/tube material, resin clumps or cured pipe pieces from entering the sanitary sewer system. If necessary a suitable sand trap, weir or dam shall be constructed in the downstream manhole in such a manner that solids shall be trapped. The Contractor shall be responsible for the removal and disposal of any solids collected. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted.

g. If point repair is required after the liner has cured, use a tube segment to splice across the point repair. Overlap on each end shall be twice the diameter, or 12 inches, whichever is greater. Cure the segment using the same process specified for the original liner

3.6 SERVICE RECONNECTIONS

A. Complete service reconnections the same day of the cured-in-place process.

B. Reconnect services by excavation, man-entry or remote-operated cutting tool. Follow procedures for reconnecting sewer service specified in Section 02564 - Service Reconnection. Perform smoke testing on services reconnected by excavation before backfilling.

3.7 SEALING AT MANHOLES

a. Form tight seals between the CIPP and the manhole walls at pipe penetrations. Do not leave annular gaps. Seal annular spaces with ½-inch-diameter activated Oakum bands soaked in chemical sealant. Seal annular spaces greater than ½ inch with manhole wall repair material. Finish off seals with non-shrink grout or cementitious liner materials placed around the pipe opening from inside the manhole in a band at least 4 inches wide. Complete sealing procedures for each liner segment immediately after the liners are cured.

b Reshape and smooth the manhole invert as specified in Section 02613 - Manhole Rehabilitation.

3.8 POST-INSTALLATION TELEVISION INSPECTION

Make and submit video tape(s) showing completed work, including condition of restored connections. Refer to Section 02563 – Television Inspection.

3.9 FINAL CLEANUP

Upon completion of rehabilitation work and testing, clean and restore project area affected by the Work.

3.10 NON-CONFORMING WORK

a. If the thickness, flexural strength or flexural modulus of elasticity of the installed CIPP are less than 90 percent of the specified values, the product is considered unacceptable. Submit a proposed method of repair or replacement for review and approval by the Engineer. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

b. If it is determined that the resin utilized did not match the submitted and approved resin via the Infrared Spectrum Analysis, the product is considered unacceptable and non-conforming. Submit proof that the resin actually utilized meets the requirements of the specification or submit a method for replacement of the sewer segment liner for review and approval by the Engineer. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

c. For all instances, where CIPP is deemed unacceptable, other than thickness, flexural strength, and flexural modulus of elasticity, as described in this specification section, submit a proposed method of repair or replacement for review and approval by the Engineer. Work required to remedy non-conforming work shall be at no additional cost to the Owner.

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1.0 GENERAL

1.1 SCOPE

This section covers the rehabilitation and repair of deteriorated, leaking or structurally unsound sanitary sewer manholes needed to improve flow, prevent entrance of inflow or groundwater, prevent entrance of soil or debris and provide protection against corrosion caused by hydrogen sulfide gas. The type and extent of rehabilitation to each manhole are indicated on the contract drawings and bid form.

1.2 RELATED WORK

Division 2, Site Work.

(1) Grouting.

(2) Traffic Channelizing Devices

(3) Excavation, Trenching and Backfill for Utilities

(4) Sewer Flow Control

(5) Waste Material Disposal

1.3 REFERENCED STANDARDS

This specification references the following published specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

a. ASTM F 2414 Standard Practice for Sealing Sewer Manholes Using Chemical Grouting

b. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

c. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

d. ASTM C 1140 Standard Practice for Preparing and testing Specimens from Shotcrete Test Panels

e. ACI 302 Guide for Concrete Floors and Slab Construction

f. ACI 305R-99 Hot Weather Concreting

g. ACI 308 Practice for Curing Concrete

1.4 MEASUREMENT AND PAYMENT

All items of rehabilitation will be paid for at the unit price bid. Manhole preparation, materials, curing, testing and cleaning shall be considered incidental to the unit price bid. The unit price shall also include restoring the surrounding area to its original condition or better as well as providing before and after photographs. Unit prices:

a. Manhole Cementitious & Epoxy Wall Coating. Measurement and payment for the work covered by these items (including bench repair) shall be on a vertical foot basis to the nearest tenth of a foot, measured from the bottom of the frame to the top of the bench.

b. Manhole Casting Repair. Measurement and payment will be on a unit prices basis, per manhole, to include all surface preparation necessary for proper fit of seal.

c. Chemical Grouting of Voids/Cracks in Fiberglass Manholes- Measurement and payment will be on a unit prices basis, per manhole, to include all surface preparation, labor, equipment and material necessary for sealing all visible cracks and voids present in manhole walls.

1.5 SUBMITTALS

a. Submit manufacturer's material data and application and installation instruction for all products used including, but not limited to, surface preparation, hydraulic cements, quick-set mortars, specialized sealants, grouts, epoxy coating, manhole inserts, manhole frames and frame to manhole seals.

b. For Epoxy Wall Coating submit technical and performance information demonstrating compliance with the system and suitability for the intended use.

1.6 QUALIFICATIONS

a. Provide manufacturer documentation that the proposed manhole rehabilitation process (cementitious liner, application process & protective coatings) has a minimum five-year history for rehabilitation of sanitary sewer manholes on projects of similar size and scope.

b. Submit certification that the equipment to be used for applying the products has been manufactured or approved by the product manufacturer and the applicator personnel have been trained and certified for the proper use of the equipment.

c. All protective coatings and cementitious liners must be applied by a manufacturer Certified Applicator, with a minimum of two (2) years application experience with all products submitted, and in accordance with the manufacturer's recommendations and specifications. Provide documentation of manufacturer certification for handling, mixing and application of the products used along. Submit references for previous work experience.

d. For consideration as an equal product, submitted product must meet all minimum physical properties of the approved products. An independent third party testing laboratory must perform all testing results submitted for consideration. All equal products must be submitted to the Engineer for approval in writing prior to construction and must be installed by a manufacturer certified applicator.

1.7 FIELD LOCATION OF MANHOLES

a. Manhole locations and depths shown on plans are approximate and given for reference only. Contractor is responsible for field locating and uncovering all manholes. If the Contractor is unable to locate or properly identify a manhole, the Contractor shall immediately notify the Engineer in writing.

b. Manholes are located within the project limits, which are not scheduled for rehabilitation in this project. Properly identify manholes before starting work.

2.0 PRODUCTS

2.1 MATERIALS

a. Wall Cleaning Material. High-pressure potable water at 3,500-psi minimum. Cleaners: Detergent or muriatic acid capable of removing dirt, grease, oil and other matter which would interfere with bond of sealing material to wall shall not be used, refer to material manufacturer's recommendations.

b. Hydraulic Cements for Infiltration Control. Use a single component, dry, factory blended and packaged rapid-setting, hydraulic Portland cement product specifically formulated for stopping active water leaks and infiltration instantly under hydrostatic pressure in the manhole structure. Material shall set in approximately 60 to 90 seconds and does not contain chlorides, gypsum, or metallic particles. Material shall be compatible with the other coatings and lining systems. Material shall have the following minimum requirements:

Compressive Strength	ASTM C-109	24hr	2500 psi
Bond	ASTM C-321	24hr	80 psi

a. Quick Set Mortars/Patching Materials. Use a single component, dry, factory blended and packaged, fast-setting, non-metallic, shrink-compensated cement repair product to repair wide cracks, voids, holes or disintegrated mortar present in the manhole prior to lining. The material shall begin to stiffen in 8 to 15 minutes and will reach final set in 30 minutes. Material shall have the following minimum requirements:

Compressive Strength	ASTM C-109	24hr	2,500 psi min
		28 day	7,500 psi min
Shrinkage	ASTM C-596	0% at 90% R.H.	
Bond	ASTM C-321	28 day 150 psi	
Cement		Sulfate resistant	
Density, when applied		105 +/- pcf	

c. Cementitious Base Coating. Cementitious coating materials shall be specifically designed for the rehabilitation of manholes and other related wastewater structures. Coating materials shall be a fiber reinforced, corrosion resistant, high build mortar material. Coating material shall be mixed with water per manufacturer's written specifications and applied using equipment specifically designed for low-pressure spray application of cement mortars. Centrifugal Spin Casting may be used as an acceptable option for applying the cementitious material. All cement coating materials must be capable of a placement thickness of ½" to 2" in a one pass monolithic application. Material shall be compatible with the selected epoxy coating. Material shall be Quadex, Strong-Seal-MS-2C, Reliner MSP, Permacast-MS-10,000, Emaco S88-CA/RE-066, Tnemec Perma-Shield, Mainstay ML-72 by Madewell or approved equal. Material shall have the following minimum requirements:

Compressive Strength	ASTM C-109	28 day > 8,000 psi
Flexural Strength	ASTM C-78	28 day > 1400 psi
Shrinkage	ASTM-596	0% at 90% R.H.

d. Epoxy Coating. Epoxy coating system shall be 100% solids, solvent less, two-component high build epoxy resin system. Materials shall be Raven 405, Acro 4582, SpectraSheild, Futura-Thane 5040, Tnemec Perma-Glaze 435, and Mainstay DS-4 by Madewell or approved equal. Material shall have the following minimum requirements:

Solids Content (vol%)		100
Compressive Strength, psi	ASTM D579	12,000
Tensile Strength, psi	ASTM D638	7,600
Bond Strength-Concrete		> Tensile Strength of Concrete

e. Iron Frame. Provide cast iron conforming to ASTM A-48 for class 20, gray cast iron. Furnish frames that are clean, perfect, and free from sand or blowholes or other defects. Holes in the cover must be clean and free from plugs. Machine bearing surfaces of manhole frames and covers to provide even bearing in any position in which the manhole cover is seated on the frame. Cast the word "SANITARY" on each manhole cover if required.

f. Chemical Grout: Use if active water infiltration is persistent or proves difficult to stop. Chemical grout materials and application shall comply with ASTM F 2414.

3.0 EXECUTION

3.1 GENERAL

a. During the rehabilitation of manholes, the sanitary sewer system should remain in service as much as is practical. The contractor shall use bypass lines and temporary sewer plugs to block the upstream flow when necessary to complete the work. In the event of accidental spill or overflow, immediately notify the City's Operator, stop the overflow, promptly notify the Engineer and take action to clean up and disinfect spillage. Sewer bypassing shall be conducted in accordance with Section 02561-Sewer Flow Control.

b. Provide barricades, warning lights and signs for manhole rehabilitation and entrance. Comply with Section 1571-Traffic Channelizing Devices.

c. Do not allow soil, sand, debris or runoff to enter sewer system. Place covers over sewer inverts to prevent material from entering sewer lines.

d. Excavate in accordance with Section 02220- Excavation, Trenching and Backfill for Utilities.

e. Areas of manholes that are found to be structurally damaged and in need of repair beyond the scope of this specification shall be brought to the attention of the Engineer. A suitable repair method shall be developed for each area and submitted to the Engineer for review prior to commencing the repair.

3.2 MANHOLE CLEANING AND PREPARATION

a. The Contractor shall clean debris from manholes to provide a clean flow line and/or remove surcharge conditions from that manhole. Remove foreign, loose and unsound concrete and masonry material from the interior surfaces of the manhole by means of **high-pressure (3,500 psi minimum) water spray**. Loose, unsound, and protruding concrete and masonry material not able to be removed by high-pressure water spray may require the use of mason's or mechanical tools for removal.

b. If required, use detergent, muriatic acid, antibacterial agent or other chemicals to remove grease, oil and other contaminants that would prevent good bond between the existing manhole interior surface and the liner material.

c. Remove all loose material after all preparations and cleaning has been completed. Properly dispose of any deleterious materials removed from the manhole according to Section 02227 – Waste Material Disposal.

d. Remove brick steps and cast iron steps prior to wall lining.

e. Active hydrostatic leaks (infiltration) shall be stopped using the rapid-setting hydraulic cements. Apply it in dry form directly to the leak area or mixed with potable water to a soft putty consistency for larger leaks. For very active hydrostatic leaks (infiltration) drill weep holes at bottom of manhole walls to relieve hydrostatic pressure. Plug pressure-relief holes after leaks are stopped using hydraulic cement materials. Lead wool may also be used to plug large leaks.

f. Clean and prepare any exposed reinforcement steel, and apply and a cure bonding compound, in accordance with the product manufacturer's instructions and recommendations.

g. Repair cracks, voids, holes and disintegrated mortar with quick-set mortars/patching material, in accordance with the product manufacturer's instructions and recommendations.

h. Reshape and route the manhole inverts at or near the flow line elevation before wall sealing work. Remove obstructions and loose materials from benches prior to shaping inverts. Make finished benches and inverts in to smooth U-shaped inverts having minimum depths of one-half (½) the pipe diameter and channel it across the manhole floor. The channel shall be free of defects, which would allow accumulation of debris or block flow. Use a high strength, quick-set mortars/patching material for repair. Control or divert flow to allow sufficient setting time for material used.

3.3 MANHOLE WALL SEALING

a. After active leaks have been stopped, clean and prepare wall for application of selected liner material.

b. Properly apply a 1-inch (1”) minimum thickness uniform cementitious coating for the interior walls, cone, bench, and invert.

c. Prevent foreign material from entering adjoining pipes. Remove droppings of foreign and wall sealant materials before they harden on the bottom of the manhole.

d. Strictly follow product manufacturers’ published instructions and recommendations for surface preparation, application and proportioning.

e. Contractor shall be responsible for mixing of the materials, applying and finishing of the rehabilitation system.

f. Take proper precautions to minimize effect from hot weather, sunlight, freezing and air movement. Avoid any potential problems resulting from shrinkage cracking. Follow ACI 302, ACI 308 and ACI 305 guidelines to ensure hat problems caused by decreased bleeding are minimized.

3.4 COATING MATERIAL SAMPLING

Prepare samples according to ASTM C-1140 or as specified by Engineer for testing of compressive strength. Make one panel sample from each day’s work. Label the panel with the date, location, project, and product batch numbers located on each cement material bag. Testing will be conducted according to Section 01410 – Laboratory Services and ASTM C-1140. Test the cement material for 7 and 28-day periods. One sample shall be retained for further instructions should the others fail to meet the 28-day requirement.

3.5 MANHOLE FRAME REPAIR

Adjust and center manhole frames and covers found above or below grade and reset/replace loose or broken frames if required. Combine pre-cast concrete adjustment rings so that the elevation of the installed frame and cover extends six (6) inches above the natural ground in unpaved areas. In paved areas, set flush and smooth with pavement grades. An approved sealant shall be applied between the top adjustment ring and the manhole frame. No less than two (2) beads shall be applied ½-inch wide and ¾-inch high. An approved manhole cementitious lining material shall be applied between the rings and no less than one-inch (1") of lining material shall be applied to the inside and outside face of the adjustment rings.

3.6 PROTECTIVE COATINGS

Application of protective coating:

a. Products. Apply an epoxy coating to the interior walls and ceiling. The coating system shall be manufactured by Raven 405, Acro 4582, SpectraSheild, Futura-Thane 5040, Tnemec Perma-Glaze 435, and Mainstay DS-4 by Madewell or approved equal.

b. Weather. Do not conduct coating work under unfavorable weather conditions, unless work is well protected and specific approval is obtained from the Engineer. Do not paint when the ambient temperature is below 50°F (unless additional drying time as recommended by the paint manufacturer is allowed), when the surface temperature is within 5°F of the dew point, or when humidity is above that recommended by the coating manufacturer.

c. Application. Procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment. Apply coating to produce an even film of uniform thickness giving special attention to edges, corners, crevices and joints.

(1) Installation of epoxy coating shall not begin until concrete substrate or any cementitious coating has properly cured in accordance with manufacturer recommendations.

(2) The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.

(3) Comply with manufacturers printed recommendations for thinning, mixing, handling and application of products used. Keep coating materials thoroughly stirred, strained and of uniform consistency during application.

d. Thickness. Specified surfaces shall be coated by spray application of moisture tolerant, solvent-free, 100% solids, epoxy protective coating as further described herein. Spray application shall be to the following average wet film thicknesses:

Concrete, New/Smooth:	100 mils average thickness with a 80 mils minimum thickness
Concrete, Rough:	125 mils average thickness, with a 100 mils minimum thickness.
Masonry/Brick:	125-150 mils average with a 100-125 mils minimum thickness.
Steel:	25-80 mils average thickness for immersion, 16-40 mils average thickness for atmospheric, splash and spill exposure; also profile dependent.

e. Curing. Comply with recommendations of the paint manufacturer in regard to drying time for each coat, technique of spray application, ventilation, paint thinning, and safety precautions. The Contractor must fully inform all members of his field crew of these recommendations and allow complete curing before placing the coating system into service.

f. Testing and Inspection

(1) Surface preparations, coating applications and repairs are subject to inspection by the Engineer.

(i) Give sufficient notice in advance (minimum 24 hours) of coating applications so that the Engineer can perform the following inspections:

(ii) Examination and approval of surface preparation prior to any coating.

(iii) Examination and approval of each coat prior to application of the next coat.

(iv) Inspection of the completed coating for runs, overspray, roughness, and any evidence of improper application.

(v) Direction or observation of testing.

(2) Any re-inspection cost will be charged to the Contractor at Seventy-Five Dollars ($75.00) per hour including travel time.

(3) During application a wet film thickness gage meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

(4) After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment. Surfaces shall first be dried, an induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.

(5) Measurement of bond strength of the protective coating may be required by the Engineer if areas are suspect of having poor adhesion. Bond strength will be measured in accordance with ASTM D4541. Any areas detected to have inadequate bond strength shall be evaluated by the Project Engineer. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Applicator in strict accordance with manufacturer's recommendations.

(6) A final visual coating inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Applicator.

g. Return to Service. The municipal sewer system may be put back into non-severe operational service as soon as the final coating Inspection has taken place. However, for severe corrosion duty such as high concentrations of acids, bases or solvents, 3 to 7 days and/or force cure by heat induction to the coated surfaces may be necessary prior to returning to service. Consult coating manufacturer for further details.

3.7 FIELD QUALITY CONTROL

Inform the Engineer immediately if materials being used are not producing required results or need modification. The Engineer has the right to stop the use of any material at any time.

3.8 TESTING OF SANITARY MANHOLES

a. After construction or rehabilitation all manholes receiving full depth lining shall be tested for water tightness using hydrostatic or vacuum testing procedures. All newly constructed manholes shall also be tested. Test shall be performed after allowing time for the proper curing of the liner. Any visible water leakage shall be repaired regardless of testing results.

b. Plug influent and effluent lines, including service lines, with suitably-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendation. Place plugs a minimum of six-inches (6") outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled.

c. Vacuum testing:

(1) Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to the recommended maximum inflation pressure; do not over-inflate.

(2) Evacuate manhole with vacuum pump to 10-inches (10") mercury (Hg.) disconnect pump, and monitor vacuum for the time period specified in the following table:

VACUUM TEST TIME TABLE

DIAMETER IN INCHES			
Depth-Feet	48"	60"	72"
4	10 sec	13 sec	16 sec
8	20 sec	26 sec	32 sec
12	30 sec	39 sec	48 sec
16	40 sec	52 sec	64 sec
20	50 sec	65 sec	80 sec
24	60 sec	78 sec	96 sec
*	05 sec	6.5 sec	8.0 sec

* Add "T" times for each additional two-foot (2') depth.
The values listed above have been extrapolated from ASTM C924-85

(3) If the drop in vacuum exceeds one-inches (1") mercury (Hg.) over the specified time period tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

d. Hydrostatic Testing:

(1) Hydrostatic exfiltration testing shall be performed as follows: lines coming into the manhole shall be sealed with an internal plug. Fill manhole with water to top of frame. Add water over a 24 hour period to compensate for absorption and evaporation losses. After 24 hours, refill to top of frame and observe for loss of water. The maximum allowable leakage shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.

The following chart calculates the drop in inches per fifteen (15) minute time span based on the requirement of 0.025 gal / vertical foot depth / inside diameter of manhole / hour of test.

Four (4) Foot Diameter Manhole

Depth of Manhole Vert. Feet	Maximum Allowable Loss Gallons / Hour	Maximum Drop 32" Casting Inches / 15 Minutes	Maximum Drop 24" Casting Inches / 15 Minutes
0 - 4	0.4	1/32 in	1/16 in
5	0.5	1/32 in	1/16 in
6	0.6	1/32 in	3/32 in
7	0.7	1/16 in	3/32 in
8	0.8	1/16 in	3/32 in
9	0.9	1/16 in	1/8 in
10	1	1/16 in	1/8 in
11	1.1	3/32 in	1/8 in
12	1.2	3/32 in	5/32 in
13	1.3	3/32 in	5/32 in
14	1.4	3/32 in	3/16 in
15	1.5	1/8 in	3/16 in
16	1.6	1/8 in	7/32 in
17	1.7	1/8 in	7/32 in
18	1.8	1/8 in	7/32 in
19	1.9	1/8 in	1/4 in
20	2	1/8 in	1/4 in
21	2.1	5/32 in	9/32 in
22	2.2	5/32 in	9/32 in
23	2.3	5/32 in	5/16 in
24	2.4	5/32 in	5/16 in
25	2.5	3/16 in	11/32 in

Five (5) Foot Diameter Manhole

Depth of Manhole Vert. Feet	Maximum Allowable Loss Gallons / Hour	Maximum Drop 32" Casting Inches / 15 Minutes	Maximum Drop 24" Casting Inches / 15 Minutes
0 - 4	0.5	1/32 in	1/16 in
5	0.625	1/32 in	3/32 in
6	0.75	1/16 in	3/32 in
7	0.875	1/16 in	1/8 in
8	1	1/16 in	1/8 in
9	1.125	3/32 in	5/32 in
10	1.25	3/32 in	5/32 in
11	1.375	3/32 in	3/16 in
12	1.5	1/8 in	3/16 in
13	1.625	1/8 in	7/32 in
14	1.75	1/8 in	7/32 in
15	1.875	1/8 in	1/4 in
16	2	1/8 in	1/4 in
17	2.125	5/32 in	9/32 in
18	2.25	5/32 in	9/32 in
19	2.375	5/32 in	5/16 in
20	2.5	3/16 in	11/32 in
21	2.625	3/16 in	11/32 in
22	2.75	3/16 in	3/8 in
23	2.875	7/32 in	3/8 in
24	3	7/32 in	3/8 in
25	3.125	7/32 in	13/32 in

(2) If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3.9 FINAL ACCEPTANCE

a. At completion of manhole rehabilitation, assist Engineer in verifying installation of minimum coating thickness of cementitious liner. Test several points on manhole walls. Repair verification points prior to final acceptance for payment.

b. After all rehabilitation has been completed; the Contractor in the presence of the Engineer's Representative shall visually inspect the work for the elimination of active inflow/infiltration. In addition, a vacuum or hydrostatic exfiltration test shall be performed as stated in Section 3.8. All results of the manholes tests shall be subject to the approval by the Engineer. The Contractor shall also provide a before and after photograph of each manhole rehabilitated as part of the project. The costs of photographs shall be considered incidental to the cost of the work.

c. At the request of the Owner, the Contractor may be required within one (1) year to visually inspect the manholes that were rehabilitated. The Contractor at no additional expense to the Owner shall redo any work that has become defective.

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1.0 GENERAL

1.1 SCOPE

This section provides for repairing street, highway, and service drive and other pavements which have been cut, broken, or otherwise damaged during construction.

1.2 RELATED WORK

a. Division 2, Site Work.

(1) Limestone Base

(2) Asphaltic Concrete Paving

(3) Portland Cement Concrete Paving

b. Division 16, Electrical. Underground Duct Banks

1.3 GUARANTEE

Workmanship and materials required in this section must be specifically covered in the guarantee of the work as stated in the General Conditions.

1.4 MEASUREMENT AND PAYMENT

Payment shall be made on a per square yard basis for pavement repair required for the construction of this project.

2.0 PRODUCTS

a. Flexible Base. Obtain crushed limestone material from an approved source and provide in accordance with the section on Limestone Base.

b. Pavement.

(1) Provide concrete pavement in accordance with the section on Portland Cement Concrete Paving.

(2) Furnish hot-mix asphaltic concrete paving in accordance with the section on Asphaltic Concrete Paving.

c. Curbs and Gutters. Furnish concrete curbs and gutters in accordance with the section on Concrete Curbs.

3.0 EXECUTION

3.1 PARKING AREAS, DRIVEWAYS, SERVICE DRIVES, CURBS, AND SIDEWALKS

Where concrete, asphalt gravel and shell parking areas, driveways, service drives, sidewalks and curbs and gutters are cut or damaged, replace them with material similar to the existing.

3.2 STREET PAVEMENTS

Repair street pavements cut or damaged with new material. Use new flexible base material, bituminous prime coat, and asphaltic concrete or Portland cement concrete surface.

3.3 CONCRETE PAVEMENT

a. Where construction requires cutting a concrete or concrete base street, cut the pavement two-feet (2') wider than the width of trench needed to install the sewer. Leave a minimum of one-foot (1') of undisturbed subgrade on each side of the trench to support the slab when replaced. Do not break concrete pavement or base with a drop hammer.

b. After the trench has been backfilled, compacted and approved, fine grade the area on which the concrete slab is to be placed.

3.4 CONCRETE BASE WITH ASPHALT PAVING

Where the pavement consists of concrete base with asphaltic surfacing, surface the new concrete base with at least two-inches (2") of hot-mix asphaltic concrete surfacing mixed and placed in accordance with the section on Asphaltic Concrete Paving.

3.5 ASPHALTIC CONCRETE PAVEMENT

a. Where the installation requires cutting an existing flexible base, and the proposal contains an item "Salvaging Flexible Base" remove excavated base and bituminous surface material and store in a designated location. Take all necessary precautions to prevent mixing foreign materials with the base material during the entire salvaging operation.

b. After the trench has been backfilled according to the requirements of these specifications, replace the salvaged material in layers not more than six-inches (6") deep, loose measurement. Compact each layer by wetting and rolling with pneumatic tires until no further settlement is noticeable.

c. Where additional or new base material is required and placing is authorized, furnish the new material in accordance with the type of material specified in the proposal for flexible base replacement.

d. Where existing flexible base has been surfaced with bitumen, the base replaced under this section will be surfaced with hot-mix asphaltic concrete paving in accordance with the provisions of the section on Asphaltic Concrete Paving.

1.0 GENERAL

1.1 SCOPE

This specification defines the approved methods and materials for the rehabilitation of existing gravity sewer lines by the Pipe Bursting/Crushing process. Pipe bursting consists of the reconstruction of an existing sanitary sewer line by insertion of a new liner pipe within the bore of the existing pipe, enlarged by breaking and expanding the old pipe.

1.2 RELATED WORK

a. Division 2, Site Work

(1) Excavation, Trenching and Backfilling for Utilities

(2) Cement Sand Backfill

(3) Trench Safety System

(4) Sanitary Sewers

(5) Sewer Flow Control

(6) Television Inspection

(7) Removal and Replacement of Sanitary Sewers

(8) Well Point System

(9) Point Repairs and Obstruction Removals to Sanitary Sewers

1.3 DEFINITION

The Pipe Bursting process is defined as the reconstruction of gravity sewer pipe by installing an approved pipe material, by means of one of the pre-approved processes set forth in this specification. Essentially the process involves the use of a hydraulic "moling" device or pneumatic hammer, suitable sized to break out the old pipe or using a modified boring "knife" with a flared plug that implodes and crushes the existing sewer pipe. Forward progress of the "mole" or the "knife" may be aided by the use of a hydraulic winch, as specified in the patented process. No other Pipe Bursting systems other than those set forth in Section 2.1(a) of these specifications is acceptable.

1.4 REFERENCED STANDARDS

This specification references the following published ASTM specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

a. ASTM D 2657 – Practice for Heat-Joining Polyolefin Pipe and Fittings

b. ASTM D 543 - Test Method for Resistance of Plastics to Chemical Reagents.

c. ASTM F 585 – Standard Practice for Insertion of Flexible Polyethylene Pipe Into Existing Sewers.

d. ASTM D 1248 –Polyethylene Plastics Molding and Extrusion Materials

e. ASTM F 714- Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

f. ASTM D 3350- Polyethylene Plastics Pipe and Fittings Material

1.5 MEASUREMENT AND PAYMENT

a. Measurement for installing replacement pipe using pipe-bursting method is on a linear foot basis for installed liner pipe, measured from centerline of upstream manhole to centerline of downstream manhole. Depth range for payment is based on greatest depth measured at manholes from natural ground level to flow line of sanitary sewer for each pipe segment.

b. The unit price bid for rehabilitating the sewer main in the manner described shall be full compensation for all materials, labor, equipment, and incidentals required to install the replacement pipe. The cost of insertion or access pits, clamp installation, testing of liner and service connections, embedment (bedding, haunching and initial backfill), sealing liner pipe at manholes, grouting annular space, building up, shaping and reworking manhole inverts and benches, pre-installation and post-installation cleaning and television inspection of completed work are included in the pipe bursting unit price and are not paid separately.

c. Installation and payment for service connections restored by excavation and reconnecting with approved fittings shall be in accordance with Section 02567- Removal and Replacement of Sanitary Sewers.

d. All other payments shall be made as per bid items. No payment shall be made for work considered incidental or complimentary to a pay item already in bid item. The Contractor shall clarify, for his own benefit, all work required for any item, incidental or otherwise, prior to bidding.

1.6 CONTRACTOR QUALIFICATIONS AND REQUIREMENTS

a. The Contractor shall be certified by the pipe bursting system manufacturer as a fully trained user of the pipe bursting system and equipment. At all times, only trained personnel shall at operate the pipe bursting system.

b. The Engineer may require that the Contractor provide certificates of training for any employee directly involved in the supervision or operation of the pipe bursting system.

1.7 SUBMITTALS

a. 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. A Certificate of "Compliance with Specification" shall be furnished for all materials to be supplied. Include independent testing laboratory test results certifying that polyethylene pipe conforms to ASTM D 1248 and ASTM D 3350.

b. Submit television inspection footage as specified in Section 02563 – Television Inspection.

c. Submit manufacture’s product data on clamps.

1.8 PERFORMANCE REQUIREMENT

a. Maintain sewage flow by diversion pumping or other method approved by Engineer.

b. Clear existing sewers of debris, obstructions and other foreign material and make point repairs to existing sewers as specified in Section 02565-Point Repairs and Obstruction Removals to Sanitary Sewers.

c. Perform pipe bursting according to this Section.

d. Shape and reform manhole inverts as specified in Section 02613-Manhole Rehabilitation.

e. Test lines as specified in Section 02560 – Sanitary Sewers.

f. Inspect lines by remote television as specified in Section 02563 – Television Inspection.

2.0 PRODUCTS

2.1 PIPE BURSTING SYSTEMS

a. The following pipe bursting systems are acceptable when installed by a licensed Contractor

(1) Miller Pipeline Corporation (Xpandit System) Indianapolis, Indiana

(2) Trenchless Replacement Systems (TRS), Calgary, Canada

(3) TT Technologies (Grundocrack Pipe Replacement System) Aurora, Illinois

(4) Eliminator (TTI)

(5) TTS Northwest Company

2.2 MANUFACTURERS

Provide polyethylene liner pipes manufactured by Chevron/Phillips/ Drisco Plex, Plexaco, or pre-approved equal.

2.3 PIPE

a. Solid Wall Polyethylene Pipe (HDPE)

(1) The replacement pipe shall be manufactured from a high density high molecular weight polyethylene resin which conforms to ASTM D-1248 (Specification for Polyethylene Plastics Molding and Extrusion Materials) and meets the requirements for Type III, Class A, Grade P34, Category 5, and has a PPI rating of PE 3408, when compounded. The pipe produced from this resin shall have a minimum cell classification of 345434D or E (inner wall shall be light in color) under ASTM D3350 (Specification for Polyethylene Plastic Pipe and Fittings Materials).

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.

A Certificate of "Compliance with Specification" shall be furnished for all materials to be supplied.

(2) The Standard Dimension Ration (SDR) Classification for various depths shall be as follows:

Minimum wall thickness of HDPE pipe shall be SDR 19 where pipe depth is less than 16 feet and SDR 17 where pipe depth is greater than 16 feet. Depth shall be measured from the upstream and downstream rim to the invert of the existing sewer in the pipe segment to be replaced. The SDR shall be selected for the deeper of the two manholes for a given pipe segment.

2.4 CLAMP AND GASKETS

a. Where excavations for the insertion of the replacement pipe are made between two manholes, the ends of the HDPE will be cut smooth and square to the axis, so that it can be joined in a workman like manner such that both ends meet and touch uniformly and continuously. An all stainless steel (including bolts and lugs) full circle universal clamp coupling with a ¼ inch minimum thickness grid type gasket shall be used, JCM Industries Type 108 of equal. Clamps shall be selected to fit the outside diameter of the replacement pipe. Minimum clamp widths shall be provided in accordance with Table III.

Table III, Minimum ClampWidths

Liner Pipe Outside Diameter (Inches)	Minimum Clamp Length (Inches)
8.625	18
10.750 or greater	30

2.5 BEDDING

In all excavations where the replacement pipe is uncovered (i.e. insertion pits, sag elimination pits), Class "AA" bedding as stated in Section 02220-Excavation, Trenching and Backfilling for Utilities, shall be installed. Visual inspection is required for approval of bedding before backfill is completed.

3.0 EXECUTION

3.1 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 preparation/steps, unless approved otherwise by the Engineer.

a. Safety. The Contractor shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space. It shall be the contractor's responsibility to comply with OSHA Standards and Regulations pertaining to all aspects of the work.

b. Pre-installation Television Inspection. It shall be the responsibility of the Contractor to review videotapes of the sewer pipe immediately before the pipe bursting to assure that the existing pipe conditions are acceptable for pipe bursting. This inspection as well as the video (TV) inspection after the installation, shall be incidental to the installation of the replacement pipe.

c. Diversion Pumping/Sewer Flow Control. The Contractor, when and where required, shall provide diversion for the main sewer flow around the pipe to be replaced, or into adjacent sanitary sewers, if available. The pumps and the bypass lines shall be of adequate capacity and size to handle all flows without sewage backup to private property and be in accordance with Section 02561-Sewer Flow Control. The Contractor shall be solely responsible for clean-up, repair, property damage costs and claims resulting from failure of the diversion system.

d. Line Obstructions. If Pre-Installation video (TV) review reveals an obstruction in the existing sewer (heavy solids, dropped joints, protruding service taps or collapsed pipe) which will prevent completion of the pipe bursting process, and that cannot be removed by conventional sewer cleaning equipment, then an Obstruction Removal shall be made by the Contractor, with the approval of the Engineer.

3.2 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 in installation procedures shall require submittal of revised procedures and acceptance by the Engineer.

a. Pipe Jointing.

(1) Sections of polyethylene replacement pipe shall be assembled and joined on the job site above the ground. Jointing shall be accomplished by the heating and butt-fusion method in strict conformance with the manufacturer's printed instruction.

(2) The butt-fusion method for pipe jointing 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.

(3) All joints shall be made available for inspection by the Engineer before insertion. The replacement pipe shall be joined on the site in appropriate working lengths near the insertion pit.

b. Insertion or Access Pits.

(1) 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. Where possible locations of damaged pipe or point repairs are to be used for insertion pits.

(2) The cost for diversion pumping required around an insertion pit, from a manhole upstream to a manhole downstream, shall be incidental.

(3) Perform excavation and backfill in accordance with Section 02220- Excavation, Trenching and Backfilling.

(4) Provide any necessary dewatering system as specified in Section 02600- Well Point System.

(5) Excavation for insertion pits shall not be paid for separately but shall be included in the unit price bid for price bursting.

(6) The approximate location of existing utilities are given for reference only. Before commencing the work on this contract, contact various utility providers and verify by field investigation the actual locations of all utility facilities within and adjacent to the limits of the work that may be affected by the work. Conflicts which result due to the negligence by the contractor to locate, horizontally and vertically, existing utilities which are shown on the construction drawings, or which the contractor has been given notice or has knowledge of, shall be the sole responsibility of the contractor. The cost of remedial work, removal of portions of the work, utility repairs, interruption of service, temporary service or extensive design changes occasioned by the failure of the contractor to verify the location of existing utilities as described above shall be borne by the contractor.

c. Process Limitations.

(1) Though the installation process may be licensed or proprietary in nature, the Contractor SHALL NOT change any material, thickness, design values or procedures matters stated or approved in the submittals, without the Engineer's prior knowledge and preapproval. 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.

(2) All sewer rehabilitation by pipe bursting methods are being considered structurally equal processes as far as "end product" required by the City. 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. It shall be the responsibility of the Contractor to comply with the specifications in full without any request for any change after the award of the contract. The City reserves the right to accept, reject, or modify any later requests for change at no additional cost to the City of even to the extent of asking credit for the City.

(3) It is the Contractor's responsibility to examine the proposed line segment and notify the Engineer if conditions exist that could cause problems with the pipe bursting method. These could include nearby services that could be damaged by the operations, roads, existing slabs that could be damaged, or less than acceptable depth of cover.

(4) Any damage caused to nearby services, roads, slabs, etc. by the pipe bursting process shall be the responsibility of the Contractor to repair to the satisfaction of the City at no cost to the City.

d. Pulling Liner

(1) After completing insertion pit excavation, remove top of existing sanitary sewer line down to the spring line. Connect power winch cable to end of liner by use of suitable pulling head equal to outside diameter of liner pipe. Secure pulling head to liner and attach to power winch cable so that liner can be satisfactorily fed and pulled through the existing sanitary sewer line. Prevent ragged edges of existing pipe from scarring liner pipe. Follow insertion procedures in ASTM F 585.

(2) Do not allow sand, dirt or other debris to enter the liner.

(3) The maximum length of liner assembled above ground and pulled at one time shall not exceed the maximum length recommended by the manufacturer’s printed instructions.

(4) Limit pulling force exerted on liner to that specified by the manufacturer. Provide a suitable pulling force measuring device connected to the winch or pulling mechanism.

(5) Any alternative insertion techniques (pushing or pushing and pulling) are subject to approval by the Engineers and must be obtained in writing before proceeding. Any portions damaged during insertion shall be cut out, removed and replaced.

e. Clamp Installation

(1) Where excavations for liner pipe insertion are made between two (2) manholes, cut ends of liner pipe smooth, square to pipe axis. Join liner pipes with appropriately sized stainless steel universal clamp couplings. Butt together gaps between ends of liner pipe with space between ends but not exceeding one inch.

(2) Install cement-stabilized sand bedding in accordance with Section 02221- Cement-Sand Backfill and extend bedding 12 inches above the clamp/liner pipe.

f. Finished Pipe.

(1) The installed replacement pipe shall be continuous over the entire length of each pipe segment noted on the plans and 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 form 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. 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.

(2) Low Pressure air test: Perform before sealing liner in place at manholes and before making service reconnections to liner. The purpose of this test is to check the integrity of the joints that have been made and to verify that inserting it into the sanitary sewer has not damaged the replacement pipe.

(3) Service lateral connection test: After all service laterals have been completed for a particular sewer section, verify integrity of re-connection at points where they join liners and existing service lines by performing smoke test.

(4) Refer to Section 02560 – Sanitary Sewers for testing procedures.

3.3 SEALING AND BENCHES IN MANHOLE

a. Allow the liner pipe to normalize to ambient temperature and recover from imposed stretch before cutting to fit between manholes, sealing at manholes and shaping manhole inverts. Allow at least 8 hours for normalization of liners prior to service reconnections.

b. Cut liner so it extends four (4") inches into manholes. Make smooth, vertical cuts and slope areas over top of exposed liner using non-shrink grout. 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.

c. The replacement pipe shall be installed with a tight fitting seal with the existing or new manhole. Water stop gaskets or approved equal shall be used to form a watertight seal around the pipe.

d. Finish seal liner pipe to host pipe with non-shrink grout around annular space from inside manhole. Apply grout in a band at least six (6") inches wide.

e. The replacement pipe in the manhole shall be sealed as specified above before proceeding on to the next manhole section and all manholes shall be individually inspected for replacement pipe cut-offs, benches and sealing works.

f. Reshape and smooth manhole inverts as specified in Section 02613- Manhole Rehabilitation.

3.4 TESTING OF THE REPLACEMENT PIPE

a. All costs for testing the replacement pipe by a pressure method will be incidental to the installation. Two types of testing shall be required after the replacement pie has been installed in the existing sanitary sewer main. The first is a low pressure air test of the replacement pipe before it has been sealed in place at the manholes, and before any service reconnections have been made. The purpose of this test is to check the integrity of the joints that have been made and to verify that the replacement pipe has not been damaged by inserting it into the sanitary sewer. The second test is service lateral connection test. The test shall be done after all service laterals have been made for a particular pipe segment between adjacent manholes. This test shall verify the integrity of the connection at the point where it joins the replacement pipe and existing service line.

b. Low Pressure Air Test Procedure: After a manhole-to-manhole section of sanitary sewer main has been pipe bursted and prior to any service lines being connected to the replacement pipe, the pipe shall be plugged at each manhole with pneumatic plugs. The design of the plugs shall be such that they will hold against the test pressure without requiring external blocking or bracing. One of the plugs shall have three air hose connections: one for the inflation of the plug, one for reading the air pressure in the sealed line, and one for introducing air into the sealed line.

c. Low pressure air shall then be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure resulting from any groundwater that may be over the pipe. At least two minutes shall elapse to allow the pressure to stabilize.

3.5 POST TELEVISING OF COMPLETED SECTIONS

a. The Contractor shall provide the City a color videotape taken by a 360 degree radial view camera for close up view showing the completed work, including the condition of the restored taps in accordance with Section 02563- Television Inspection.

b. Upon completion of the installation work and testing, the Contractor shall restore/clear the project area affected by his operations. No trash, rubbish, etc, shall be stored at any site, whether the work is in progress or not.

c. Post televising will be paid at the unit price bid and must show all proposed improvements including, but not limited to, pipe bursting, service reconnections, and manhole rehabilitation.

4.0 PUBLIC NOTIFICATION

The Contractor shall place door hangers at each building or residence that may be affected by the work of this contract. The door hangers shall inform the occupants of the type of work being done and the expected duration of the work. The door hanger shall give the contractor's name, address, a 24-hour phone number, and the name of a contact. The door hangers shall be placed a minimum of 48 hours and not more than 72 hours before the work is to commence in the affected area.

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1.0 GENERAL

1.1 SCOPE

This section covers grouting of pump, motor, and equipment baseplates and column baseplates. Epoxy Grout and grout applied as concrete fill in structures or for use in concrete masonry are also covered under this section.

1.2 REFERENCES

a. CRD C 621 – Corps of Engineers Specification for Non-shrink Grout.

b. ASTM C 109 – Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm. cube specimens)

c. ASTM C 230 – Specification for Flow Table for use in Tests of Hydraulic Cement.

d. ASTM C 1107 – Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non-shrink)

1.3 SUBMITTALS

a. Conform to Section 01330 – Submittal Procedures.

b. Quality Control:

(1) The Contractor shall submit manufacturer's literature certifying compliance with the specified properties for Class I and II grouts.

(2) The Contractor shall submit manufacturer's literature containing instruction and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

c. The Contractor shall submit manufacturer's written warranty as specified.

1.4 QUALITY ASSURANCE

a. Field Tests:

(1) Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. The specimens will be made by the Engineer or its representative.

(2) Compression tests and fabrication of specimens for non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.

(3) Grout already placed which fails to meet the requirements of these Specifications is subject to removal and replacement no additional cost to the Owner.

(4) The cost of laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. The Contractor shall supply materials necessary for fabricating the test specimens.

b. Warranty:

(1) Provide one-year warranty for work provided under this Section.

(2) Manufacturer's warranty shall not contain a disclaimer limiting responsibility to only the purchase price of products or materials furnished.

(3) Manufacturer shall warrant participation with Contractor in replacing or repairing grout found to be defective due to faulty materials, as determined by industry standard test methods.

2.0 MATERIALS

a. Nonshrinking Grout. Product and Manufacturer: Provide one of the following:

(1) Set Grout, as manufactured by Master Builders, Inc.

(2) NBEC Grout, as manufactured by Five Star Products, Inc.

(3) NS Grout, as manufactured by the Euclid Chemical Company.

(4) Sikagrout 212, as manufactured by Sika Corporation

(5) Or approved equal according to Corps. of Engineers Specification CRD-C62l.

b. Epoxy Grout.

Adhesive	Sika "Sikadur Hi-Mod" or "Sikadur Hi-Mod Gel" or approved equal.
Aggregate	Suitable for application as recommended by the epoxy grout manufacturer.

c. Grout for Concrete Fill. Portland Type 1 Cement and Aggregate according to ASTM C-476.

d. Water. Clean and free from all deleterious substances.

2.1 NONSHRINKING GROUT

a. Application - The following is a listing of typical applications and the corresponding type of non-shrink grout which is to be used. Unless indicated otherwise, grouts shall be provided as listed below whether or not called for on the Drawings.

Application:	Type of Grout
Structural member base plates	Non-shrink Class II
Storage tanks and other equipment	Non-shrink Class I
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-shrink Class II (Class I where placement time exceeds 15 minutes)
Under precast concrete elements	Non-shrink Class I
Toppings and concrete fill less than 3 inches thick	Non-shrink Class I
Toppings and concrete fill greater than 3 inches thick	Non-shrink Class I
Any application not listed above, where grout is called for on the Drawings	Non-shrink Class I, unless noted otherwise

b. Prepackaged Grouts

(1) Basic Requirements for Cementitious Non-Shrink Grout

(a) Provide prepackaged non-shrink grout that is inorganic, flowable, non-gas-liberating, non-metallic, and cement-based, requiring only the addition of water.

(b) Deliver grout in original packaging with manufacturer's instructions printed on each container.

(c) Select the specific formulation for each class of non-shrink grout specified to conform to that recommended by the manufacturer for the particular application.

(d) Compressive strength at 28 days: 7000 psi minimum.

(e) Do not use a grout for which the non-shrink property is based on a chemically generated gas or gypsum expansion.

(2) Class I Non-Shrink Grout:

(a) Supply Class I Grout conforming to these specifications and to CRD C 621 and ASTM C 1107 Grade C and B (as modified below) when tested using the amount of water needed to achieve the following properties:

(i) Fluid consistency (20 to 30 seconds) per CRD C 611 at initial testing.

(ii) Fluid consistency (45 seconds) per CRD C 611 at 30 minutes after mixing.

(iii) At temperatures of 45, 73.4, and 95 degrees F.

(b) To satisfy non-shrink requirements, the length change from placement to time of final set shall not have a shrinkage greater than the amount of expansion measured after final set at 3 and 14 days. The expansion at 3 and 14 days shall not exceed the 28-day expansion.

(c) Fluid grout shall pass through the flow cone, with a continuous flow, 1 hour after mixing.

(d) Demonstrate in tests that grout maintains contact with the baseplate to provide an minimum effective bearing area of 95 percent of the gross contact area after final set.

(e) The grout packaging shall list weight, maximum amount of mixing water to be used, maximum usable working time (pot life) at flowable consistency, and temperature restrictions for preparation and placement within which grout will meet specified requirements.

(3) Class II Non-Shrink Grout:

(a) Supply Class II Grout confirming to ASTM C 1107 and the following requirements when tested using the amount of water needed to achieve the following properties:

(i) Flowable consistency: 140 percent flow on ASTM C 230, five drops in 30 seconds.

(ii) Fluid working time: 15 minutes, minimum.

(iii) Flowable duration: 30 minutes, minimum.

(b) When tested, the grout shall not bleed at maximum allowed water.

c. Curing Materials. Curing materials: Concrete Curing as recommended by the manufacturer of prepackaged grouts.

d. Consistency. Mix grouts to the consistency necessary to completely fill the space to be grouted. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

2.2 EPOXY GROUT

Epoxy grout shall be provided for all anchor bolts and reinforcing bars installed in hardened concrete.

Epoxy resin, 50% hardener and 50% resin by volume, shall be provided in equal parts containers. Contractor shall not exceed manufacturer's recommendation for pot life.

a. Preparation. Where indicated on the drawings, anchor bolts and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete. Diameters of holes shall be ¼-inch (¼") larger than the maximum dimension of the bolt head, and ½-inch (½") larger than the bar diameter. The embedment depth for epoxy grouted anchor bolts and reinforcing bars shall not be less than 10 bolt or bar diameters unless indicated otherwise on the drawings.

Holes shall be prepared for grouting as recommended by the grout manufacturer.

b. Installation. Anchor bolts and reinforcing bars shall be clean, dry and free of grease and other foreign matter at time of installation. The bolts and bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer. Particular care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.

2.3 GROUT FOR CONCRETE FILL

Grout for concrete fill in structures or for use in concrete masonry should comply with ASTM C-476. Fine or coarse grout may be used depending upon the horizontal dimension of the grout space. Fine grout shall be used when the minimal dimension is two-inches (2") and coarse grout shall be used when the minimal dimension is four-inches (4").

Grout Proportions by volume shall be supplied as follows:

(1) Fine Grout . 1 part Portland cement; 2¼ to 3 parts fine aggregate

(2) Coarse Grout. 1 part Portland cement; 2¼ to 3 parts fine aggregate; 1 to 2 parts coarse aggregate

All grout should be of fluid consistency; the desired slump is eight-inches (8").

Whenever possible, grout should be batched, mixed, and delivered in accordance with ASTM C-94, requirements for transit mixed concrete. When a batch mixer is used on the job site, all materials should be mixed thoroughly for at least five (5) minutes. Grout which has not been placed l½ hours after water is first added should be discarded.

3.0 EXECUTION

3.1 PREPARATION

a. Verify that base concrete or masonry has attained design strength before grout is placed.

b. When cementitious grouts are used on concrete surfaces, saturate the concrete surface with water for 24 hours prior to placement of cement-based grout. Upon completion of saturation period remove excess water prior to grouting.

3.2 GROUTING PROCEDURES

Prepackaged Grouts: Perform mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts according to the written instructions of the manufacturer. Use prepackaged materials in the quantities and proportions as directed by the manufacturer unless there is certified test data verifying that the specified properties are attained by modified mix.

3.3 CONSOLIDATION

Place grout in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

3.4. EDGE FINISHING.

The grout shall be finished smooth in all locations where the edge of the grout will be exposed to view after it has reached its initial set. Edges of grout shall be cut flush at the baseplate of structural member or piece of equipment unless drawings indicate otherwise.

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