ARLINGTON℠
THE AMERICAN DREAM CITY

I-20 Sanitary Sewer Rehabilitation

CITY OF ARLINGTON
PROJECT NO. WUWS17021

Prepared by
City of Arlington
Department of Water Utilities

STATE OF TEXAS
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88482
LICENSED
PROFESSIONAL ENGINEER

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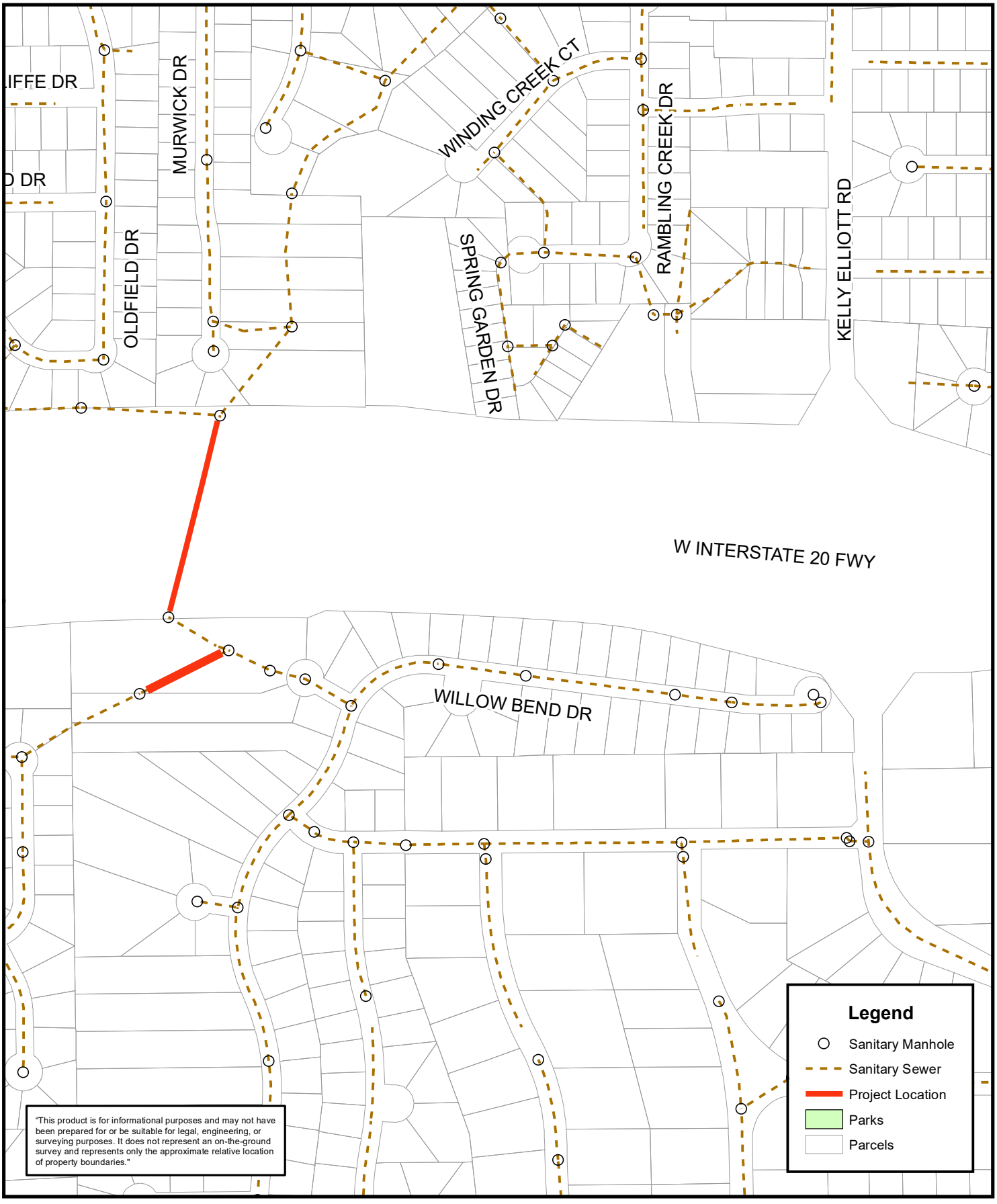
01/18/2022



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ARLINGTON
THE AMERICAN DREAM CITY

Water Information Services
May 04, 2020

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INSTRUCTIONS TO BIDDERS

1. PROPOSAL FORM: The Bidder may use the original proposal forms included in these bid documents or the Bidder may substitute a computer-generated proposal for the original proposal included in these bid documents. The Substitute Proposal shall also be signed by the Bidder. Any discrepancy in items between the Substitute Proposal and the original proposal form, the original proposal form shall govern. If the Substitute Proposal changes the intent of a bid item or contains an error in the quantities, unit prices, or extension of prices, the City may reject the bid submitted.

2. DELIVERY OF PROPOSAL: Proposal shall be delivered directly to the Office of the Director of Water Utilities, 2nd Floor, City Hall, 101 West Abram Street, Arlington TX, 76010. It shall be the Bidder's responsibility to ensure delivery of his/her proposal at the proper place by the time stated in the Notice to Bidders. The mere fact that a proposal was dispatched will not be considered. Any bids received after closing time will be returned unopened.

- **Each Proposal shall be in a sealed envelope plainly marked with the words "BID DOCUMENTS" or "BID PROPOSAL" with the name or description of the project as shown on the front cover of the Contract Documents.**

- **All bid items in the proposal including alternate and addendum items must be filled with a numeric value, including zero value. Bid items with blanks or dashes will be considered as non-responsive items and the bid will not be eligible for award consideration.**

- **The following MUST be included in the bid proposal otherwise the bid will be considered non-responsive and the bid will not be eligible for award consideration:**
  - ***Certified or cashier's check or an approved bidder's bond***
  - ***Signed Section 3 Contractor Residency Statement***
  - ***Signed Acknowledgement/Acceptance of addendum(s) {last page of the addendum}, if applicable***
  - ***MWBE Utilization Plan - Section 3A (MWBE certifications for each firm must be included)***
  - ***Qualifications Statement for Sanitary Sewer Cured-In-Place Pipe (CIPP) Rehabilitation***

- **All potential bidders MUST submit the following to Emily Hannon at emily.hannon@arlingtontx.gov no later than 2:00 p.m. CDT, on Thursday, February 10th, 2022.**
  - ***Letter of Intent to Subcontract – Section 3B (needed for each subcontractor)***
  - ***Good Faith Effort Checklist (GFE) – Section 3C and supporting documentation.***

    Failure to submit the required MWBE documentation, based on the above listed time and date will result in the bid being considered non-responsive.

3. MINORITY/WOMAN BUSINESS ENTERPRISE CONTRACT SPECIFIC GOAL

The City's Minority/Woman Business Enterprise (MWBE) utilization goal, for this project is **26** %.

Subcontracting opportunity identified for this solicitation includes: **Mobilization and Demobilization, Design and Install SWPPP, Clearing & Easement preparation, Temporary Access Drive (pavement or gravel), Temporary Creek Crossing (install drainage pipe), Traffic Control Plan, Sanitary Sewer pipe, sanitary sewer manholes (fiberglass), Sanitary Sewer bypass pumping, Sanitary Sewer cleaning & CCTV, Sanitary Sewer Rehab (CIPP), Landscaping/site restoration**

The contractor's MWBE commitment percentage is based on the total value of the contract including any change orders and modifications throughout the contract agreement.

The criteria used to set a MWBE Contract Specific Goal shall include business availability, the nature of the contract, the City's past experiences with MWBE participation in similar contracts, price competitiveness, subcontracting opportunities, progress towards meeting the annual goal and other relevant factors.

Bidders/proposers must submit good-faith efforts documentation, along with Good Faith Effort (GFE) checklist, **no later than 2:00 p.m. CDT, on Thursday, February 10th, 2022.** Good Faith Effort (GFE) documentation will be sent to the Office of Business Diversity for review to determine if bid/proposal will be accepted, declined, or allow the bidder/proposer to withdraw.

4. PROCUREMENT OF GOODS AND SERVICES FROM MINORITY/WOMEN BUSINESS ENTERPRISE OR HISTORICALLY UNDERUTILIZED BUSINESSES:

It is the City's policy to remove all barriers for MWBEs to compete and create a level playing field for MWBEs to participate in City contracts and related subcontracts.

The Contractor specifically shall comply with all applicable provisions of the City's MWBE Policy and Procedures and any amendments. MWBE and non-MWBE subcontractors also agree to comply with all applicable provisions of the City's MWBE Policy and Procedures and any amendments. The City's MWBE Policy and Procedures and any amendments thereto are incorporated by reference herein as though written word for word. The Contractor shall insert the substance of this provision in all subcontracts and purchase orders.

The Contractor shall appoint a high-level official with decision-making capabilities for the Contractor to administer and coordinate the Contractor's efforts to carry out the requirements and provisions of the City's MWBE Policy and Procedures and its Contractual commitments.

The City of Arlington reaffirms that it will not, nor will its contractors, discriminate based on race, age, color, religion, sex, sexual orientation, gender identity, national origin, ancestry, gender, disability, or place of birth in the award and performance of contracts.

Every locally funded contract will be evaluated by the City to determine the appropriate method for enhancing MWBE participation, including progress towards the achievement of the annual aspirational MWBE goal and other program objectives.

Procedures for implementation, including good faith efforts requirements, information submitted with bid proposals, reporting procedures, etc., shall be consistent with the procedures utilized in the City's MWBE Policy & Procedures Manual.

The City will recognize MWBE companies that have received one or more certifications from the following organizations:

- North Central Texas Regional Certification Agency (NCTRCA),
- State of Texas Historically Underutilized Business (HUB),
- Texas Department of Transportation (TxDOT),
- DFW Minority Supplier Development Council (MSDC), and
- Woman's Business Council Southwest.

The City reserves the right to review, accept or reject any certification from agencies not listed. In addition, the lowest responsible bidder will be required to submit cost information related to minority/woman businesses in accordance with Section 11-25.

5. QUALIFICATIONS OF BIDDERS: All Bidders on this project must meet the qualifications and requirements as outlined in the Qualifications Requirements for Sanitary Sewer Cured In Place Pipe (CIPP) Rehabilitation below. The Contractor must submit the required information below **with their bid.** The successful contractor must perform this primary work type on this project.

Qualifications Requirements for Sanitary Sewer Cured In Place Pipe (CIPP) Rehabilitation:

A. The Contractor performing the CIPP work shall be fully qualified, experienced, and equipped to complete this work expeditiously and in a satisfactory manner. There shall be no exceptions to these requirements.
   1. The Contractor shall have successfully installed, using CIPP operations, a minimum of 200,000 feet of sanitary sewer ranging in sizes from 15-inch to 36-inch.
   2. The proposed Superintendent shall have successfully installed, using CIPP operations, a minimum of 200,000 feet of sanitary sewer ranging in sizes from 15-inch to 36-inch as supported by Owner references.

B. **The Contractor shall submit the following information with their bid for review and approval**.
   1. The number of years of experience in installing pipe by CIPP operations. A minimum of five (5) years of active continuous experience installing CIPP liners in pipe of similar size, length and configuration as proposed in the project.
   2. The name of the liner manufacturer and supplier for this work and previous work listed below.
   3. A list of municipal clients that the Contractor has performed this type of work for, including names, phone numbers, linear footage, and a description of the actual work performed. Provide a sufficient number of references to total 5,000 feet or more of CIPP work to date.

C. The proposed CIPP liner specified herein shall be furnished by a single manufacturer who regularly engages in the production of the proposed CIPP liner and who is fully experienced, reputable, and qualified in the manufacture of the liner to be furnished. The manufacturer shall have a successful record of operation and manufacturing for a minimum of 5 years prior to the bid date. Manufacturers shall supply the previous installation details of at least 3 successful operations of a similar nature for not less than 5 years, which shall include the curing system proposed for this project.

D. The Owner reserves the right to approve or disapprove the Contractor and/or manufacturer based on the submitted information and a follow up interview.

6. BID SECURITY: Each bid must be accompanied by a certified or cashier's check or an approved bidder's bond made payable to the City in an amount of five (5%) percent of the largest possible total of the bid as a guarantee that, if awarded the contract, the Bidder will enter into a Contract and execute all necessary bonds.

7. PERFORMANCE, PAYMENT AND MAINTENANCE BONDS: Performance, payment and maintenance bonds in the amount of not less than one hundred percent (100%) of the contract price conditioned upon the faithful performance of the contract, and upon payment of all persons supplying labor or furnishing materials, will be required upon the forms which are a part of the Contract Documents. Bonds shall be executed by a surety company acceptable to and approved by the City, authorized to do business in the State of Texas and acceptable for underwriting of risks as indicated by the latest revision, Treasury Department Circular 570, listing acceptable sureties on Federal Bonds. The period of the Maintenance Bond shall be two years from the date of acceptance of all work done under the Contract, to cover the guarantee as set forth in the Special Provisions.

8. BIDDERS KNOWLEDGE OF CONDITIONS: Prior to submission of a proposal, bidders shall have made a thorough inspection of the site of work and a thorough examination of the plans and specifications and shall become informed as to the nature of the work, labor conditions, and all other matters that may affect the cost and time of completion of the work.

9. INTERPRETATION OF DOCUMENT: If any person contemplating submitting a bid is in doubt as to the meaning of any part of the plans, specifications, or other proposed contract documents, the person may contact the engineer (email preferred) for an interpretation. All inquiries must be received no later than seven (7) calendar days prior to opening of bids. The person making the inquiry or request for additional information will be responsible for its prompt delivery. The City cannot guarantee a response if the inquiry or request is not submitted in time. Any interpretation of these documents will be made by addendum duly issued. The City will not be responsible for any other explanations or interpretations.

10. SOIL INVESTIGATION: Investigation of soil and foundation conditions of the size and areas near the site were performed by Gorrondona & Associates, Inc. A copy of the soils report is available for review via request to the project engineer or it can be downloaded from the City's supplier/vendor portal, IonWave. The City of Arlington does not represent that the available records show completely the existing conditions and does not guarantee any interpretations of these records. The Contractor assumes all responsibility for interpretations of these records and for making conclusions as to the nature of materials to be excavated, the difficulties of making and maintaining the required excavations and of doing other work affected by the geology of the site of the work. This geotechnical report is in no way intended for use in designing trench safety systems.

11. ALTERNATE BIDS: No bids for alternate work items shall be submitted except as shown on the Proposal. The City reserves the right to choose either the base bid or alternate bid whichever is most advantageous to the City. There will be no adjustments to unit prices bid due to the City's choice of alternate bids.

12. ADDENDUM: The City reserves the right to issue addendum(s) to the Plans, Proposal, Specifications, and Special Provisions. Addendum(s) will be issued via the City's supplier/vendor portal, IonWave, located on the City's web page. Bidders who are currently registered with IonWave will be notified via the portal notification process and the addendum(s) may be

downloaded by logging into the portal. **It shall be the Bidder's responsibility to ensure that he/she is aware of any and all addendum(s) issued by the City.**

13. AWARD OF CONTRACT: As allowed by law, the Contract shall be awarded to the bidder whose bid represents the lowest responsible bid as determined by the City.

It is the intent of the City of Arlington that this project be completed as quickly and economically as is feasible. A tabulation of the bids received will be prepared for consideration by the City Council. It is anticipated that the BEGIN WORK DATE will be approximately two months after the date of bid opening.

14. BID TABULATION: A tabulation of all bids will be available within five (5) working days of the bid opening on City's web page, https://www.arlingtontx.gov/city_hall/departments/finance/purchasing/bidding_procurement, under "Current Bid Opportunities", "Water Utilities".

15. AFFIDAVIT AGAINST PROHIBITED ACTS: It shall be the lowest responsible bidder's responsibility to complete this affidavit (Sections 4, 4A and 4B of the Contract Documents) prior to execution of the contract by the City of Arlington. Failure to complete this form may prohibit the Contractor's ability to secure the contract.

16. TITLE VI: The City of Arlington, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all vendors that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. Vendor will abide and ensure compliance with all terms of Appendix A of the USDOT Standard Title VI Assurances as listed below.

Appendix A of the USDOT Standard Title VI Assurances
During the performance of this contract, the Contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

(1) Compliance with Regulations: The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-Assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

(3) Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's

obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the City of Arlington or the Texas Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to the City of Arlington, or the Texas Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, the City of Arlington shall impose such contract sanctions as it or the Texas Department of Transportation may determine to be appropriate, including, but not limited to:

(a) withholding of payments to the Contractor under the contract until the Contractor complies, and/or
(b) cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The Contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The Contractor shall take such action with respect to any subcontract or procurement as the City of Arlington or the Texas Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the City of Arlington to enter into such litigation to protect the interests of the City of Arlington, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

17. FORM 1295: Effective January 1, 2016, the Texas Legislature, House Bill 1295 requires all business entity to file an electronic disclosure of interested parties (Form 1295) to the Texas Ethic Commission (TEC) for any contracts requiring City Council approval. The lowest responsible bidder will be required to file online with TEC at https://www.ethics.state.tx.us/filinginfo/1295/. The responsible bidder will be required to swear or affirm that the information entered is true and correct. An original signed copy of the filing must be submitted to the City prior to approval of the contract by City Council. **Failure to submit Form 1295 prior to date of City Council's approval will result in the contracts not being processed.**

Definition of "Interested Party" is located under Laws & Regulations, Chapter 46, Commission Rules; Disclosure of Interested Parties. FAQ's for Form 1295 can be found on https://www.ethics.state.tx.us/resources/FAQs/FAQ_Form1295.php.

18. VERIFICATION RELATING TO BOYCOTTING ISRAEL: New State legislation, Chapter 2270 of the Texas Government Code prevents the City of Arlington from entering a contract that boycotts Israel. The successful contractor must verify they do not and will not boycott Israel during term of this contract. It shall be the lowest responsible bidder's responsibility to complete this verification (Section 5 of the Contract Documents) prior to execution of the contract by the City of Arlington. Failure to complete this form will prohibit the contractor's ability to secure the contract.

19. VERIFICATION RELATING TO ENERGY BOYCOTT: New State legislation, Chapter 2274 of the Texas Government Code prohibits a city from entering into a contract with a value of $100,000 or more that is to be paid from public funds with a company with more than 10 full-time employees for goods or services unless the contract contains a written verification from the company that it: (1) does not boycott energy companies; and (2) will not boycott energy companies during the term of the contract. It shall be the lowest responsible bidder's responsibility to complete this verification (Section 4A of the Contract Documents) prior to execution of the contract by the City of Arlington. Failure to complete this form will prohibit the contractor's ability to secure the contract.

20. VERIFICATION RELATING TO FIREARMS BOYCOTT: New State legislation, Chapter 2274 of the Texas Government Code (1) prohibits a governmental entity from entering into a contract with a value of $100,000 or more that is to be paid from public funds with a company with more than 10 full-time employees for the purchase of goods or services unless the contract contains a written verification from the company that it: (a) does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association; and (b) will not discriminate during the term of the contract against a firearm entity or firearm trade association; and (2) provides that the prohibition in (1) does not apply to a city that (a) contracts with a sole-source provider, or (b) the city does not receive any bids from a company that is able to provide the required verification required by (1). It shall be the lowest responsible bidder's responsibility to complete this verification (Section 4B of the Contract Documents) prior to execution of the contract by the City of Arlington. Failure to complete this form will prohibit the contractor's ability to secure the contract.

21. PROCUREMENT OF GOODS AND SERVICES FROM ARLINGTON BUSINESSES: In performing this contract, Contractor agrees to use diligent efforts to purchase all goods and services from Arlington Businesses whenever such goods and services are comparable in availability, quality and price.

END OF SECTION

MWBE SPECIAL CONTRACT PROVISIONS:
SEALED BID

POLICY STATEMENT

On March 30, 2021, the Arlington City Council approved the resolution to adopt the City's Minority/Woman Business Enterprise (MWBE) Policy & Procedures Manual. This MWBE Policy seeks to reduce race- and gender-based barriers and foster participation with minority and woman-owned businesses in contracting and procurement opportunities with the City of Arlington by increasing the capacities of such firms to perform as prime vendors and subcontractors as well as suppliers.

The City of Arlington reaffirms that it will not, nor will its contractors, discriminate based on race, age, color, religion, sex, national origin, ancestry, gender, disability, or place of birth in the award and performance of contracts.

Every locally funded contract will be evaluated by the City of Arlington's Office of Business Diversity (OBD) to determine the appropriate method for enhancing MWBE participation, including progress towards the achievement of the annual aspirational MWBE goal and other program objectives.

Procedures for implementation, including good faith efforts requirements, information submitted with bid proposals, reporting procedures, etc., shall be consistent with the procedures utilized in the City's <MWBE Policy & Procedures Manual>.

MWBE PROJECT GOAL

The City's MWBE goal, for this project is **26** %.

Trades identified for this solicitation includes: **Mobilization and Demobilization, Design and Install SWPPP, Clearing & Easement preparation, Temporary Access Drive (pavement or gravel), Temporary Creek Crossing (install drainage pipe), Traffic Control Plan, Sanitary Sewer pipe, sanitary sere manholes (fiberglass), Sanitary Sewer bypass pumping, Sanitary Sewer cleaning & CCTV, Sanitary Sewer Rehab (CIPP), Landscaping/site restoration.**

In making a determination that the contractor has made a good-faith effort to meet the City's MWBE goals, the Office of Business Diversity shall consider specific documentation concerning the steps taken to obtain MWBE participation, with a consideration of the following factors listed on Good Faith Effort Form.

If a contractor fails to submit the Good Faith Efforts checklist, with document, by the deadline for submission will be considered non-responsive.

The contractor's MWBE commitment percentage is based on the total value of the contract including any change orders and modifications throughout the contract agreement.

The criteria used to set a MWBE Contract Specific Goal shall include business availability, the nature of the contract, the City's past experiences with MWBE participation in similar contracts, price competitiveness, subcontracting opportunities, progress towards meeting the annual goal and other relevant factors.

A contractor cannot require a MWBE to sign an exclusive arrangement for the purpose of a bid/proposal submittal or enter a non-compete arrangement post award.

SUBMITTAL OF REQUIRED DOCUMENTATION

The following documents must be received by the assigned City Project Manager or Department Designee within the allocated times shown in order for the bid or proposal to be considered responsive to the specification. The Offeror shall **DELIVER OR EMAIL** the MWBE documentation to the assigned City Project Manager or Department Designee; a faxed copy will not be accepted.

MWBE Utilization Plan	Received on bid opening date and time.
Good Faith Effort Form and supporting documentation (if participation is less than stated goal)	Received no later than 2:00 pm CST, on the two (2) City business day after the bid opening or proposal due date. Should be sent to agent of record.
Intent to Perform as a Subcontractor	Received no later than 2:00 pm, on the two (2) City business day after the bid opening or proposal due date. Should be sent to agent of record.

Failure to submit the required MWBE documentation, based on the listed time and date, will result in the bid being considered non-responsive.

MWBE CERTIFICATIONS

The City will recognize MWBE companies that have received one or more certifications from the following organizations:

- North Central Texas Regional Certification Agency (NCTRCA),
- State of Texas Historically Underutilized Business (HUB),
- Texas Department of Transportation (TxDOT),
- DFW Minority Supplier Development Council (MSDC), and
- Woman's Business Council Southwest.

The City reserves the right to review, accept, or reject any certification from agencies not listed.

POST AWARD COMPLIANCE

If change orders, amendments, or any Contract modifications are issued, the contractor has a contractual commitment to meet and/or exceed their MWBE utilization goal. Contractor is obligated to immediately notify OBD, in writing, of any agreed increase or decrease in the scope of work that will impact the MWBE participation on the contract.

The Contractor cannot terminate, substitute, or change the terms of the MWBE Utilization Plan prior to or after Contract award without the prior written consent of the OBD. If the Contractor is unable to meet its MWBE commitment with existing MWBEs, the Contractor shall satisfy its commitment, as it relates to scope of work changes, modifications, and or amendments, by soliciting new MWBEs, must submit a **Request for Approval of Change to MWBE Utilization Plan** for review and written approval from the OBD.

All payments must be submitted to our supplier diversity portal B2GNow: https://arlingtontx.diversitycompliance.com/

For vendors who are not users of B2Gnow and would like to be added, please send an email to The Office of Business Diversity mwbe@arlingtontx.gov. Please include your first name, last name, email address, full company address and phone number to be added when you email the City of Arlington. Any missing information will result in your account not being created.

For training on how to utilize B2Gnow, please sign up at https://arlingtontx.diversitycompliance.com/ and click on System Training.

Office of Business Diversity

MWBE UTILIZATION PLAN

Project Name _____

Project No: _____ Date: _____

LEGEND

MWBE = Minority/Woman Business Enterprise

* Ethnicity = Native American (AI), Asian Pacific/Indian (AS), African American (BL), Hispanic (HI), Caucasian Female (WO), or Non- Minority (N/A)

Prime Contractor	MWBE (Yes/No)

LIST ALL SUBCONTRACTING OPPORTUNITIES (use additional sheets if necessary):

Name of Company and Description of Work Type	Potential MWBE Firm Ethnicity* (Yes/No)	Anticipated Dollar ($) of Work

Please complete this form and include with proposal, as an attachment.

Upon formal award of said project, the proposer will submit a Prime, Subs & MWBE Report identifying the Local and/or MWBE subcontractor(s) that will perform the listed work. By signing below, the recommended proposer shall agree to meet their Local and/or MWBE goal based on the information provided on this document.

Name of Company's Main Contact Person _____

Signature of Main Contact Person _____

MINORITY/WOMEN BUSINESS ENTERPRISE

(MWBE)

Minority and/or Woman-owned Business Enterprises are encouraged to participate in all City procurement solicitation. In order to be identified as a certified Minority/Woman Business Enterprise with the City of Arlington, Texas; this form, along with a copy of the selected certification, should be included with the bid/ proposal.

PLEASE CHECK THE APPROPRIATE ETHNICITY AND/OR GENDER:

☐ **American Indian** ☐ **Asian** ☐ **Black** ☐ **Hispanic** ☐ **Woman Owned**

Certification Status: Is the firm certified as a Minority, Woman, or Disadvantaged Business Enterprise by a government or business development agency? Yes No (If yes, please select specific agency)

☐ North Central Texas Regional Certification Agency (NCTRCA)

☐ State of Texas Historically Underutilized Business (HUB)

☐ Dallas/Fort Worth Minority Supplier Development Council (DFW MSDC) or NMSDC affiliate

☐ Women's Business Council – Southwest (WBC-SW) or WBENC affiliate

☐ Texas Department of Transportation, Disadvantaged Business Enterprise (TxDOT, DBE)

☐ Small Business Administration, 8(A) Program

☐ Other (please specify) _____

The City of Arlington encourages minority participation and utilizing MWBE subconsultants where there are opportunities on this project.

For City Use Only:

I have reviewed this Utilization Plan and found that the _____ **HAS** or **HAS NOT** complied as per the City's M/WBE Special Provisions.

Verified Goal attainment:

MBE____% WBE _____%

Reviewer Date:

Office of Business Diversity

LETTER OF INTENT TO SUBCONTRACT

Project Number: _____

Project Title: _____

_____ ("Prime Contractor") agrees to enter into a contractual agreement with _____ ("MWBE Subcontractor"), who will provide the following goods/services on the above-referenced contract.

(Use broad categories (ex. "electrical work", "HVAC equipment purchase", etc.) to describe the goods/services to be provided).

_____

_____

_____

for an estimated amount of $ _____ or 0.0% of the total estimated contract value.

Prime Contractor agrees to utilize said MWBE Subcontractor in the capacity indicated herein and MWBE Subcontractor agrees to work on the above-referenced contract in the capacity herein, contingent upon award of the contract to Prime Contractor.

_____
Signature – Prime Contractor

_____
Print Name

_____
Title Date

_____
Signature – MWBE Subcontractor

_____
Print Name

_____
Title Date

Office of Business Diversity

Good Faith Effort Checklist

In making a determination that the contractor has made a good-faith effort to meet the City's MWBE goals, the Office of Business Diversity shall consider specific documentation concerning the steps taken to obtain MWBE participation, with a consideration of the following factors:

If a contractor fails to submit the Good Faith Efforts checklist, with document, by the deadline for submission will be considered non-responsive.

□ Contractor attended the City's pre-bid or pre-proposal meeting.

□ Contractor advertised in general circulation, trade association, and/or MWBE-focused media regarding subcontracting and/or supplier opportunities.

□ Contractor solicited through reasonable and available means (*e.g.*, written notices, advertisements) M/WBEs certified in the anticipated scopes of subcontracting of the contract, within sufficient time to allow them to respond. Attach detailed Contacts Log, including date, method of contact, person contacted and contact information, and the result of the contact.

□ Contractor selected those portions of the contract consistent with the available M/WBEs, including breaking down the work into economically feasible units to facilitate M/WBE participation even when the proposer would prefer to perform those scopes with its own forces. Provide description of work selected.

□ Contractor provided timely and adequate information about plans, specifications, scope of work and contract requirements to interested MWBEs. Followed up initial solicitations to answer questions and encourage M/WBEs to submit proposals or bids. Attach evidence of information provided, including the date, e.g., letters, emails, telephone logs, etc.

□ Contractor negotiated in good-faith with interested MWBEs that have submitted proposals or bids and thoroughly investigated their capabilities, using good business judgement, and taking into consideration the MWBE subcontractor's price quote and not rejecting reasonable quotes from interested MWBE. Evidence of such negotiations includes the names, addresses, email addresses and telephone numbers of M/WBEs with whom the vendor negotiated; a description of the information provided to M/WBEs regarding the work selected for subcontracting; and explanations as to why agreements could not be reached with M/WBEs to perform the work.

□ Contractor made effort to assist interested MWBEs to obtain bonding, lines of credit, or insurance as required by the City or the vendor for performance of the contract (if applicable).

□ Contractor effectively utilized the services of M/WBE assistance groups; local, state, and federal M/WBE business assistance offices and other organizations that provide assistance in the recruitment and placement of MWBEs.

Signature Prime Contractor: **Print Name:**

Title **Date:**

SECTION NO. 1

ADVERTISEMENT FOR BIDS

This project primarily consists of the rehabilitation of an existing 24-inch sanitary sewer main crossing I-20 using cured-in-place pipe (CIPP) lining technology. The project also includes sanitary sewer bypass pumping and approximately 240 LF of 12-inch PVC sanitary sewer pipe by open cut. The Engineer's estimate for this project is $760,000.

Sealed bids will be received by the City of Arlington, Texas, at the Office of the Director of Water Utilities, 2nd Floor, City Hall, 101 W. Abram Street, Arlington TX, 76010, **until 2:00 p.m. on February 8th, 2022**, for the construction of **I-20 Sanitary Sewer Rehabilitation, PROJECT NO. WUWS17021** as listed in the contract documents, at which time and place they will be publicly opened and read aloud in the Water Administration Conference Room. Any bid received after closing time will be returned unopened.

All bidders on this project must submit their Qualifications Statement for Sanitary Sewer Cured-In-Place Pipe (CIPP) Rehabilitation per the Instructions to Bidders of the contract documents.

Contract documents, including plans, specifications, and addendums may be reviewed and/or downloaded from the City's vendor/supplier portal, IonWave, accessible via the City's web page, https://arlingtontx.gov/city_hall/departments/finance. Look for "Vendor/Supplier" under "Services".

A cashier's check or an acceptable Bidder's Bond payable to the City of Arlington, Texas, in an amount of not less than five percent (5%) of the largest possible total for the bid submitted, must accompany the bid.

A Performance Bond and a Payment Bond, each for one hundred percent (100%) of the contract price, will be required. The successful bidder shall also furnish to the City a Maintenance Bond covering defects of material and workmanship for two calendar years following the City's approval and acceptance of the construction.

Not less than the prevailing wage rates adopted by the City of Arlington, Texas, and as set forth in the contract documents, must be paid on this project.

In case of ambiguity or lack of clearness in stating prices in the Proposal, the City reserves the right to accept the most advantageous construction thereof to the City or to reject the proposal.

The City reserves the right to reject any or all bids and waive any or all informalities. No bid may be withdrawn until the expiration of ninety (90) days from the date bids are opened.

All inquiries must be submitted to the City in accordance with the Instructions to Bidders of the contract documents.

A PRE-BID MEETING will be held for this project at 2:00 p.m. on January 27th, 2022 in the Public Works and Transportation Conference Room, 2nd Floor, City Hall, 101 W. Abram Street, Arlington, TX 76010. If you have any questions concerning this project, please contact Emily Hannon at emily.hannon@arlingtontx.gov.

***Arlington Star-Telegram* publication dates:** Wednesday, 1/19/2022 & Wednesday, 1/26/2022

CONTRACTOR STATUS INFORMATION

Instructions: Please fill in the appropriate section below, completing all blanks within the section. This information is necessary to ensure that the contract and bonds are in the correct form.

SECTION 1: If the contractor is a sole proprietor, fill in this section only:

Name: _____
First Middle Last

Name under which you are engaged in business (if operating under an assumed name):

_____

Residence: _____
Street City County State ZIP

Business: _____
Street City County State ZIP

Principal place of business: _____
City County State ZIP

Contact Person: _____
Name Phone Email Address

SECTION 2: If the contractor is a partnership, fill in this section only:

Name of Partner: _____
First Middle Last

Residence: _____
Street City County State ZIP

Name of Partner: _____
First Middle Last

Residence: _____
Street City County State ZIP

Name under which contractor conducts business (if operating under an assumed name):

_____

Business Address: _____
Street City County State ZIP

Principal place of business: _____
City County State Zip

Contact Person: _____
Name Phone Email Address

SECTION 3: If the contractor is a corporation, fill in this section only:

Registered name of corporation: _____

Doing business as: _____

Date charter expires: _____

State of corporation: _____

Date of corporation filing: _____ (If non-Texas corporation, date of Certificate of Authority Issuance).

Registered Agent: _____
First Middle Last

Address: _____
Street City County State ZIP

Location of Corporation principal office:

_____
Street City County State ZIP

Person executing contract on behalf of corporation: (Please print)

Name: _____
First Middle Last

Title: _____

Address: _____
Street City County State ZIP

Telephone Number: _____

Contact Person: _____
Name Phone Email Address

END OF SECTION

SECTION NO. 2

PREVAILING WAGE RATES

"General Decision Number: TX20220026 01/07/2022

Superseded General Decision Number: TX20210026

State: Texas

Construction Type: Heavy

Counties: Johnson, Parker and Tarrant Counties in Texas.

Heavy Construction Projects (Including Water and Sewer Lines)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/07/2022

* PLUM0146-002 05/01/2021

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 34.13	9.70

SUTX1990-041 06/01/1990

	Rates	Fringes
CARPENTER	$ 10.40	$3.64
Concrete Finisher	$ 9.81	

ELECTRICIAN	$ 13.26	
Form Setter	$ 7.86	
Laborers:		
Common	$ 7.25	
Utility	$ 8.09	
PAINTER	$ 10.89	
Pipelayer	$ 8.43	
Power equipment operators:		
Backhoe	$ 11.89	3.30
Bulldozer	$ 10.76	
Crane	$ 13.16	3.30
Front End Loader	$ 10.54	
Mechanic	$ 10.93	
Scraper	$ 10.00	
Reinforcing Steel Setter	$ 10.64	
TRUCK DRIVER	$ 7.34	

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

THE STATE OF TEXAS §

COUNTY OF _____ §

AFFIDAVIT

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, ☐ who is known to me or ☐ who was proved to me on the oath of _____ (name of person identifying the acknowledging person) or ☐ who was proved to me through _____ _____ (description of identity card or other document issued by the federal or state government containing the picture and signature of the acknowledging person) to be the person whose name is subscribed to this affidavit; and being by me first duly sworn, upon oath stated as follows:

"My name is _____. I am of sound mind and capable of making this affidavit.

"I am _____ for _____, which company entered into a contract on the ___ day of _____, 20____, to construct **I-20 Sanitary Sewer Rehabilitation**, City of Arlington Project No. **WUWS17021,** in the City of Arlington, Texas, and I am duly authorized on behalf of said company to hereby swear and affirm that all wages for labor on the above-referenced project are in strict compliance with the established prevailing wage rates as described in the contract documents for the referenced project, and all wages have been and will be paid and satisfied as the prevailing rates may change from time to time. Upon request by the City of Arlington, I shall allow a complete examination of the financial records relative to this project, including, but not limited to, cancelled checks, invoices and statements at any time, and allow the City of Arlington to interview any and/or all employees of the above said company or any and/or all employees of said Company's subcontractor or subcontractors. Also, I hereby agree on behalf of the above company, to be accountable for any and all penalties and/or fine provisions in accordance with the contract documents and relevant law."

_____
AFFIANT

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20_____.

_____
Notary Public In and For The State of Texas

_____
Notary's Printed Name

END OF SECTION

SECTION NO. 3

CONTRACTOR RESIDENCY STATEMENT

The Texas Government Code section 2252.002 governs the awarding of contracts to non-resident bidders. This law provides that, in order to be awarded a contract as low bidder, a non-resident bidder (out-of-state contractor whose corporate office or principal place of business is outside the State of Texas) bid projects in Texas at an amount lower than the lowest Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a non-resident bidder in order to obtain a comparable contract in the state in which the non-resident's principal place of business is located. The appropriate blanks in the following statement **must** be filled out by all out-of-state or non-resident bidders in order for those bids to meet specifications. The failure of out-of-state or non-resident contractors to do so will automatically disqualify that bidder. This does not apply to contracts involving Federal Funds.

☐ Initial here if you are **Texas Residential Bidder**.

☐ Initial here if you are a **Non-resident contractor** in _____ (give state), our principal place of business, is required to be _____ percent lower than resident bidders by State Law.

BIDDER

_____ By _____

Company (Please Print)

_____ _____

Address Signature

_____ _____

City State Zip Title (Please Print)

*The **State Purchasing and General Services Commission** defines Principal Place of Business as follows: Principal Place of Business in Texas means, for any type of business entity recognized in the **State of Texas,** that the business entity:

-has at least one permanent office located in the **State of Texas**, from which business activities other than submitting bids to governmental agencies are conducted and from which the bid is submitted, and

-has at least one employee who works in the Texas office

*The **Texas Comptroller** annually publishes a list showing how each state regulates the award if governmental contracts whose principal place of business is not located in that state. http://comptroller.texas.gov/

END OF SECTION
Revised 9/2016

SECTION NO. 4

AFFIDAVIT AGAINST PROHIBITED ACTS

I hereby affirm that I am aware of the provisions of the Texas Penal Code Sec. 36.02, 36.08, 36.09, and 36.10 (a copy of which follows), dealing with Bribery and Gifts to Public Servants. I further affirm that I will adhere to such rules and instruct and require all agents, employees, and sub-contractors to do the same. I am further aware that any violation of these rules subjects this agreement to revocation, my removal from bid lists, prohibiting future contract/subcontract work, revocation of permits, and prosecution.

Signature	Date
ATTEST (if corporation)	Date

TEXAS PENAL CODE

TITLE 8: OFFENSES AGAINST PUBLIC ADMINISTRATION

CHAPTER 36. Bribery and Corrupt Influence

36.02 Bribery

(a) A person commits an offense if he intentionally or knowingly offers, confers, or agrees to confer on another, or solicits, accepts, or agrees to accept from another:

(1) any benefit as consideration for the recipient's decision, opinion, recommendation, vote, or other exercise of discretion as a public servant, party official, or voter;

(2) any benefit as consideration for the recipient's decision, vote, recommendation, or other exercise of official discretion in a judicial or administrative proceeding;

(3) any benefit as consideration for a violation of a duty imposed by law on a public servant or party official; or

(4) any benefit that is a political contribution as defined by Title 15, Election Code, or that is an expenditure made and reported in accordance with Chapter 305, Government Code, if the benefit was offered, conferred, solicited, accepted, or agreed to pursuant to an express agreement to take or withhold a specific exercise of official discretion if such exercise of official discretion would not have been taken or withheld but for the benefit; notwithstanding any rule of evidence or jury instruction allowing factual inferences in the absence of certain evidence, direct evidence of the express agreement shall be required in any prosecution under this subdivision.

(b) It is no defense to prosecution under this section that a person whom the actor sought to influence was not qualified to act in the desired way whether because he had not yet assumed office or he lacked jurisdiction or for any other reason.

(c) It is no defense to prosecution under this section that the benefit is not offered or conferred or that the benefit is not solicited or accepted until after:

(1) the decision, opinion, recommendation, vote, or other exercise of discretion has occurred; or

(2) the public servant ceases to be a public servant.

(d) It is an exception to the application of Subdivisions (1), (2), and (3) of Subsection (a) that the benefit is a political contribution as defined by Title 15, Election Code, or an expenditure made and reported in accordance with Chapter 305, Government Code.

(e) An offense under this section is a felony of the second degree.

36.08 Gift to Public Servant by Person Subject to His Jurisdiction

(a) A public servant in an agency performing regulatory functions or conducting inspections or investigations commits an offense if he solicits, accepts, or agrees to accept any benefit

from a person the public servant knows to be subject to regulation, inspection, or investigation by the public servant or his agency.

(b) A public servant in an agency having custody of prisoners commits an offense if he solicits, accepts, or agrees to accept any benefit from a person the public servant knows to be in his custody or the custody of his agency.

(c) A public servant in an agency carrying on civil or criminal litigation on behalf of government commits an offense if he solicits, accepts, or agrees to accept any benefit from a person against whom the public servant knows litigation is pending or contemplated by the public servant or his agency.

(d) A public servant who exercises discretion in connection with contracts, purchases, payments, claims, or other pecuniary transactions of government commits an offense if he solicits, accepts, or agrees to accept any benefit from a person the public servant knows is interested in or likely to become interested in any contract, purchase, payment, claim, or transaction involving the exercise of his discretion.

(e) A public servant who has judicial or administrative authority, who is employed by or in a tribunal having judicial or administrative authority, or who participates in the enforcement of the tribunal's decision, commits an offense if he solicits, accepts, or agrees to accept any benefit from a person the public servant knows is interested in or likely to become interested in any matter before the public servant or tribunal.

(f) A member of the legislature, the governor, the lieutenant governor, or a person employed by a member of the legislature, the governor, the lieutenant governor, or an agency of the legislature commits an offense if he solicits, accepts, or agrees to accept any benefit from any person.

(g) A public servant who is a hearing examiner employed by an agency performing regulatory functions and who conducts hearings in contested cases commits an offense if the public servant solicits, accepts, or agrees to accept any benefit from any person who is appearing before the agency in a contested case, who is doing business with the agency, or who the public servant knows is interested in any matter before the public servant. The exception provided by Sec. 36.10(b) does not apply to a benefit under this subsection.

(h) An offense under this section is a Class A misdemeanor.

(i) A public servant who receives an unsolicited benefit that the public servant is prohibited from accepting under this section may donate the benefit to a governmental entity that has the authority to accept the gift or may donate the benefit to a recognized tax-exempt charitable organization formed for educational, religious, or scientific purposes.

36.09 <u>Offering Gift to Public Servant</u>

(a) A person commits an offense if he offers, confers or agrees to confer any benefit on a public servant that he knows the public servant is prohibited by law from accepting.

(b) An offense under this section is a Class A misdemeanor.

36.10 Non-Applicable

(a) Sections 36.08 (Gift to Public Servant) and 36.09 (Offering Gift to Public Servant) do not apply to:

(1) a fee prescribed by law to be received by a public servant or any other benefit to which the public servant is lawfully entitled or for which he gives legitimate consideration in a capacity other than as a public servant;

(2) a gift or other benefit conferred on account of kinship or a personal, professional, or business relationship independent of the official status of the recipient; or

(3) a benefit to a public servant required to file a statement under Chapter 572, Government Code, or a report under Title 15, Election Code, that is derived from a function in honor or appreciation of the recipient if:

(A) the benefit and the source of any benefit in excess of $50 is reported in the statement; and

(B) the benefit is used solely to defray the expenses that accrue in the performance of duties or activities in connection with the office which are nonreimbursable by the state or political subdivision;

(4) a political contribution as defined by Title 15, Election Code;

(5) a gift, award, or memento to a member of the legislative or executive branch that is required to be reported under Chapter 305, Government Code;

(6) an item with a value of less than $50, excluding cash or a negotiable instrument as described by Section 3.104, Business & Commerce Code; or

(7) an item issued by a governmental entity that allows the use of property or facilities owned, leased, or operated by the governmental entity.

(b) Section 36.08 (Gift to Public Servant) does not apply to food, lodging, transportation, or entertainment accepted as a guest and, if the donee is required by law to report those items, reported by the donee in accordance with that law.

(c) Section 36.09 (Offering Gift to Public Servant) does not apply to food, lodging, transportation, or entertainment accepted as a guest and, if the donor is required by law to report those items, reported by the donor in accordance with that law.

(d) Section 36.08 (Gift to Public Servant) does not apply to a gratuity accepted and reported in accordance with Section 11.0262, Parks and Wildlife Code. Section 36.09 (Offering Gift to Public Servant) does not apply to a gratuity that is offered in accordance with Section 11.0262, Parks and Wildlife Code.

END OF SECTION

SECTION NO. 4A

VERIFICATION RELATING TO DISCRIMINATING AGAINST FIREARM OR AMMUNITION INDUSTRIES

The State of Texas has passed legislation, which is codified in Chapter 2274 of the Texas Government Code, that prevents any municipal government from entering into a contract for goods and services unless the contractor makes certain verifications. The Contractor, by signing below, verifies that Contractor does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, and that it will not discriminate against a firearm entity or firearm trade association during the term of this Contract. This verification, when executed, will be attached to the contract and become a part of the contract for all purposes. This verification relates to the contract for **I-20 Sanitary Sewer Rehabilitation**, City of Arlington project No. **WUWS17021**.

BY: _____

Name: _____

Title: _____

Witness:

_____
Signature

_____
Name

_____
Title

END OF SECTION

SECTION NO. 4B

VERIFICATION RELATING TO BOYCOTTING ENERGY COMPANIES

The State of Texas has passed legislation, which is codified in Chapter 2274 of the Texas Government Code, that prevents any municipal government from entering into a contract for goods and services unless the contractor makes certain verifications. The Contractor, by signing below, verifies that Contractor does not boycott energy companies and will not boycott energy companies during the term of the Contract. This verification, when executed, will be attached to the contract and become a part of the contract for all purposes. This verification relates to the contract for **I-20 Sanitary Sewer Rehabilitation**, City of Arlington project No. **WUWS17021**.

BY: _____

Name: _____

Title: _____

Witness:

_____
Signature

_____
Name

_____
Title

END OF SECTION

SECTION NO. 5

VERIFICATION RELATING TO BOYCOTTING ISRAEL

The State of Texas has passed legislation which is codified in Chapter 2270 of the Texas Government Code that prevents any municipal government from entering into a contract for goods and services unless the contractor makes certain verifications. The Contractor by signing below verifies that Contractor does not boycott Israel and will not boycott Israel during the term of the Contract. This verification when executed will be attached to the contract and become a part of the contract for all purposes. This verification relates to the contract for **I-20 Sanitary Sewer Rehabilitation**, City of Arlington project No. **WUWS17021**.

BY: _____

Name: _____

Title: _____

Witness:

_____
Signature

_____
Name

_____
Title

END OF SECTION

SECTION NO. 6

PROPOSAL

Proposal of: _____

Address: _____

City/State/ZIP: _____

Federal ID# _____

City/State/ZIP: _____

TO THE CITY OF ARLINGTON,TEXAS:

The undersigned hereby proposes to furnish the equipment, fuel, labor, materials, power, tools, superintendence, transportation, and to perform the work required for the construction of **I-20 Sanitary Sewer Rehabilitation**, City of Arlington Project No. **WUWS17021**, in the City of Arlington, Texas, for the following prices, which prices it is clearly and definitely understood shall include all construction materials and equipment as set out in the basis of payment in the contractual documents and maintaining same as required by the detailed specifications.

PROPOSAL SCHEDULE

MOBILIZATION & SWPPP (101-102)

ITEM NO.	DESCRIPTION	UNIT PRICE IN WORDS	QTY	UNIT	PRICE IN FIGURES	
					UNIT PRICE	TOTAL
101	Mobilization & Bonds in accordance with Section 11-10, for the unit price of	Twenty Two Thousand Eight Hundred Dollars and Zero Cents	1	Lump Sum	$ 22,800.00	$ 22,800.00
102	Design, Implement, & Maintain Storm Water Pollution Prevention Plan , complete and in place for the unit price of	Seven Thousand Six Hundred Dollars and Zero Cents	1	Lump Sum	$ 7,600.00	$ 7,600.00

SUBTOTAL MOBILIZATION & SWPPP (101-102) $ 30,400.00

SEWER IMPROVEMENTS (ITEMS 201 - 224)

ITEM NO.	DESCRIPTION	UNIT PRICE IN WORDS	QTY	UNIT	PRICES IN FIGURES	
					UNIT PRICE	TOTAL
201	Right-of-way/Easement Preparation, work fully performed for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$
202	Furnish & Install Temporary Access Drive for Construction Access, complete and in place for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$
203	Furnish & Install Temporary Creek Crossing per Detail, complete and in place for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$
204	Furnish & Install Project Sign, complete and in place for the unit price of	_____ Dollars and _____ Cents	2	Each	$	$
205	Tree Removal 6-inch to 12-inch diameter as measured at 4-feet above ground level, including grinding stump to below ground level, work fully performed for the unit price of	_____ Dollars and _____ Cents	10	Each	$	$
206	Design & Implement Traffic Control Plan in accordance with local and state guidelines, complete and in place for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$
207	Furnish & Install 12-inch Sanitary Sewer Line, PVC (SDR- 26, 115 psi, Green Color) by open cut, all depths, including trench, embedment, & backfill, complete and in place for the unit price of	_____ Dollars and _____ Cents	240	Linear Foot	$	$
208	Furnish & Install 24-inch Sanitary Sewer Line, SN 72 FRPM by open cut, all depths, including trench, embedment, & backfill, complete and in place for the unit price of	_____ Dollars and _____ Cents	40	Linear Foot	$	$

ITEM NO.	DESCRIPTION	UNIT PRICE IN WORDS	QTY	UNIT	PRICES IN FIGURES	
					UNIT PRICE	TOTAL
209	Furnish & Install Trench Safety Systems for Sanitary Sewer Line for all depths, in accordance with the Trench Safety Plan & the latest OSHA Standards, complete and in place for the unit price of	_____ Dollars and _____ Cents	280	Linear Foot	$	$
210	Furnish & Install 24-inch Cured-in-Place Pipe (CIPP) Sanitary Sewer Line Rehabilitation, complete and in place for the unit price of	_____ Dollars and _____ Cents	600	Linear Foot	$	$
211	Furnish, Install & Maintain Temporary Bypass Pumping and Piping per Section 33 01 30.51, including necessary temporary isolation plugs, complete and in place for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$
212	Remove & Replace Wooden Fence for Bypass Pumping Access, including coordination with Homeowner, complete and in place for the unit price of	_____ Dollars and _____ Cents	40	Linear Foot		$
213	Furnish & Install 5-foot Diameter FRP Sanitary Sewer Manhole (0-20 foot depth), complete and in place for the unit price of	_____ Dollars and _____ Cents	3	Each	$	$
214	Remove & Dispose Existing Sanitary Sewer Manhole, work fully performed for the unit price of	_____ Dollars and _____ Cents	1	Each	$	$
215	Remove & Replace Cone, Grade Rings, Frame and Cover on Existing 5-foot Diameter Sanitary Sewer Manhole, work fully performed for the unit price of	_____ Dollars and _____ Cents	1	Each	$	$
216	Cut & Plug Existing Sanitary Sewer Line, work fully performed for the unit price of	_____ Dollars and _____ Cents	2	Each	$	$

ITEM NO.	DESCRIPTION	UNIT PRICE IN WORDS	QTY	UNIT	PRICES IN FIGURES	
					UNIT PRICE	TOTAL
217	Demolish False Bottom in Existing Manhole and Plug Invert of Abandoned Sewer Main, work fully performed for the unit price of	_____ Dollars and _____ Cents	1	Each		$
218	Furnish & Install Crushed Stone Cushion for bad weather access, complete and in place for the unit price of	_____ Dollars and _____ Cents	50	Ton	$	$
219	Furnish & Install Hydromulch to disturbed areas, complete and in place for the unit price of	_____ Dollars and _____ Cents	2,500	Square Yard	$	$
220	Remove & Replace 5-inch Reinforced Concrete Residential Drive on compacted native soil, work fully performed for the unit price of	_____ Dollars and _____ Cents	100	Square Yard	$	$
221	Pre-Construction Heavy Mechanical Cleaning of Existing 24-inch Sanitary Sewer and CCTV Inspection to Evaluate Existing Sanitary Sewer Line Conditions, work fully performed for the unit price of	_____ Dollars and _____ Cents	600	Linear Foot	$	$
222	Post-Construction CCTV Inspections of Sanitary Sewer Main in accordance with Section 14-23, work fully performed for the unit price of	_____ Dollars and _____ Cents	850	Linear Foot	$	$
223	Pipeline and Manhole Cleaning and Obstruction Removal and Disposal (As Directed by Owner), work fully performed for the unit price of	_____ Dollars and _____ Cents	50	Linear Foot	$	$
224	Construction Contingency for Sanitary Sewer Items, work fully performed for the unit price of	One Dollar and Zero Cents	70,000	Lump Sum	$ 1.00	$ 70,000.00

SUBTOTAL SEWER IMPROVEMENTS (ITEMS 201 - 224) $ _____

ALTERNATE A (Item 399A)

ITEM NO.	DESCRIPTION	UNIT PRICE IN WORDS	QTY	UNIT	PRICES IN FIGURES	
					UNIT PRICE	TOTAL
399A	The additional cost for using Green Cement above the cost of cement in accordance with Section 12-38 for raw cement and for items where concrete is placed or cast-in-place, for the unit price of	_____ Dollars and _____ Cents	1	Lump Sum	$	$

SUBTOTAL ALTERNATE A (Item 399A) (Item 399A) $ _____

TOTAL SUMMARY

MOBILIZATION & SWPPP (101-102)	**$ 30,400.00**
SEWER IMPROVEMENTS (ITEMS 201 - 224)	**$**
TOTAL BASE BID	
TOTAL BASE BID + ALTERNATE A	

In case of ambiguity or lack of clearness in stating prices in the Proposal, the City reserves the right to accept the most advantageous construction thereof to the City or to reject the Proposal.

The undersigned bidder agrees to begin work within ten (10) days from the beginning date of the project as provided in the written Notice to Proceed and to complete the work within **120** calendar days; provided, that the City's construction funds are available.

Enclosed with this Proposal is a Bidder's Bond or Cashier's Check for five percent bidders bond ($ 5%) dollars, which it is agreed shall be collected and retained by the City as liquidated damages if the City accepts this bid within ninety (90) days after the opening of bids, and the undersigned bidder then fails to execute the contract and bonds with the City within ten (10) days after official notice of such acceptance; otherwise, said Bidder's Bond or Check shall be returned to the undersigned on demand. This sum of money is not to be considered as a penalty, but shall be deemed, taken and treated as reasonable liquidated damages. The sum of money is fixed and agreed on between the bidder and City because of the impracticability and extreme difficulty of fixing and ascertaining the actual damage to the owner.

The undersigned acknowledges receipt of the following addendum

Addendum No. 1 _____

Addendum No. 2 _____

Addendum No. 3 _____

BIDDER

_____
Company

By _____

_____
(Please Print)

_____
Title

_____
Address

(Seal if corporation)

_____
City State Zip

SECTION NO. 7

STATE OF TEXAS §

COUNTY OF TARRANT §

Contract

PROJECT NO. WUWS17021

This Contract, made and entered into this_____day of _____, 20____, by and between the City of Arlington of Tarrant County, Texas, a municipal corporation, hereinafter called "Owner," and _____, hereinafter called "Contractor."

W I T N E S S E T H:

For and in consideration of the payment, agreements and conditions hereinafter mentioned, and under the conditions expressed in the bonds herein, Contractor hereby agrees to complete the construction of improvements described as follows:

I-20 Sanitary Sewer Rehabilitation
City of Arlington Project No. WUWS17021

in the City of Arlington, Texas, and all extra work in connection therewith, under the terms as stated in the latest versions of the:

Standard Specifications for Public Works Construction Standards, as issued by the North Central Texas Council of Governments, and;

City of Arlington Standard Specifications For Water & Sanitary Sewer Construction,

as they may be amended from time to time (hereinafter collectively called "Standard Specifications"), and under the terms of all Special Provisions and Special Specifications of this Contract; and at his, her or their own proper cost and expense to furnish all superintendence, labor, insurance, equipment, tools and other accessories and services necessary to complete the said construction in accordance with all the Contract documents, incorporated herein as if written word for word, and in accordance with the plans, which include all maps, plats, blueprints, and other drawings and printed or written explanatory manner therefore, and the specifications as prepared by **City of Arlington** hereinafter called Engineer, who has been identified by the endorsement of the Contractor's written proposal, these General Provisions of the Standard Specifications, the Special Provisions, and the Special Specifications of this Contract, the payment, performance, and maintenance 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 from the beginning date of the project as provided in the written Notice to Proceed and to complete the work within **120** calendar days from the beginning date of the project.

The Owner agrees to pay the Contractor in current funds for the performance of the Contract in accordance with the proposal submitted therefore, subject to additions and deductions, as provided therein.

This Contract is entered into subject to the Charter and ordinances of Owner, as they may be amended from time to time, and is subject to and is to be construed, governed, and enforced under all applicable State of Texas and federal laws. Situs of this Contract is agreed to be Tarrant County, Texas, for all purposes including performance and execution.

If any of the terms, sections, subsections, sentences, clauses, phrases, provisions, covenants, or conditions of this Contract is held for any reason to be invalid, void or unenforceable, the remainder of the terms, sections, subsections, sentences, clauses, phrases, provisions, covenants, or conditions of this Contract shall remain in full force and effect and shall in no way be affected, impaired, or invalidated.

Owner reserves the right to terminate this agreement immediately upon breach of any term or provision of this Contract by Contractor; or, if any time during the term of this Contract, Contractor shall fail to commence the work in accordance with the provisions of this Contract or fail to diligently provide Services in an efficient, timely, and careful manner and in strict accordance with the provisions of this Contract or fail to use an adequate number or quality of personnel and equipment to complete the work or fail to perform any of its obligations under this Contract, then Owner shall have the right, if Contractor shall not cure any such default after thirty (30) days written notice thereof, to terminate this Contract and complete the work in any manner it deems desirable, including engaging the Services of other parties therefore. Any such act by Owner shall not be deemed a waiver of any other right or remedy of Owner. If after exercising any such remedy the cost to Owner of the performance of the balance of the work is in excess of that part of the Contract sum which has not theretofore been paid to Contractor hereunder, Contractor shall be liable for and shall reimburse Owner for such excess.

No right or remedy granted herein or reserved to the parties is exclusive of any other right or remedy herein by law or equity provided or permitted; but, each shall be cumulative of every other right or remedy given hereunder. No covenant or condition of this Contract may be waived without consent of the parties. Forbearance or indulgence by either party shall not constitute a waiver of any covenant or condition to be performed pursuant to this Contract.

Contractor's status shall be that of an independent Contractor and not an agent, servant, employee or representative of Owner in the performance of this Contract. No term or provision of, or act of Contractor or Owner under this Contract shall be construed as changing that status.

This Contract embodies the complete agreement of the parties hereto, superseding all oral or written previous and contemporary agreements between the parties relating to matters herein; and except as otherwise provided herein, cannot be modified without the written agreement of the parties.

Owner and Contractor each bind themselves, their successors, executors, administrators and assigns to the other party to this Contract. Neither Owner nor Contractor will assign, sublet, subContract or transfer any interest in this Contract without the written consent of the other party. No assignment, delegation of duties or subcontract under this Contract will be effective without the written consent of Owner.

It is further agreed that one or more instances of forbearance by the City in the exercise of its rights herein shall in no way constitute a waiver thereof.

In performing this Contract, Contractor agrees to use diligent efforts to purchase all goods and services from Arlington Businesses whenever such goods and services are comparable in availability, quality and price.

{Signature Pages Follows}

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

CONTRACTOR

_____
Company Name

_____
Tax Identification Number:

By_____
Signature

_____
Printed or Typed Name

_____
Printed or Typed Title

CITY OF ARLINGTON, TEXAS

_____
Craig M. Cummings
Director of Water Utilities

ATTEST:

_____
Alex Busken
City Secretary

APPROVED AS TO FORM:
TERIS SOLIS, City Attorney

BY_____

THE STATE OF TEXAS §

Contractor Acknowledgment

COUNTY OF _____ §

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, ☐ who is known to me or ☐ who was proved to me on the oath of _____ (name of person identifying the acknowledging person) or ☐ who was proved to me through _____ (description of identity card or other document issued by the federal or state government containing the picture and signature of the acknowledging person) to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed same for and as the act and deed of _____, a corporation of _____ County, Texas, and as _____ thereof, and for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20_____.

_____
Notary Public In and For The State of Texas

_____
Notary's Printed Name

THE STATE OF TEXAS §

City Acknowledgement

COUNTY OF TARRANT §

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared Craig M. Cummings, known to me to be a person and officer whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed same for and as the act of the City of Arlington, Texas, a Texas municipal corporation, and as Director of Water Utilities thereof, and for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20_____.

_____
Notary Public In and For The State of Texas

_____
Notary's Printed Name

END OF SECTION

SECTION NO. 8

THE STATE OF TEXAS §

Performance Bond

COUNTY OF TARRANT §

KNOW ALL BY THESE PRESENTS:

THAT_____

of the City of _____, County of _____

State of _____ hereinafter referred to as "PRINCIPAL," and

_____, a corporate surety/sureties organized under the laws of the State of _____ and authorized to do business in the State of Texas, hereinafter referred to as "SURETY," (whether one or more), are held and firmly bound unto the **CITY OF ARLINGTON**, **TEXAS**, a municipal corporation located in Tarrant County, Texas, hereinafter referred to as "CITY," in the amount of _____**DOLLARS and _____CENTS ($_____)**, lawful money of the United States, to be paid in Arlington, Tarrant County, Texas, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, assigns, administrators and successors, jointly and severally; and firmly by these presents, the condition of this obligation is such that,

WHEREAS, PRINCIPAL entered into a certain written Contract with the City of Arlington dated the _____ day of _____, 20_____, a copy of which is attached hereto and made a part hereof, to furnish all materials, equipment, labor, supervision, and other accessories necessary for the construction of:

I-20 Sanitary Sewer Rehabilitation
City of Arlington Project No. WUWS17021

in the City of Arlington, Texas, as more particularly described and designated in the above referenced contract such contract being incorporated herein and made a part hereof as fully and to the same extent as if written herein word for word:

NOW THEREFORE,

If PRINCIPAL shall well, truly and faithfully perform and fulfill all of the undertakings, covenants, terms, conditions and agreements of the above referenced Contract in accordance with the plans, specifications and Contract documents during the original term thereof, and any extension thereof which may be granted with or without notice to SURETY, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all the covenants, terms, conditions and agreements of any and all authorized modifications of such Contract that may hereafter be made, notice of which modifications to SURETY being hereby waived, then this obligation shall be

void, otherwise to remain in full force and effect; and in case PRINCIPAL shall fail to do so, it is agreed that CITY may do such work and supply such materials and charge the same against PRINCIPAL and SURETY on this obligation, and PRINCIPAL and SURETY hereon shall be subject to the liquidated damages mentioned in the Contract for each day's failure on its part to comply with the terms and provisions of such Contract.

Provided, further, that if any legal action be filed on this Bond, venue shall lie in Tarrant County, Texas.

And, that SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work performed thereunder, or the plans, specifications, drawings, etc., accompanying 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 to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by SURETY as the agent resident in either Tarrant or Dallas County to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, this instrument is executed on this the _____ day of _____, 20___.

WITNESS	PRINCIPAL
	_____ Company
By _____ Signature	By _____ Signature
_____ Typed/Printed Name	_____ Typed/Printed Name
_____ Title	_____ Title
_____ Address	_____ Address
_____ City State Zip	_____ City State Zip

WITNESS

SURETY

_____
Company

By _____
Signature

_____
Typed/Printed Name

_____
Title

_____
Address

_____
City State Zip

By _____
Signature

_____
Typed/Printed Name

_____
Title

_____
Address

_____
City State Zip

NOTE: Date of Performance Bond must NOT be prior to date of Contract

END OF SECTION

SECTION NO. 9

THE STATE OF TEXAS §

Payment Bond

COUNTY OF TARRANT §

KNOW ALL BY THESE PRESENTS:

THAT_____

of the City of _____, County of _____

State of _____ hereinafter referred to as "PRINCIPAL", and

_____, a corporate surety/sureties organized under the laws of the State of _____ and authorized to do business in the State of Texas, hereinafter referred to as "SURETY", (whether one or more), are held and firmly bound unto the **CITY OF ARLINGTON, TEXAS**, a municipal corporation located in Tarrant County, Texas, hereinafter referred to as "CITY", and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, in the penal sum of _____**DOLLARS and _____ CENTS($)**, lawful money of the United States, to be paid in Arlington, Tarrant County, Texas, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally; and firmly by these presents, the condition of this obligation is such that,

WHEREAS, PRINCIPAL entered into a certain Contract with the City of Arlington, dated the day of _____, _____, a copy of which is attached hereto and made a part hereof, to furnish all materials, equipment, labor, supervision, and other accessories necessary for the construction of:

I-20 Sanitary Sewer Rehabilitation
City of Arlington Project No. WUWS17021

in the City of Arlington, Texas, as more particularly described and designated in the above referenced contract such contract being incorporated herein and made a part hereof as fully and to the same extent as if written herein word for word:

NOW THEREFORE,

If PRINCIPAL shall well, truly and faithfully perform its duties and make prompt payment to all persons, firms, subcontractors, corporations and claimants supplying labor and materials in the prosecution of the work provided for in the above referenced Contract and any and all duly authorized modifications of such Contract that may hereafter be

made, notice to SURETY of such modifications being hereby waived, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, further, that if any legal action be filed on this Bond, venue shall lie in Tarrant County, Texas.

And, that such SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work performed thereunder, or the plans, specifications, drawings, etc. accompanying 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 to the work to be performed thereunder.

This Bond is given pursuant to the provisions of Chapter 2253 of the Government Code, as amended. The terms "payment bond beneficiary", "public work labor", and "public work material", as used herein, are in accordance with and as defined in the relevant provisions of Chapter 2253 of the Government Code.

The undersigned and designated agent is hereby designated by SURETY herein as the resident agent in either Tarrant or Dallas Counties to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, this instrument is executed on this the _____ day of _____, 20___.

WITNESS	PRINCIPAL
	_____ Company
By _____ Signature	By _____ Signature
_____ Typed/Printed Name	_____ Typed/Printed Name
_____ Title	_____ Title
_____ Address	_____ Address
_____ City State Zip	_____ City State Zip

WITNESS	SURETY
	_____ Company
By _____ Signature	By _____ Signature
_____ Typed/Printed Name	_____ Typed/Printed Name
_____ Title	_____ Title
_____ Address	_____ Address
_____ City State Zip	_____ City State Zip

The Resident Agent of the SURETY in either Tarrant or Dallas County, Texas, for delivery of notice and service of process is:

NAME_____

ADDRESS_____

NOTE: Date of Payment Bond must NOT be prior to date of Contract.

END OF SECTION

SECTION NO. 10

THE STATE OF TEXAS §

Maintenance Bond

COUNTY OF TARRANT §

KNOW ALL BY THESE PRESENTS:

THAT_____

of the City of _____, County of _____

State of _____ hereinafter referred to as "PRINCIPAL," and

_____, a corporate surety/sureties organized under the laws of the State of _____ and authorized to do business in the State of Texas, hereinafter referred to as "SURETY," (whether one or more), are held and firmly bound unto the **CITY OF ARLINGTON, TEXAS**, a municipal corporation located in Tarrant County, Texas, hereinafter referred to as "CITY," in the amount of_____ **DOLLARS and _____ CENTS ($_____)**, lawful money of the United States, to be paid in Arlington, Tarrant County, Texas, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, assigns, administrators and successors, jointly and severally; and firmly by these presents, the condition of this obligation is such that:

WHEREAS, PRINCIPAL entered into a certain written Contract with City of Arlington, dated the _____ day of _____, 20____, a copy of which is attached hereto and made a part hereof, to furnish all materials, equipment, labor, supervision, and other accessories necessary for the construction of:

I-20 Sanitary Sewer Rehabilitation
City of Arlington Project No. WUWS17021

in the City of Arlington, Texas, as more particularly described and designated in the above referenced contract such contract being incorporated herein and made a part hereof as fully and to the same extent as if written herein word for word:

NOW THEREFORE,

If PRINCIPAL will maintain and keep in good repair the work herein contracted to be done and performed for a period of two (2) years from the date of acceptance and perform all necessary work and repair any defective condition growing out of or arising in any part of the construction of said improvement, including but not limited to; performing all necessary backfilling that may arise on account of sunken conditions in ditches, or otherwise, repair any defective condition growing out of or arising from the improper joining of underground infrastructures, or on account

of any breaking of infrastructures caused by PRINCIPAL in laying or building the infrastructures, or on account of any defect arising in any of such work laid or constructed by PRINCIPAL, or on account of improper excavation or backfilling. It being understood that the purpose of this section is to cover all defective conditions arising by reason of defective materials, work or labor performed by PRINCIPAL; then this obligation shall be void, otherwise it shall remain in full force and effect; and in case PRINCIPAL shall fail to do so, it is agreed that CITY may do such work and supply such materials and charge the same against PRINCIPAL and SURETY on this obligation, and in addition, PRINCIPAL and SURETY herein shall be subject to the liquidated damages as provided in the Contract referred to herein for each day's failure on its part to comply with the terms and provisions of such Contract.

Provided, further, that if any legal action be filed on this Bond, venue shall lie in Tarrant County, Texas.

And, that SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work performed thereunder, or the plans, specifications, drawings, etc., accompanying 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 to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by SURETY as the resident agent in either Tarrant or Dallas County to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, this instrument is executed on this the _____ day of _____, 20___.

WITNESS	PRINCIPAL
	_____ Company
By _____ Signature	By _____ Signature
_____ Typed/Printed Name	_____ Typed/Printed Name
_____ Title	_____ Title
_____ Address	_____ Address
_____ City State Zip	_____ City State Zip

WITNESS	SURETY
	_____ Company
By _____ Signature	By _____ Signature
_____ Typed/Printed Name	_____ Typed/Printed Name
_____ Title	_____ Title
_____ Address	_____ Address
_____ City State Zip	_____ City State Zip

NOTE: Date of Maintenance Bonds must NOT be prior to date of Contract

END OF SECTION

SECTION NO. 11

SPECIAL PROVISIONS – GENERAL ADMINSTRATION SPECIFICATIONS

NUMERICAL LISTING

Section No.	
11-01	PURPOSE OF SPECIAL PROVISIONS
11-02	SCOPE OF WORK
11-03	MINORITY / WOMEN BUSINESS ENTERPRISE (MWBE) CONTRACT SPECIFIC GOAL
11-04	MINORITY / WOMEN BUSINESS ENTERPRISE (MWBE) POST AWARD COMPLIANCE
11-05	PREVAILING WAGE RATES
11-06	BONDS, INSURANCE, & AFFIDAVITS
11-07	INDEMNIFICATION
11-08	RIGHT TO AUDIT
11-09	SALES TAX EXEMPTION
11-10	CONTRACTOR PERSONNEL
11-11	MOBILIZATION AND BONDS
11-12	SUBMITTALS
11-13	CONSTRUCTION MEETING
11-14	PUBLIC MEETING
11-15	TIME FOR COMPLETION & LIQUIDATED DAMAGES
11-16	BONUS
11-17	COMPUTATION OF CONTRACT TIME FOR COMPLETION & DELAYS
11-18	CONSTRUCTION CONTINGENCY ALLOWANCE
11-19	MATERIALS AND WORKMANSHIP: WARRANTIES AND GUARANTEES
11-20	DEFECTIVE MATERIALS, EQUIPMENT, OR IN-PLACE CONSTRUCTION
11-21	QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)
11-22	SAFETY DATA SHEET
11-23	SATURDAY OR CITY HOLIDAY INSPECTIONS
11-24	WORK PERFORMED WITHOUT BENEFIT OF INSPECTIONS
11-25	MONTHLY ESTIMATE
11-26	OWNER NOTIFICATION
11-27	SIGNS FOR BUSINESSES
11-28	PROJECT SIGNS

11-29 QUANTITIES
11-30 CONTRACTOR SELF-PERFORMANCE

SECTION NO. 11

SPECIAL PROVISIONS – GENERAL ADMINISTRATION SPECIFICATIONS

11-01 PURPOSE OF SPECIAL PROVISIONS:

A. Paving and Drainage improvements shall be in accordance with the latest version of the STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION STANDARDS as issued by The North Central Texas Council of Governments (NCTCOG); Water and Sanitary Sewer improvements shall be in accordance with the latest version of the CITY OF ARLINGTON STANDARD SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION; hereinafter collectively referred to as "Standard Specifications".

B. All Special Provisions included in this contract document are for the purpose of adapting the Standard Specifications to the particular project which is subject to this agreement and of adding thereto such further provisions as may be necessary to state the contract in its entirety.

C. The work shall conform to the requirements of the Special Provisions and the details as shown on the drawings. These contract documents are intended to be complementary. The intent of the contract documents, including the Standard Specifications, Special Provisions, and other instruments, documents, drawings and maps comprising the Plans and Specifications, is to describe the completed work to be performed by the Contractor under the contract as an independent Contractor. Requirements of any of the contract documents are as binding as if called for by all. Any provision of the agreement vesting in the City or the engineer the right of inspection is understood by all the parties to be for the purpose of ensuring that the plans and specifications are complied with and that the completed work is obtained and described, and no such provision shall be interpreted as vesting the City or engineer the right to control the details of work.

D. In the event of conflict between documents, Special Provisions shall take priority over drawings, and drawings shall govern over Standard Specifications.

E. References made to TxDOT Items in this contract shall mean items in the latest version of the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges as published by the Texas Department of Transportation. Further technical requirements contained in other publications are referenced in sections where they apply and are hereby incorporated.

F. References made to "City" shall mean the City of Arlington.

11-02 SCOPE OF WORK:

A. The work governed by these specifications is located in the City of Arlington, Texas and consists of **I-20 Sanitary Sewer Rehabilitation**, City of Arlington Project No. **WUWS17021**, including all necessary appurtenances.

B. The Contractor shall provide, at his/her own expense, all construction staking required to perform the work as described in the plans and specifications. For City capital projects, control monuments may be verified by the City. The Contractor shall set excavation and fill stakes on or near the right-of-way, all stakes necessary for water or sewer relocation and storm drain placement, 4-feet off-set back of curb stakes for subgrade stabilization and paving, and intermediate grade stakes (i.e. blue topping, fill, or cut stakes) on the centerline. All staking shall be subjected to inspection by the City. While the City shall have the right to inspect, it shall have no duty to inspect. The Contractor will be responsible for any discrepancies from the plan alignment and/or grade. Calendar days will not be adjusted due to the lack of available crews or due to the negligence of the Contractor or vandalism that causes the replacement of stakes.

C. Work shall be accomplished between the hours of 7 a.m. to 6 p.m. (Central Standard Time) and 7 a.m. to 8 p.m. (Central Daylight Savings Time), Monday through Friday unless otherwise approved by the City. For Saturday and holiday inspections, see Section 11-22.

D. Contractor is responsible to stay informed of all events involving the AT&T (Cowboys) Stadium, Globe Life Field (Texas Rangers) and any other major events at other venues in the Entertainment District. Contractor shall not work in the Entertainment District unless approved by the City's Traffic Engineering division. Upon approval to proceed with construction, the Contractor must complete work and remove all traffic control devices two (2) days prior to the next event, or as directed by the City. It will be the responsibility of the Prime Contractor to see that Subcontractor(s) is in compliance with requirement.

11-03 MINORITY/WOMEN BUSINESS ENTERPRISE (MWBE) CONTRACT SPECIFIC GOAL: The City's Minority/Woman Business Enterprise (MWBE) utilization goal, for this project is **26** %.

The contractor's MWBE commitment percentage is based on the total value of the contract including any change orders and modifications throughout the contract agreement.

11-04 MINORITY/WOMEN BUSINESS ENTERPRISE (MWBE) POST AWARD COMPLIANCE:

A. The Contractor shall report all subcontractor payment activity with the Contractor's monthly estimate in accordance to Section 11-25. If change orders, amendments or any contract modification are issued by the City, the Contractor has a contractual commitment to meet and/or exceed their MWBE utilization goal. Contractor is obligated to immediately notify the City, in writing, of any agreed increase or decrease in the scope of work that will impact the MWBE participation in the contract.

B. The Contractor cannot terminate, substitute, or change the terms of the MWBE Utilization Plan prior to or after Contract award without prior written consent from the City. If the Contractor is unable to meet its MWBE commitment with certified MWBE companies, the Contractor shall satisfy its commitment, as it relates to the scope of work changes, modifications, and/or amendments by soliciting new certified MWBE companies.

Contractor shall submit a Request for Approval of Change to MWBE Utilization Plan for review and written approval from the City.

If the City observes any MWBE subcontractor other than those listed on the MWBE Utilization Plan are performing work or providing materials and/or equipment for those MWBE Subcontractors listed on the MWBE Utilization Plan, the Contractor will be notified in writing that an apparent violation is taking place and payments may be withheld in addition to any other sanctions included in the MWBE Policy and Procedures Manual. The Contractor will be given an opportunity to meet with the City prior to a finding of noncompliance.

C. Contractor shall pay its subcontractors no later than the 5th business day after the date the prime contractor receives payment from the City. The prime contractor also agrees to promptly request the release of any retainage withheld from subcontractors within five (5) business days after the subcontractor's work is satisfactorily completed and receives partial acceptance, substantial completion or final completion/final acceptance as defined in the General Provisions of the contract. Furthermore, the prime contractor agrees to pay the subcontractor its retainage within five (5) business days after the date the prime contractor receives the subcontractor's retainage payment from the City.

A finding of non-payment shall be a material breach of this contract. The City may withhold progress payments until the Contractor demonstrates timely payment due all subcontractors. The City also reserves the right to exercise other breach of contract remedies.

D. During the performance of this Contract, the Contractor or Subcontractor agrees that it will not discriminate on the basis of on race, age, color, religion, sex, sexual orientation, gender identity, national origin, ancestry, gender, disability, or place of birth in the award. Failure by the Contractor to ensure non-discrimination is a material breach of this Contract, which may result in the termination of this Contract or such other remedy, as the City deems appropriate. The Contractor must insert the substance of this clause in all Subcontracts and purchase orders.

E. The failure by the Contractor to carry out the requirements of the Program is a material breach of the Contract and may result in the termination of the Contract or such other remedies as the City deems appropriate. Violation of MWBE Policies and Procedures, or Contractual obligations, may result in any one or more of the following sanctions:

1. Administrative Warning: Issued for first-time violations or minor violations.
2. Withholding of funds payable under the Contract, including, but not limited to, funds payable for work self-performed by the Contractor or applicable retainage.
3. Temporarily suspending, at no cost to the City, Contractor's performance under the Contract.
4. Termination of the Contract.
5. Suspension/debarment of a Contractor for a period of time from participating in any solicitations issued by the City.

11-05 PREVAILING WAGE RATES:

A. The Contractor shall comply with V.T.C.A., Government Code, Chapter 2258, in performing this project. In accordance with V.T.C.A., Government Code, Chapter 2258, the prevailing wage rates as set forth in Section 2 of the contract documents shall be paid on this project. For overtime work and legal holidays, the hourly rate shall be one and one-half (1½) times the basic hourly rate set forth in Section 2. The City will require Contractor to execute an affidavit affirming that all wages are in strict compliance with the established prevailing wages rates as described in the contract documents and all wages have been or will be paid accordingly. The City reserves the right to conduct interviews with the Contractor's employees to ensure compliance with Section 2 of the contract documents in accordance with applicable State and Federal Laws.

B. Upon written request by the City, the general Contractor shall be responsible for submitting payroll information to the City for all employees performing work on the project, whether employed by the general Contractor or a subcontractor to the general Contractor. Each submittal shall be certified by the general Contractor as to completeness and accuracy.

C. A Contractor or subcontractor in violation of V.T.C.A., Government Code, Chapter 2258 is liable for a penalty. That Contractor or subcontractor shall pay to the City sixty dollars ($60.00) for each laborer, workman, or mechanic employed for each calendar day, or portion thereof, such laborer, workman, or mechanic is paid less than the said stipulated rates for work done under the contract.

D. The Contractor or subcontractor violating a requirement of this Special Provision may be determined ineligible to bid on or receive any additional work during the calendar year following the year in which the violation of this Special Provision occurred.

11-06 BONDS, INSURANCE AND AFFIDAVITS:

A. The following bonds and proof of insurance shall be filed with the City of Arlington as a condition of the contract, together with appropriate powers of attorney.

1. Performance, Payment, And Maintenance Bonds: Performance, payment and maintenance bonds in the amount of not less than one hundred percent (100%) of the contract price conditioned upon the faithful performance of the contract, and upon payment of all persons supplying labor or furnishing materials, will be required upon the forms which are a part of the Contract Documents. Bonds shall be executed by a surety company authorized to do business in the State of Texas and acceptable to and approved by the City. The period of the Maintenance Bond shall be two (2) years from the date of acceptance of all work done under the contract, to cover the guarantee as set forth in the Special Provisions.

2. Performance Bonds And Payment Bonds In Excess Of $100,000: In addition to all other requirements set forth with regard to performance bonds and payment bonds, any performance bond or payment bond in an amount exceeding One Hundred Thousand Dollars ($100,000) must be issued by a surety that is qualified as a surety on obligations permitted or required under federal law as indicated by publication of

the surety's name in the current U.S. Treasury Department Circular 570. In the alternative, an otherwise acceptable surety company that is authorized and admitted to write surety bonds in Texas must obtain reinsurance on any amounts in excess of One Hundred Thousand Dollars ($100,000) from a reinsurer authorized and admitted as a reinsurer in Texas who qualifies as a surety or reinsurer on obligations permitted or required under federal law as indicated by publication of the surety's or reinsurer's name in the current U.S. Treasury Department Circular 570.

3. Insurance: Contractor shall, at his/her own expense, purchase, maintain and keep in force during the term of this contract such insurance as set forth below. Contractor shall not commence work under this contract until he/she has obtained all the insurance required under the contract and such insurance has been approved by the City, nor shall the Contractor allow any subcontractor to commence work on his/her subcontract until all similar insurance of the subcontractor has been obtained and approved. All insurance policies provided under this contract shall be written on an "occurrence" basis. The policy limits stated below are at a minimum.

Liability Insurance	
Commercial General Liability (No standard coverages are to be excluded by endorsement. XCU and contractual liability are not to be excluded)	$1,000,000 Per Occurrence/ $2,000,000 Aggregate
Automobile Liability Insurance	
Commercial Auto Liability Policy (Any Auto, including hired, and non-owned autos)	$ 1,000,000 Combined Single Limit
Umbrella Liability	
(Following Form and Drop Down Provisions Included)	$2,000,000 Each Occurrence
Workers' Compensation Insurance	
Workers' Compensation	Statutory Limit
Employer's Liability	$1,000,000 Each Occurrence $1,000,000 Disease - Each Employee $1,000,000 Disease – Policy Limit
Professional Liability – required for Contractor or subcontractor performing CCTV services and report	
Or Errors & Omissions coverage	$1,000,000 per claim $2,000,000 Aggregate

(Rev. 1/2020)

B. It is agreed by all parties to this contract that the insurance policies required under this contract shall be endorsed to provide:

1. The City, its officials, employees and volunteers shall be named as an additional insured on the Commercial General Liability, Automobile Liability and Umbrella Liability insurance policies. These insurance policies shall contain the appropriate additional insured endorsement to cover premises/operations and products/completed operations, including materials, equipment or supplies provided by the City. (Rev. 9/2019)

2. The General Liability policy shall be endorsed as primary and non-contributory with other insurance carried by the City, and aggregate policy limits shall apply "per project";

3. Provide for thirty (30) days notice of cancellation to the City, ten (10) days notice of cancellation is acceptable for nonpayment of premium;

4. Be written through companies duly authorized to transact that class of insurance in the State of Texas with an A.M. Best rating of A:VII or better; and,

5. Waive subrogation rights for loss or damage so that insurers have no right to recovery or subrogation against the City of Arlington, it being the intention that the required insurance policies shall protect all parties to the contract and be primary coverage for all losses covered by the policies.

6. Provide one copy of a Certificate of Insurance on an Acord form or other State-approved form evidencing the required coverages to:

Arlington Water Utilities Department, MS01-0200
Attention: Ashley Brown, Capital Projects Coordinator
City of Arlington
P.O. Box 90231
Arlington, TX 76004-3231

C. Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the City (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the City or the City's property might be responsible or encumbered (less amounts withheld by City) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the contract documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) days prior written notice has been given to the City, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the contract documents, (4) consent of Surety, if any, to final payment and (5) if required by the City, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the contract, to the extent and in such form as may be designated by the City. If a subcontractor refuses to furnish a release or waiver required by the City, the Contractor may furnish a bond satisfactory to the City to indemnify the City of Arlington against such lien. If such lien

remains unsatisfied after payments are made, the Contractor shall refund to the City all money that the City may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

D. In addition to the requirements contained above, the Contractor shall comply with the following in its provision of workers' compensation insurance.

1. Definitions:

   Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

   Duration of the project - includes the time from the beginning of the work on the project until the Contractor's/person's work on the project has been completed and accepted by the governmental entity.

   Persons providing services on the project ("subcontractor" in §406.096) - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent Contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries and delivery of portable toilets.

2. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.

3. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

4. If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

5. The Contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

a. a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and

b. no later than seven (7) days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

6. The Contractor shall retain all required certificates of coverage for the duration of the project and for two (2) year thereafter.

7. The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within ten (10) days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

8. The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

9. The Contractor shall contractually require each person with whom it contracts to provide services on a project, to:
   a. provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;

   b. provide to the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

   c. provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

   d. obtain from each other person with whom it contracts, and provide to the Contractor:
      1. a certificate of coverage, prior to the other person beginning work on the project; and

      2. a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

e. retain all required certificates of coverage on file for the duration of the project and for one (1) year thereafter;

f. notify the governmental entity in writing by certified mail or personal delivery, within ten (10) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

g. contractually require each person with whom it contracts, to perform as required by paragraphs 1 – 7 above, with the certificates of coverage to be provided to the person for whom they are providing services.

10. By signing this contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the governmental entity that all employees of the Contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

11. The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the governmental entity.

A. It is understood and acknowledged by both parties that the minimum amounts for insurance, as provided for herein may be adjusted from time to time due to changing conditions to cover City's needs as determined by its Risk Manager.

B. Any of the insurance policies required under this section may be written in combination with any of the others, where legally permitted, but none of the specified limits may be lowered thereby.

11-07 INDEMNIFICATION: Contractor does hereby agree to waive all claims, release, indemnify, defend and hold harmless the City of Arlington and all of its officials, officers, agents, employees, in both their public and private capacities, from and against any and all liability, claims, losses, damages, suits, demands or causes of action including all expenses of litigation and/or settlement, court costs and attorney fees which may arise by reason of injury to or death of any person or for loss of, damage to, or loss of use of property occasioned by error, omission, or negligent act of Contractor, his or her officers, agents, employees, subcontractors, invitees or any other persons, arising out of or in connection with the performance of this contract, and Contractor will at his or her own cost and expense defend and protect City of Arlington from any and all such claims and demands. Contractor does hereby agree to waive all claims, release, indemnify, defend and hold harmless City of

Arlington and all its officials, officers, agents, and employees, from and against any and all claims, losses, damages, suits, demands or causes or action, and liability of every kind including all expenses of litigation and/or settlement, court costs and attorneys fees for injury or death of any person or for loss of, damage to, or loss of use of any property, arising out of or in connection with the performance of this contract. Such indemnity shall apply whether the claims, losses, damages, suits, demands or causes of action arise in whole or in part from the negligence of the City of Arlington, his or her officers, officials, agents or employees. It is the express intention of all the parties that the indemnity provided for in this paragraph is indemnity by Contractor to indemnify and protect City of Arlington from the consequences of City of Arlington's own negligence, whether that negligence is a sole or concurring cause of the injury, death or damage and whether said negligence is characterized as sole, contractual comparative, concurrent, joint, gross, active, passive, or any other form of negligence.

In any and all claims against any party indemnified hereunder by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, this indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workmen's compensation acts or other employee benefit acts.

11-08 RIGHT TO AUDIT:

A. Contractor agrees that City shall, until the expiration of three (3) years after final payment under this contract, have access to and the right to examine any directly pertinent books, documents, papers and records of Contractor involving transactions relating to this contract. Contractor agrees that City shall have access during normal working hours to all necessary Contractor facilities and shall be provided adequate and appropriate work space in order to conduct audits in compliance with the provisions of this section. City shall give Contractor reasonable advance notice of intended audits.

B. Contractor further agrees to include in subcontract(s), if any, a provision that any subcontractor agrees that City shall have access to and the right to examine any directly pertinent books, documents, papers and records of such subcontractor involving transactions to the subcontract, and further, that City shall have access during normal working hours to all subcontractor facilities, and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with the provisions of this paragraph.

11-09 SALES TAX EXEMPTION: The Contractor is responsible for understanding Texas law regarding tax exemption for City projects and bidding accordingly. The latest information can be obtained from the State Comptroller's Office and/or other appropriate entities.

11-10 CONTRACTOR PERSONNEL:

A. The Prime Contractor shall provide phone number(s) of superintendent(s) available twenty-four (24) hours a day to handle any emergencies that may occur. (Rev. 3/2019)

B. The Prime Contractor shall provide a superintendent authorized to receive and fulfill instructions from the Inspector at all times on the job site. Superintendent must: (Rev. 3/2019)

1. Serve as the Contractor's primary point of contact.

2. Be a permanent staff employee.

3. Be knowledgeable of the specifications herein and common construction practices.

4. Be responsible for the performance of the crew(s).

5. Be responsible for the day to day operations in accordance to the service requirements throughout the term of the contract.

6. Make decisions and receive, follow, give, and understand written and verbal instructions in English, and inspect the work site with City upon request.

7. Provide copy of the monthly pay estimate/quantity to the Inspector on the spreadsheet provided by the City.

8. Upload MWBE Reporting to the City's Diversity Management System (B2Gnow).

C. The City recognizes that events beyond the control of the Contractor (such as death, physical or mental incapacity, long-term illness, or the voluntary termination of employment of the on-site supervisor) will require the Contractor to propose a replacement. In the event that such replacement is necessary, the Contractor agrees that no personnel shall begin work on the project without written approval from the City.

D. The Contractor shall employ only competent, efficient workmen and shall not use any unfit person or one that is not skilled in the work assigned to him. The Contractor shall at all times maintain good order among his/her employees.

E. Whenever the City informs the Contractor in writing that, in his/her opinion, any employee is unfit, unskilled, disobedient or is disrupting the orderly progress of the work, such employee shall be removed from the project. The City may orally require immediate removal of an employee for cause, to be followed by written confirmation.

11-11 MOBILIZATION AND BONDS: A lump sum bid item in the amount designated in the PROPOSAL has been included for compensation for mobilization and bonds. This item is a one-time pay item per project and will not be paid per location unless otherwise stated in the PROPOSAL. Upon presentation of a paid invoice for the required bonds, the Contractor will be paid that amount from the amount stated in the PROPOSAL. However, a monthly pay estimate will not be processed solely for paying these items. Work on other pay items must be initiated prior to processing the first monthly pay estimate. The remaining amount of the lump sum will be paid when ten percent (10%) of the amount for the original construction items is earned.

11-12 SUBMITTALS:

A. Contractor shall submit plans or product data to City for review and approval prior to the purchase or fabrication of any equipment or material for use on this project.

B. Submittals shall include but not limited to the following:

- Streetlight Pole Assemblies, including Luminaires
- Signal Pole Assemblies
- Pedestrian Pole Assemblies
- Concrete Design
- Asphalt Design
- Pipe Or Box Culvert Material
- Any Pre-Cast Structures (If Approved)
- Turf Reinforced Matting (TRM)
- Water/Sanitary Sewer Products
- Trench Safety
- Concrete Formliners
- Specialty Concrete/Brick Pavers
- Modular Block Walls And Tie-Backs
- Traffic Control Plans (1 hard copy)
- SWPPP (2 hard copies)
- Street Marker Blades

C. Submittal shall include all appropriate catalog cut sheets, shop drawings, product specifications, and other product documentation as requested by the City. Shop drawings and other necessary data for all non-catalog or custom-made items, shall be sealed or certified accordingly. Unless otherwise noted, submittals should be in electronic format.

D. In order to facilitate review, the Contractor shall clearly label each item of submittal data with the bid item number which it applies to. Each submittal shall contain sufficient information and details to permit full evaluation of the item and its interrelationship with other items. Submittals that, in the judgment of the City, are insufficient to permit proper evaluation, will not be reviewed.

E. Items that are "rejected" are judged to be basically unacceptable and the Contractor shall proceed immediately to identify new items or redesign said items and resubmit them for review.

F. The Contractor shall allow a fourteen (14) business day review period for each package of submittal information. No time extensions will be granted to the Contractor as a result of re-occurring incomplete or unacceptable submittals or resubmittals.

G. Review and acceptance of the submittal data by the City shall not relieve the Contractor of his/her obligation to furnish and install the work in accordance with the contract documents.

11-13 CONSTRUCTION MEETING: A pre-construction meeting will be held prior to the issuance of the Notice to Proceed. The purpose of this meeting is to cover all aspects of the project. Issues will be discussed related to the chain-of-command, areas of special concern, and coordination expectations. Weekly or bi-weekly project construction meetings may be held for this project. The City will schedule the time and location; and determine the frequency of these meetings. A representative of the Contractor, knowledgeable of the project, shall attend these construction meetings.

11-14 PUBLIC MEETING: A Public Meeting will not be held for this project.

11-15 TIME FOR COMPLETION AND LIQUIDATED DAMAGES: Since time is of the essence, the City has seen fit to establish the time required to complete this project. The time, as set out in SECTION 6 of this contract, will be the maximum number of **calendar** days allowed to substantially complete this project. Substantially complete is defined as having completed all bid items included in the contract to allow the facilities to function as designed. Failure of the Contractor to complete the work within this time will result in damages being sustained by the City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. The Contractor will pay the City five hundred dollars **($500)** for each **calendar** day of delay (including Sundays and holidays**)** in finishing the work in excess of time specified for completion, plus any authorized time extensions. Execution of the contract under these specifications shall constitute agreement by the City and Contractor that five hundred dollars **($500)** is the minimum value of the costs and actual damage caused by failure of the Contractor to complete the work within the allotted time, that such sum is liquidated damages and shall not be construed as a penalty, and that such sum may be deducted from payments due the Contractor if such delay occurs. .

11-16 BONUS: N/A

11-17 COMPUTATION OF CONTRACT TIME FOR COMPLETION & DELAYS:

A. Time will be charged for all calendar days regardless of weather conditions, material supplies, or other conditions not under the control of the Contractor, which could impede the progress of the work. Time will also be charged for Sundays and holidays.

B. Prior to beginning construction operations, the Contractor shall submit to the City a critical path method (CPM) chart progress schedule showing the manner of prosecution of the work that he intends to follow in order to complete the contract within the allotted time. The purpose for this schedule is to assure adequate planning and execution of the work. The progress schedule must present a reasonable approach to completing the work within the allotted time.

C. Payment of partial monthly estimates will not be processed until the CPM chart progress schedule has been approved by the City.

D. The Contractor shall be entirely responsible for maintaining the progress of the work in accordance with the approved schedule. Should it become evident, in the opinion of the City, any time during the construction that the progress of the work has not been maintained

in accordance with the approved schedule, the Contractor shall, upon written request by the City, promptly submit a revised schedule. This revised schedule shall set out operations, methods, equipment, added labor, and additional work shifts by which time lost shall be made up. At the end of each estimate period, the City will determine whether the Contractor is in compliance with the approved schedule, or the approved revised schedule. In the event the Contractor is determined not to be in compliance, he/she will be notified immediately in writing. If the Contractor does not correct the work progress to comply with the approved revised schedule by the end of the month of notification, payment for work performed during the period of non-compliance will be reduced according to the following:

1st Month - Reduction = 30% X work performed (Month Only)
2nd Month - Reduction = 40% X work performed (Month Only)
3rd Month - Reduction = 50% X work performed (Month Only)
Subsequent Month - Reduction = 50% work performed (Month Only)

E. The first month (the month of notification) is that month in which notification is made. Each month's reduction will be assessed only for that work performed during that specific month. The reduction will be cumulative for the entire period of non-compliance; i.e., thirty percent (30%) payment reduction for the work performed during the first month, plus forty percent (40%) payment reduction for work performed during the second month, plus fifty percent (50%) payment reduction for work performed during the third month, and plus fifty percent (50%) payment reduction for work performed in each succeeding month of non-compliance thereafter. When the work progress becomes in compliance with the approved schedule, or the approved revised schedule, all withheld monies will be paid to the Contractor with the next regular estimate.

F. The Contractor shall anticipate possible delays and shall be prepared to supplement and revise his/her construction methods accordingly. The Contractor assumes the risk of all suspensions of or delays in performance of the contract, regardless of length thereof, arising from all causes whatsoever, whether or not relating to this contract, including wrongful acts or omissions of the City or its Contractors or subcontractors except only to the extent, if any, that compensation or an extension of time may be due as expressly provided for elsewhere in this contract for such suspension or delays, and, subject only to such exception, the Contractor shall bear the burden of all costs, expenses and liabilities which he/she may incur in connection with such suspensions or delays, and all such suspensions, delays, costs, expenses and liabilities of any nature whatsoever, whether or not provided for in this contract, shall conclusively be deemed to have been within the contemplation of the parties.

G. Notwithstanding any provisions of this contract, whether relating to time of performance or otherwise, City makes no representation or guarantee as to when the construction site or any part thereof will be available for the performance of the contract, or as to whether conditions at the construction site will be such as to permit the contract to be performed thereon without interruption or by any particular sequence or method or as to whether the

performance of the contract can be completed by the time required under this contract or by any other time.

H. Wherever in connection with this contract it is required, expressly or otherwise, that City shall perform any act relating to the contract, including making available or furnishing any real property, materials or other things, no guarantee is made by the City as to the time of such performance and the delay of City in fulfilling such requirement shall not result in liability of any kind on the part of City except only to the extent, if any, that an extension of time or compensation may be due as expressly provided for in this contract.

I. If the contract requires unforeseen work or work and materials in greater amounts than those set forth in the contract, then additional calendar days may be considered at the discretion of the City. However, the completion time can only be changed by the execution of a signed agreement. An extension of time will only be considered when a claim for such extension is submitted to the City in writing by the Contractor within fourteen (14) calendar days from the time when any alleged cause of delay occurs.

11-18 CONSTRUCTION CONTINGENCY ALLOWANCE: A construction contingency allowance, in the amount designated in the PROPOSAL, is provided to allow for expeditious handling of unforeseen conditions that may arise during the course of the Project and may only be used with the concurrence of the City. Before contingency work is performed, the Contractor shall submit a proposed price for the work to the City and shall obtain written approval before proceeding with the additional work. Any balance of funds remaining in the construction contingency allowance at the close of the project belong to and shall remain with the City.

11-19 MATERIALS AND WORKMANSHIP: WARRANTIES AND GUARANTEES: Under the terms of the warranties which arise from these contract documents and/or by the terms of any applicable special warranties required by the contract documents, if any of the work in accordance with this contract is found to not be in accordance with the requirements of the contract documents, the Contractor shall correct such work promptly after receipt of written notice from the City or other entity as the contract documents may provide. This obligation shall survive acceptance of the work under the contract and termination of the contract. If Contractor fails within a reasonable time after written notice to correct defective work or to remove and replace rejected work, or if Contractor fails to perform the work in accordance with the contract documents, or if Contractor fails to comply with any provision in the contract document, either the City or its designee may, after seven (7) days written notice to Contractor, correct and remedy any such deficiency at the expense of the Contractor.

11-20 DEFECTIVE MATERIALS, EQUIPMENT OR, IN-PLACE CONSTRUCTION:

A. Materials and equipment not conforming to the requirements of these specifications will be rejected and shall be removed immediately from the site of the work, unless permitted to remain by the Inspector. Rejected materials, the defects of which have been subsequently corrected, shall be considered as new material.

B. In-place construction not conforming to the requirements of these specifications will be removed and replaced/reworked at the Contractor's expense as deemed appropriate by the

City. Tests made on in-place construction which has been replaced or reworked due to failure to meet project specifications will be authorized by the City and the cost of such tests will be the expense of the Contractor. Testing will be performed by testing company under contract with the City at the rates specified by that contract.

11-21 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC):

A. The City shall have the authority to test materials, equipment and in-place construction to verify compliance with project specifications. Unless otherwise noted within these Special Provisions, the expense of testing shall be paid for by the City.

B. If there are any failing tests, the Contractor shall be responsible for all cost of additional testing until compliant. The failure of the City to make any tests shall in no way relieve the Contractor of his/her responsibility to provide materials, equipment, and in-place construction which comply with project specifications.

C. The Contractor shall provide such facilities as the City may require for collecting and forwarding samples and shall not, without specific written permission of the City, use the materials represented by the samples until tests have been made and materials approved for use. The Contractor will furnish adequate samples without charge to the City.

D. All testing shall be coordinated through the Inspector. Results of tests shall be based on findings by the City's contracted testing facility.

11-22 SAFETY DATA SHEET: Contractor shall provide a copy of Safety Data Sheets (SDS), product specifications, Manufacturer's warranty, and application instructions to City for approval prior to commencing work, if applicable. (Rev 9/2019)

11-23 SATURDAY OR CITY HOLIDAY INSPECTION:

A. In an effort to limit face-to-face contact and maintain continuing operations, the City will accept credit card payments over the phone for Saturday/Holiday Inspection fees. (Rev. 4/2020)

B. Any Contractor requiring the services of an Inspector on Saturdays will be charged a flat rate of $40.00 per hour for inspection services. In addition, the Contractor will also be required to pay a non-refundable $100.00 deposit to the City. Contactors will notify the Department of Public Works and Transportation by 4:30 PM on the preceding Thursday at 817-459-6550 to request Saturday/Holiday Inspection Services. If the request is not submitted by the deadline, the Contractor will not be able to work on the requested Saturday/Holiday. City Staff from the Planning and Development Department will contact the Contractor Friday by 10:00 AM to process a credit card over the telephone. For each transaction, there is a 2.75% third party credit card processing fee. This is not a city fee. A receipt will be emailed to the Contractor. (Rev. 4/2020)

C. Following the performance of inspection services, an invoice will be prepared and mailed to the Contractor. The $100.00 deposit will be deducted from the total invoice amount.

All invoices must be paid in order for the Contractor to receive the retained funds at the termination of a project, and/or to receive a final project acceptance.

D. The Contractor will be charged only for the hours worked. If the Contractor works only 2.5 hours, no invoice will be generated (2.5 hours x $40 = $100 deposit already received). If an Inspector watches several projects and the remitted deposits equal or surpass the amount needed to pay for his or her hours, no invoices will be delivered. However, if the $100.00 deposit is delivered and the Contractor is unable to work for any reason, including weather, the $100.00 fee will not be refunded.

E. Construction Services management will determine the appropriate number of Inspectors necessary and which Inspectors will work on each Saturday.

F. No money will be exchanged in the field.

G. Overtime during the work week is not subjected to the required process listed above. Night time tie-ins are also exempt from these rules when they are done in an effort to reduce the impact of water outages to customers.

H. No work will be permitted on Sundays without prior approval from the Construction Services Manager. If approved to work on Sunday, the Saturday inspection rates will apply.

I. Holiday Schedule

1. Below are holidays observed by the City of Arlington. Actual date/day that the holiday is observed changes yearly based on the calender. No work will be permitted except in the most extreme circumstances and with prior approval from the Construction Services Manager. If approved to work on a holiday, the Saturday inspection rates will apply.

   - » Martin Luther King Day
   - » President's Day
   - » Good Friday
   - » New Year's Day
   - » Memorial Day
   - » Juneteenth
   - » Independence Day
   - » Labor Day
   - » Thanksgiving Day
   - » Thanksgiving Friday
   - » Christmas Eve
   - » Christmas Day

(Rev. 1/2022)

2. In addition to the above, no work will be permitted on the weekend adjoining a holiday that falls on Friday or Monday.

(Rev. 1/2022)

11-24 WORK PERFORMED WITHOUT BENEFIT OF INSPECTION:

A. **Contractor shall provide the City 24 hours notice prior to any construction.** Any time work is being performed on bid items, work that supports bid items, or work that requires lane closures, an Inspector must be present. Work performed without the proper inspection will be consider unauthorized, and at the option of the Construction Services Manager may not be measured and paid for and may require removal at the Contractor's expense.

B. If the Contractor fails to satisfactorily repair, replace or remove the unauthorized work or materials immediately upon receipt of written notice, the City will have authority to cause such remediation to be performed and to deduct the cost thereof from any monies due or to become due to the Contractor.

C. If there is ever any question as to what requires inspection, please check with the assigned Inspector, Inspector Supervisor, or Construction Services Manager. General clean-up and similar items of work that have no direct pay can be performed without the benefit of inspection.

11-25 MONTHLY ESTIMATE:

A. Monthly pay estimates will be processed at the beginning of each month for work per formed during the prior month. Monthly pay estimates shall be submitted no later than the 1st day of each month. Assuming there are no issues encountered during the standard process, payment will be processed within thirty (30) days from the end of the prior month. (Rev. 9/2020)

B. Where multiple locations are included in the contract, City may require measurements to be performed on a daily basis. The Contractor is required to be present whenever (monthly or final) quantities are measured by the Inspector. The Inspector will coordinate with the Contractor to schedule a mutually agreeable date and time (including Saturdays) to perform the measuring. If the Contractor chooses not to be present when quantities are measured by the Inspector, the Contractor agrees to accept the Inspector's measurements. Invoices shall be submitted for the actual work performed.

C. Submittal of monthly pay estimate shall include:
- » Spreadsheet of itemized request (form provided by City)
- » SWPPP Report
- » Monthly Payment Breakdown (form provided by the City)
- » Invoices
- » Tickets
- » Other supporting documentation (where applicable or as required by the City)

D. Submittal of monthly pay estimate to the City's Diversity Management System (B2Gnow), including all payments to subcontractors on the Contract no later than 5 business days after City has agreed on quantities in monthly estimate.

E. Failure to submit by the deadline or without the required documents will result in the pay estimate being processed in the following month.

11-26 OWNER NOTIFICATION:

A. When work performed has the potential of disrupting businesses or homestead, including but not limited to water cutoff or driveway reconstruction, Contractor shall notify the business owners, occupants and residents in writing forty-eight (48) hours prior to commencing work. It is incumbent upon the Contractor to provide and place door hangers by the required time. Cost for producing the door hangers shall be subsidiary to various bid items.

B. Door hangers shall be printed in color, in English & Spanish, on 65 pound, white card stock paper and be designed as indicated below. Any deviation will require prior approval from the City. The City will provide a full scaled colored pdf version of the doorhangers to the successful contractor for production. (Rev 1/2019)

LIMITED STREET PARKING

ARLINGTON

Hello!

We are making progress on your street's project and need your help to finish it!

How does this construction affect me?

The City of Arlington is making improvements in your neighborhood. With that improvement comes construction. This construction may at times affect access in and around your street.

What do I need to do?

To help ensure that this project is completed in a timely fashion with minimal interruptions and to prevent damage to your personal vehicles, **please remove any vehicles, trailers, etc. that may interfere with the construction process and avoid parking on the street**, Monday through Friday from 7:00 a.m. to 5:00 p.m. on

Date	To Date

Please remember to tell any guest visiting you about this parking limitation.

What happens if I am unable to move my vehicles?

If vehicles are not moved, the towing of vehicles will be at the owner's expense of at least $200 (Article XIV, Section 14.04 Streets and Sidewalks).

Who can I talk to?

For any additional information or questions, please contact the following contractor or City staff member.

Contractor Name	
Contractor Phone Number	
City Inspector	
City Inspector Phone Number 817-459-6550	Date

We appreciate your cooperation and apologize for any inconvenience this may cause. The City of Arlington appreciates your help in moving this project forward!

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ESTACIONAMIENTO LIMITADO EN LA CALLE

¡Hola!

Estamos progresando en el proyecto de su calle y necesitamos su ayuda para terminar.

¿Como me afecta la construcción?

La City of Arlington esta mejorando su barrio. Con el mejoramiento viene construcción. Esta construcción puede afectar el acceso de su calle y las calles alrededor.

¿Que necesito hacer?

Para garantizar que este proyecto se termine a tiempo con minimas interrupciónes y para prevenir los daño a su vehículo, **por favor de mover sus vehículos, trailas, etc. que puede interferir con el proceso de construcción y evitar estacionar en el calle,** Lunes a Viernes de las 7:00 AM a 5:00PM

Fecha	Hasta Fecha

Por favor recuerda informar a sus visitantes de el estacionamiento limitado.

¿Que pasa si no puedo mover mi vehículo?

Si los vehículos no se han movido, vehiculos estacionados seran remolcados y será la responsabilidad financiera de el dueño de los gastos con minimo de $200 (Article XIV, Section 14.04 Streets and Sidewalks).

¿A quien puedo hablar?

Para información adicional o preguntas, por favor llama al siguiente contratista o personal de la ciudad.

Nombre de contratista	
Telefono de contratista	
Inspector de la ciudad	
Telefono de Inspector 817-459-6550	Fecha

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LIMITED DRIVEWAY ACCESS

ARLINGTON

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How does this construction affect me?

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What do I need to do?

To help ensure that this project is completed in a timely fashion with minimal interruptions and to prevent damage to your personal vehicles, **please remove any vehicles, trailers, etc. that may interfere with the construction process of your driveway and avoid parking on the street**, Monday through Friday from 7:00 a.m. to 5:00 p.m. on

Date	To Date

Your driveway will be closed during this time.

Please remember to tell any guest visiting you about this parking limitation.

What happens if I am unable to move my vehicles?

If vehicles are not moved, the towing of vehicles will be at the owner's expense of at least $200 (Article XIV, Section 14.04 Streets and Sidewalks).

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ACCESO LIMITADO EN LA ENTRADA DE VEHÍCULO

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¿Que necesito hacer?

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Fecha	Hasta Fecha

No tendra acceso a su entrada de vehículos durante este tiempo.

Por favor recuerda informar a sus visitantes de el estacionamiento limitado.

¿Que pasa si no puedo mover mi vehículo?

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UPCOMING WATER SHUTOFF

The City of Arlington is working to improve water services to your neighborhood and will be performing necessary utility work that requires turning off your water.

When will my water be turned off?

From	To
On	
Comments	

How can I get updates?

Go to www.arlingtontx.gov/wateroutages or sign up for email notifications by registering your account at www.arlingtontx.gov/wateronline.

Who can I talk to?

For any additional information or questions, please contact the following contractor or City staff member.

Contractor Name	
Contractor Phone Number	
City Inspector	Time
City Inspector Phone Number 817-459-6550	Date

We appreciate your cooperation and apologize for any inconvenience this may cause. This work is necessary for the enhancement of your neighborhood and the City of Arlington.

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APAGADO PROGRAMADO DE AGUA

La City of Arlington esta mejorando el servicio de agua en su barrio y estaremos haciendo las necesarias instalaciones que requiere apagar el servicio de agua.

¿Cuando se apagara mi servicio de agua?

Desde	Hasta
En	
Comentarios	

¿Como recibo actualizaciones?

Se puede recibir actualizaciones en www.arlingtontx.gov/wateroutages o se puede registrarse en www.arlingtontx.gov/wateronline para recibir notificaciones por correo electronico.

¿A quien puedo hablar?

Para información adicional o preguntas, por favor llamar al siguiente contratista o personal de la ciudad.

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Desde	Hasta
En	
Comentarios	

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Inspector de la ciudad	
Telefono de Inspector 817-459-6550	Fecha

Apreciamos su cooperación y nos disculpamos por la inconveniencia que esto puede causar. ¡La City of Arlington apreciamos su ayuda en el avance del proyecto!

11-27 SIGNS FOR BUSINESSES:

A. Weatherproof signs directing motorists to adjacent business entrances shall be provided by the Contractor and used during construction at locations directed by the City. The signs shall be approved by the City prior to fabrication and installation.

B. The sign shall include the business name, shall be at a minimum of 18-inches by 24-inches and have a minimum of 3-inches tall by 2-inches wide lettering. The sign shall be placed such that it is visible from the street to help direct patrons to adjacent businesses but shall not obstruct traffic visibility for vehicles exiting the driveway.

C. It will be the Contractor's responsibility to maintain the signs until such time as the City agrees they can be removed. A bid item has been included which shall cover all costs related to fabricating, installing, and maintaining the signs.

11-28 PROJECT SIGNS:

A. Contractor shall provide and install a minimum of two (2) project signs. Fewer signs may be allowed upon approval by the City.

B. Generally, project signs shall be located at the beginning and end of the project and on major intersecting streets. Locations of signs and specific information on signs shall be approved by the City prior to fabrication of signs.

C. Signs shall be in accordance with the appropriate sign detail for the project. Construction shall be on ¾-inch weatherproof (marine), 4-feet x 8-feet plywood and the painting/graphics shall be accomplished with good quality paint which will not weather or fade during the life of the contract. A jpeg file of the graphics is available on the City's web page, http://www.arlingtontx.gov/details. Color shall be similar in nature. Any deviation will require prior approval from the City. (Rev 4/2019)

D. Signs shall be placed in prominent locations and maintained in good condition until the completion of the project. Damaged or defaced signs will be repaired or replaced within two (2) calendar days at the Contractor's expense. The cost of the plywood sign(s) shall be considered subsidiary to the unit prices bid on this project.

11-29 QUANTITIES:

A. Quantities provided in the plans are superseded by quantities included in this contract. Quantities shown on plan sheets are for guidance only. (Rev. 8/2021)

11-30 CONTRACTOR SELF-PERFORMANCE:

A. The contractor shall use its own personnel and equipment to perform the primary work type identified in this contract. Primary work includes: sanitary sewer cured-in-place-pipe (CIPP) rehabilitation. Qualified subcontractors may be used to perform any other work types in this contract.

(Rev. 8/2021)

END OF SECTION

SECTION NO. 12

SPECIAL PROVISIONS – GENERAL CONSTRUCTION SPECIFICATIONS

NUMERICAL LISTING

Section No.	
12-01	STORMWATER MANAGEMENT CONTROLS
12-02	FILTER FABRICS
12-03	DETOURS AND BARRICADES
12-04	TEMPORARY TRAFFIC SIGNALS
12-05	PROTECTION OF THE PUBLIC
12-06	PROTECTION OF FLOODPLAIN
12-07	PROTECTION OF ADJACENT PROPERTY
12-08	PROTECTION OF ADJACENT LANDSCAPING IMPROVEMENTS
12-09	PROTECTION & CLEANING OF EXISTING STORM OR SANITARY SEWERS
12-10	MAINTENANCE OF ADEQUATE DRAINAGE
12-11	TEMPORARY ACCESS TO PRIVATE PROPERTIES
12-12	CRUSHED STONE BAD WEATHER PROTECTION
12-13	USE OF PRIVATE PROPERTY
12-14	USE OF CITY PARKS
12-15	CONSECUTIVE STREET CONSTRUCTION
12-16	TOWING OF VEHICLES
12-17	CONSTRUCTION WATER
12-18	DAILY CLEANUP & REMOVAL ITEMS
12-19	DUST CONTROL
12-20	MOWING DURING CONSTRUCTION
12-21	EXISTING UTILITIES
12-22	SITE PREPARATION
12-23	TREE REMOVAL
12-24	TREE TRIMMING
12-25	SITE GRADING
12-26	BORROW
12-27	FILLING
12-28	SELECT FILL

12-29 SPRINKLER RELOCATIONS
12-30 CRUSHED STONE CUSHION
12-31 BACKFILL & BACKFILL MATERIAL
12-32 MECHANICALLY COMPACTED BACKFILL
12-33 TRENCHLESS TECHNOLOGY
12-34 BACKFILL AND CLEANUP
12-35 FLOWABLE BACKFILL
12-36 TEMPORARY STREET REPAIR
12-37 VERTICAL ADJUSTMENT OF WATER VALVES, MANHOLES, ACCESS CHAMBERS AND CLEANOUTS
12-38 GREEN CEMENT
12-39 REINFORCING STEEL
12-40 RESTORATION OF EXISTING PAVED SURFACES
12-41 GALVANIZED GABIONS WITH PVC COATING
12-42 CONDUIT
12-43 SLOPE EROSION CONTROL
12-44 TOPSOIL
12-45 HYDRO-MULCH SEEDING
12-46 SODDING/TURFGRASS PLANTING
12-47 FINAL CLEANUP
12-48 FINAL INSPECTION

SECTION NO. 12

SPECIAL PROVISIONS – GENERAL CONSTRUCTION SPECIFICATIONS

12-01 STORMWATER MANAGEMENT CONTROLS:

A. This project is subject to the Texas Commission on Environmental Quality's (TCEQ) Construction General Permit under the Texas Pollutant Discharges Elimination System (TPDES) Program as well as the City's Ordinances. The City is a Municipal Separate Storm Sewer System (MS4) Operator.

B. The Contractor is considered the Primary Operator and is responsible for the Erosion Control Plan, Stormwater Pollution Prevention Permit (SWPPP), and or Notice of Intent/Notice of Termination (NOI/NOT) as well as ongoing compliance throughout construction. The Contractor shall provide adequate erosion, sedimentation and pollution controls, and shall be solely responsible for day to day operations, inspections, and maintenance of stormwater controls. It shall be the Contractor's responsibility to ensure no sediment leaves the site. An Erosion Control Plan has been included in the construction plans for the Contractor's use. The provided Erosion Control Plan serves as minimum measures to control erosion, sediment, and pollution during construction.

C. The City is considered the Secondary Operator and has control over specifications, plans and the Erosion Control Plan and/or SWPPP. The Contractor shall comply with all requests by the City for maintenance of stormwater controls or general site maintenance to prevent erosion, sedimentation, or pollution.

D. The information contained in the Erosion Control Plan, SWPPP, NOI and/or Site Notices shall be in accordance with the TPDES Construction General Permit and City's Ordinances. All plans, permits, and notices shall be submitted to the City for review at least fifteen (15) calendar days prior to commencement of construction activities. Final plans, permits and notices shall be submitted to the City and TCEQ (if applicable). Notices must be posted on site prior to commencement of construction activities.

E. All plans and permits shall be prepared and certified by a Licensed Professional Engineer or other professional, approved by the City, certified in a discipline that includes erosion and sediment control principles appropriate for the site in accordance with City Ordinances.

F. For projects that disturb less than twelve thousand (12,000) square feet that are not part of a Larger Common Plan of Development, no submittals are required. Installation, inspection and maintenance of stormwater controls shall be in accordance with standards set forth in the TPDES Construction General Permit.

G. For projects that disturb between twelve thousand (12,000) square feet and 1-acre that are not part of a Larger Common Plan of Development, the Contractor shall prepare an Erosion Control Plan (if it is not provided in the construction plans). Inspection and maintenance of stormwater controls shall be in accordance with standards set forth in the TPDES Construction General Permit.

H. For projects that disturb between 1-acre and 5-acres, the Contractor shall provide a site specific SWPPP and two (2) separate Site Notices (one to be signed by the Contractor and one to be signed by the City). The SWPPP shall be prepared and certified by a licensed professional civil engineer or by a certified professional who is familiar with the TCEQ TPDES Construction General Permit requirements. The SWPPP shall be subject to approval by the City and/or TCEQ and shall contain information as required by the TPDES General Permit Regulations and the City's checklist included in the City's Design Criteria Manual.

I. For projects larger than 5-acres, the Contractor shall provide a site specific SWPPP and two (2) separate Site Notices (one to be signed by the Contractor and one to be signed by the City). The SWPPP shall be prepared and certified by a licensed professional civil engineer or by a certified professional who is familiar with the TCEQ TPDES Construction General Permit requirements. The SWPPP shall be subject to approval by the City and/or TCEQ and shall contain information as required by the TPDES General Permit Regulations and the City's checklist included in the City's Design Criteria Manual. The Contractor shall submit a NOI to TCEQ and obtain a site specific TPDES authorization number prior to the commencement of construction activities. The Contractor shall submit a NOT within thirty (30) days of project completion to TCEQ. Copy of the NOI and NOT must be submitted to the City.

J. The following shall be maintained on the project site by the Contractor at all times:
   1. Post near main entrance to project site or at project site office:
      a. Site Notices (signed by the Contractor and the City) depending on project size.
      b. Local contact person with phone number.
      c. Brief description of project.
      d. Location of SWPPP (if applicable)
   2. SWPPP including any revisions (if applicable).

K. **The stormwater controls must be in place on the project prior to any construction activity. Any stockpiles of unusable items and/or excavated materials shall be removed from the project site within seven (7) days.** In case of failure on the part of the Contractor to control soil erosion, pollution and/or siltation, the City reserves the right to employ outside assistance or to use City forces to provide the necessary corrective measures. Such incurred direct costs plus project engineering costs will be billed to the Contractor. Contractor shall not begin work to the detriment of work already begun. Contractor shall conduct operations so as to impose a minimum interference to traffic. Monthly pay estimates to the Contractor may be withheld until Contractor is in compliance.

L. A lump sum bid item in the amount designated in the PROPOSAL has been to pay the Contractor for SWPPP preparation as well as providing, installing, and maintaining the physical stormwater control measures throughout construction and removal of all items and structures constructed for stormwater pollution protection once vegetation is established. Twenty five percent (25%) of this amount will be paid on the first monthly pay estimate with the remainder amount prorated equally to the remainder months of the contract time.

M. Contractor shall provide an electronic file in pdf format of the final SWPPP, including all revisions, inspections and NOT (if applicable) with the final payment estimate.

12-02 FILTER FABRICS:

A. The filter fabric shall be of a synthetic material that will allow stormwater to freely flow through while trapping sediment and debris. The geotextile shall be non-biodegradable and resistant to degradation by ultraviolet exposure and resistant to contaminants commonly encountered in storm water.

B. When applicable, the applications and uses of the filter fabric include but are not limited to the selection listed below. The filter fabrics have the following Minimum Average Roll Values (MARV) for physical properties:

			Applications/Uses				
			Silt Fence	Sub-Drain, French Drain	Dewatering	Separation, Pipe Embedment, Concrete Channels, Concrete Slope Protection, Weepholes	Construction Access
Tensile Strength	ASTM D-4632	LBS	100x 100	120	200	250	300
CBR Puncture	ASTM D-6241	LBS	250	300	600	700	850
Apparent Opening Size (max)	ASTM D-4751	US Sieve (max)	30	70	70	80	80
Apparent Opening Size (min)	ASTM D-4751	US Sieve (min)	80	80	80	100	100
Water Flow Rate	ASTM D-4491	GAL/ MIN/	8	120	85	75	75

UV Resistance	ASTM D-4355	% (500 HRS)	80	70	70	70	70
Woven / Nonwoven			Woven	Nonwoven	Nonwoven	Nonwoven	Nonwoven

12-03 DETOURS AND BARRICADES:

A. After coordinating and discussing plans with the Project Manager and Inspector the Contractor shall submit one (1) copy of a Traffic Control Plan, together with the Temporary Traffic Control Permit two (2) weeks prior to closing any street or causing any obstruction to traffic on any street to the Department of Public Works and Transportation. The Contractor shall not proceed with the implementation of the Traffic Control Plan until notified by the City that the plan has been accepted. The Traffic Control Plan shall be drawn at a scale not less than 1″=200′ unless approved by the Traffic Engineer; and such that it is legible; and shall include proposed street closings, detours, barricade placements, and sign placement, including advance warning signs, temporary signals, portable message boards and pavement markings, if necessary. (Rev. 9/2021)

B. The Contractor shall furnish and erect suitable barricades, signs, signals and appropriate pavement markings to protect motorists and pedestrians, as set forth in the latest edition of the TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. However, vertical panels will not be allowed unless approved by the Traffic Engineer. The barricades, signs, signals and pavement markings shall be constructed, placed, and adequately maintained as set forth in the Traffic Control Plan or as directed by the City.

C. Unless otherwise approved by the City two-way traffic shall be maintained on all roadways under construction at all times. If it becomes necessary to detour traffic off the existing paved roadway for more than seven (7) days, a hard surface driving lane, such as asphalt, shall be properly constructed and maintained by the Contractor throughout the duration of the detour. All temporary tie-ins shall be constructed to a minimum of 4-inches Type “B” asphalt over a compacted subgrade (standard compaction). Subsequent maintenance of all detours and tie-ins shall be considered subsidiary to the unit prices bid for temporary asphalt. Cutting, removing, and replacing the asphalt for utility installations, excavation, and/or liming operations shall be considered subsidiary to the initial placement of asphalt and will not be paid for each re-installation. Asphalt shall be replaced within seven (7) days of removal for these activities. A bid item is included for furnishing, installing, maintaining and final removal of the asphalt.

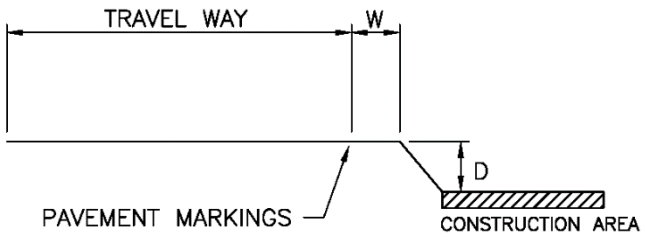
D. Where pavement drop-offs occur, traffic control plans shall be in accordance as illustrated on the following "Traffic Control Device Detail," which is enclosed as part of these specifications. These guidelines are applicable to construction work where continuous pavement edges or drop-offs exist parallel and adjacent to a lane used for traffic.

E. When performing maintenance on major arterials or as directed by the Traffic Engineer, Contractor shall use portable message boards to inform the public of the construction date,

length of project, and to expect delays. The signs shall be operational twenty-four (24) hours a day. Portable message boards shall be erected at minimum three (3) calendar days prior to beginning work or as directed by the City, and all verbiage shall be approved by the City Traffic Engineer.

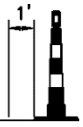
F. No direct compensation (unless bid item included) will be made to the Contractor for furnishing, installing, and maintaining any Traffic Control Devices, including but not limited to message boards, barricades, warning signs, signals, pavement markings, and detours and their subsequent maintenance and removal. This is to be considered subsidiary to the several items for which unit prices are requested in the PROPOSAL.

G. Should it be necessary for the City to provide and/or maintain signs, barricades, signals, and markings due to Contractors lack of response to correct deficiencies, Contractor shall be billed for the work performed by the City.

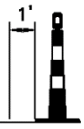


"W" GREATER THAN OR EQUAL TO 30' — NO DEVICE NEEDED

"W" LESS THAN 30' BUT GREATER THAN OR EQUAL TO 12' WITHOUT CURB OR 2' WITH CURB



"W" LESS 12' WITHOUT CURB OR 2' WITH CURB AND:

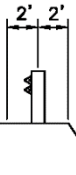


Ⓐ "D"=2" TO 6"

4'MIN. (6'DESIRED)

Ⓑ "D" GREATER THAN 6" TO 24"

Ⓒ "D" GREATER THAN 24"



MBGF, CONCRETE MEDIAN BARRIER OR "W" SECTION ON DRUMS FOR SLOPES STEEPER THAN 2:1 (IF SLOPE IS 2:1 OR FLATTER DETAIL B MAY BE USED)

TRAFFIC CONTROL DEVICE DETAIL

ALL TRAFFIC CONTROL SHALL COMPLY WITH THE LATEST EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES

REV: 03/31/16

CITY OF ARLINGTON, TEXAS		
Traffic Control Device		
DATE:	SCALE: NTS	SHEET ___ OF ___
DESIGNED BY:	DRAWN BY:	CHECKED BY:

12-04 TEMPORARY TRAFFIC SIGNALS:

A. DESCRIPTION: Traffic signals at signalized intersections are required to remain operational at all times throughout the duration of the project. Temporary traffic signals shall be considered for all existing signalized intersections within the limits of this project. This section describes furnishing, installing, maintaining, and removing intersection temporary traffic signals. Temporary traffic signals are considered a part of the Traffic Control Plan and no additional pay will be made to the Contractor for this work.

B. GENERAL:

1. Contractor shall furnish, install, maintain, reconfigure, and remove temporary traffic signals in accordance with the latest TxDOT Standard Specifications. All traffic signals shall conform to the latest Texas Manual on Uniform Traffic Control Devices (TMUTCD)

2. Contractor shall provide temporary striping to compliment the temporary traffic signals. The temporary striping plans shall be part of the Traffic Control Plans submitted for approval.

3. City will supply signal controller cabinet and signal controller. Contractor shall contact the Traffic Operations Division to arrange for pickup of equipment.

4. Contractor shall furnish and install a temporary VIVDS system for the temporary signal. Contractor will be responsible for providing all materials necessary to make it operational.

5. The Contractor is responsible for providing connection between the temporary signal and the City's Signal Network. The Contractor shall coordinate with the City to facilitate the connection by providing three (3) business days notice to the Inspector prior to making the connection.

6. Contractor will be responsible for furnishing and installing the temporary electrical service for temporary traffic signals according to the requirements of the City. Contractor will also be responsible for all necessary permits, inspection, and coordination as needed between the City and the utility regarding billing.

7. A signal inspection of the completed temporary traffic signal installation will be performed by the City. Contractor shall provide three (3) business days notice to the Inspector to request for an inspection. The City will not approve activation until the Contractor corrects all discrepancies identified in the inspection.

8. Contractor will be responsible to verify the span heights throughout the project duration.

9. Signal faces shall be placed as directed by the City. Make every effort to give maximum visibility to all signals intended for view by the motoring public.

10. The name and telephone number of the persons qualified and assigned to maintain the temporary traffic signal shall be provided to the City. Ensure this personnel will be available twenty-four (24) hours a day, seven (7) days a week, from the start of the project until the temporary traffic signal is no longer needed. Emergency calls must be received by an individual and not by an answering machine.

11. Upon completion of new signal installation, the Contractor shall switch control of the intersection over to the new permanent cabinet. Upon deactivation of the temporary signal, Contractor will need to call the electrical utility immediately for disconnection of the temporary electrical service.

12. Upon acceptance of new signal, completely remove poles and other supports used for temporary signals. Remove the temporary traffic signal faces the same day the permanent traffic signal is turned on. Removal of remaining temporary signal components shall be completed within three (3) days of activation of the permanent signal. With approval, concrete foundations may be left 2-feet or more below finish grade. Backfill and surface restoration is the responsibility of the Contractor.

13. Any equipment furnished by the city shall be returned to the city, unless the city desires to use the equipment in the permanent signal system. All other temporary signal components shall be completely removed and retained by the Contractor.

C. MAINTENANCE:

1. Contractor shall immediately correct lamp/LED outages within twenty-four (24) hours of the reported outage.

2. Contractor shall respond within one (1) hour of notification to provide corrective action to any emergency such as but not limited to signal cable problems and equipment failures. If equipment becomes damaged or faulty beyond repair, replace it within one (1) working day. It will be the Contractor's responsibility to ensure sufficient amounts of materials and equipment are in stock to provide immediate repairs.

3. The City of Arlington Field Operations Division will make every effort to have permanent signals relocated, in place, and in working order as required by the time the project is accepted. If this does not occur, it will not delay project acceptance; and a separate agreement between the general Contractor, subcontractor, and the City may be written so the City takes over responsibility of payments to the traffic control subcontractor for on-going maintenance and removal of the temporary signals.

12-05 PROTECTION OF THE PUBLIC:

A. The Contractor shall at all times conduct the work in such manner as to ensure the least possible obstruction to public traffic and protect the safety of the public. Any provisions necessary for the work being performed to provide public safety and convenience shall be the direct responsibility of the Contractor and shall be performed at his/her expense.

B. Materials placed on the site, materials excavated and construction materials or equipment shall be located so as to cause as little obstruction to the public as possible.

C. The City reserves the right to remedy any neglect on the part of the Contractor in regard to public convenience and safety which may come to our attention. The cost of such work done or material furnished by the City shall be billed to the Contractor.

12-06 PROTECTION OF FLOODPLAIN:

A. No dumping will be allowed in floodplains or below the 100-year flood elevation of drainage ways. Areas in the floodplain or near drainage ways shall be protected and be undisturbed unless otherwise noted in the construction plans. No items shall be placed in the floodplain or drainage ways unless approved by the City, including but not limited to temporary stockpiling and/or material storage.

B. Contractor is responsible for ensuring all applicable local, state and federal permits are approved prior to any land disturbance in floodplains or drainage ways. Construction activity shall not divert or obstruct the natural flow of surface water in a manner that damages surrounding properties.

12-07 PROTECTION OF ADJACENT PROPERTY:

A. The Contractor shall be responsible for the protection of all fences, trees, curb and gutter, and other improvements on the property adjoining the construction sites from damage by the Contractor's equipment and personnel. The Contractor shall be responsible for notifying the property owners in advance of any trimming to be done on trees. The Contractor will notify the City of any trees, shrubs, or bushes that are not identified on the plans that must be removed by the construction. Trees not identified on the plans shall not be removed until permission is granted by the City. The Contractor will not be allowed to place excess material, forms, equipment, or any other material outside the street right-of-way without written permission of the property owner and approval of the City.

B. For documentation purposes, the Contractor will be responsible to video the job site prior to commencing work and to provide the Inspector with a date stamped copy of the video. To avoid any dispute of damages caused, it is strongly recommended the video be of good quality and capture as much detail as possible. Contractor will be responsible for any damages caused by the Contractor or his/her subcontractors. Damages shall be repaired or resolved promptly upon notification by the Inspector. Damages to irrigation by negligence of the Contractor shall be repaired by a licensed irrigator within forty-eight (48) hours of being damaged. Contractor will be responsible for any cost incurred if City forces or City's contractor repairs the damages due to lack of response from the Contractor. Such cost shall be billed to the Contractor.

12-08 PROTECTION OF ADJACENT LANDSCAPING IMPROVEMENTS:

A. The Contractor shall be responsible for the protection of any existing landscaping improvements in the medians and parkways adjacent to the project including but not limited to trees, shrubs and irrigation from damage by Contractor's equipment or personnel.

B. If the Contractor damages any of the landscaping improvements, the Contractor shall be responsible for replacing and/or repairing the improvements at his/her expense. Monthly pay estimates may be withheld until the replacement or repair has been fully performed. If the Contractor feels any of the landscaping improvements are in conflict with the project and must be removed or have prior damage, the Contractor shall notify the City prior to removal of any landscaping improvements.

12-09 PROTECTION & CLEANING OF EXISTING STORM OR SANITARY SEWERS:

A. If the Contractor, through carelessness or negligence, obstructs the flow of or deposits any materials into any existing storm or sanitary sewer lines, the Contractor shall provide the necessary equipment and labor (or hire a subcontractor approved by the City) to clean and televise the affected lines. The limits of the lines to be cleaned and televised will be determined by the Inspector.

B. The identified lines shall be cleaned within forty-eight (48) hours of notification. In emergency situations, timeline for cleaning the lines will be determined by the Inspector. After cleaning, the Contractor shall televise and videotape the lines. Video tapes shall be delivered to the Inspector so they can be reviewed and approved for acceptance of the cleaning work.

12-10 MAINTENANCE OF ADEQUATE DRAINAGE: Contractor shall maintain adequate drainage at all times during construction. Changing of natural runoff flow locations or concentrating flows to a point of potential harm to the adjacent property will not be allowed.

12-11 TEMPORARY ACCESS TO PRIVATE PROPERTIES:

A. The Contractor shall maintain all private drives in an accessible condition to allow residents ingress and egress before leaving the job site, except during the placing and curing of drive approaches. All commercial drives and other locations with high traffic volumes, as directed by the City, shall be a minimum of 4-inches Type "B" asphalt over a compacted subgrade (standard compaction). Subsequent maintenance of drives shall be considered subsidiary to the unit prices bid. Cutting, removing, and replacing the asphalt for utility installations, excavation, and/or liming operations shall be considered subsidiary to the initial placement of asphalt and will not be paid for each re-installation. Asphalt shall be replaced within seven (7) days of removal for these activities.

B. Should a vehicle become damaged or stranded due to an inaccessible condition, any legitimate claims arising from such conditions shall be the sole responsibility of the Contractor. The City reserves the right to withhold monthly pay estimates until all claims are resolved.

12-12 CRUSHED STONE BAD WEATHER PROTECTION:

A. During periods of bad weather, the Contractor shall put in place, on excavated streets, 1½-inches to 2-inches crushed stone or crushed concrete sufficient to provide temporary access to private property. All material will be removed and stockpiled for future use at other locations as necessary. Any material removed and hauled off the project site without

approval from the City will be replaced by an equal quantity at the Contractor's expense. Special care will be taken by the Contractor during placement and removal of the material, not to unnecessarily combine it with native material on the project. If special care is not taken by the Contractor, an equal quantity of material will be replaced at the Contractor's expense.

B. Weight tickets shall be submitted to the Inspector or his/her representative no later than one (1) week after delivery. Any tickets not submitted within this time frame or signed by the Inspector shall not be paid.

C. NOTE: The use of crushed stone or crushed concrete as a means to detour traffic or maintain two-way traffic will not be paid under this item.

D. The tons in the bid quantity are rough estimates. The actual amount used will be determined by the need for temporary and/or emergency access during construction.

12-13 USE OF PRIVATE PROPERTY:

A. The Contractor shall not at any time use private property to park or turn around construction vehicles or store equipment and/or materials without the written permission of the property owner.

B. The Contractor shall not at any time use water metered by meters set for the property owner's use without written permission of the property owner. Contractor is responsible for any and all damages caused to private property or additional cost incurred by property owner due to use of property for construction purposes.

12-14 USE OF CITY PARKS:

A. The Contractor shall obtain written permission from the Parks and Recreation Department prior to the use of City park property for access or for the storage of machinery, equipment, materials, and/or supplies.

B. Any damage incurred to City park property, by unauthorized use by the Contractor will be the responsibility of the Contractor to repair in an equal or better condition. Monthly pay estimates to the Contractor may be withheld until the damage is repaired and/or payment for the damages has been made.

12-15 CONSECUTIVE STREET CONSTRUCTION: The rate of progress shall be such that at no time shall more than three (3) streets be under construction at the same time without prior approval by the City.

12-16 TOWING OF VEHICLES: The Contractor shall follow applicable City Ordinances should it be determined that vehicles parked upon a City street must be moved in order to perform street maintenance or construction. Contractor shall provide ample notice to the City if any vehicle is to be towed.

12-17 CONSTRUCTION WATER:

A. Contractor is responsible to provide all water necessary for the construction of this project. All construction water will be metered by City owned meters. A fee and a deposit must be paid before the meter is released to the Contractor. Payment and meter pick up locations are the South Service Center, 1100 S.W. Green Oaks, or City Hall Customer Care, 101 W. Abram. The meter readings will be submitted online by the Contractor and billed each month in accordance with the current Customer Care and Business Services Policy.

B. Any damage that occurs to the meter during this time will be repaired by the City at the expense of the Contractor. The cost of the repairs will be deducted from the deposit and the remaining deposit will be returned to the Contractor. This procedure will be followed wherever construction water is needed.

C. If the meter is set on a fire hydrant, the meter assembly shall be provided with an approved backflow prevention device, provided by the Contractor in accordance with the standard detail and the Fire Hydrant Meter Agreement requirements located under http://www.arlingtontx.gov/details. (Rev 4/2019)

12-18 DAILY CLEANUP & REMOVAL ITEMS:

A. The removal of existing concrete curb and gutters, concrete valley gutters, concrete drive, and existing drainage features, shall be at the locations indicated by the City and shall be paid for under the right-of-way preparation pay item (See Special Provision Section 12-22, Right-of-way/Easement Preparation) unless a separate bid item is included in the PROPOSAL.

B. All concrete curb and gutter and drive approaches removed will be broken out at existing construction expansion joints if possible. Where existing concrete is removed, the slab will be sawed in a neat straight line the full depth of the slab. The cost for sawing and breaking shall be considered subsidiary to the unit price bid for concrete removal. The Contractor shall make every effort to protect all concrete surfaces that will remain. Any remaining surfaces damaged during removal operations by the Contractor will be replaced at the Contractor's expense.

C. Disposal of excess materials and debris resulting from construction, including but not limited to concrete, excess soil, forms, and rebar shall be removed and disposed of on a daily basis, unless other disposal schedule is approved by Inspector. Depending on type of material or debris, dump trucks should be the primary source of disposal. Contractor will be responsible for providing the necessary equipment or vehicle for such task.

D. Dump trucks must be tarped while in transit to disposal sites. Tarps must be secured and not torn or tattered. All applicable State and local laws and ordinances relating to hauling, handling, and disposal of such materials shall be complied with. Use of Roll Off Box shall meet the City's Ordinances.

E. The responsibility of locating suitable disposal sites for removal items on this project will be solely a function of the Contractor. The City will in no way be responsible for the actions of the Contractor if he disposes of excess material in locations that are not approved.

12-19 DUST CONTROL: Contractor will be responsible for minimizing dust on a daily basis and when instructed by the City. Dust control shall include, but is not limited to operations such as watering stockpiles, subgrade, pavement, sawing (including brick pavers), concrete joint sealing, routing, and crack sealing. Equipment necessary for capturing particulate matter during the process of routing, cleaning & sealing cracks & joints shall be considered subsidiary. The necessary application of water for dust shall be considered subsidiary to the other bid items.

(Rev. 10/2020)

12-20 MOWING DURING CONSTRUCTION: Contractor shall maintain existing parkways and medians at all times during construction by providing periodic mowing to meet the applicable City Ordinances. Any code violation or citation issued for not maintaining these areas will be the responsibility of the Contractor. Contractor will also be responsible for any cost incurred if City forces or City's contractor performs the mowing due to lack of response from the Contractor. Such cost will be billed to the Contractor.

12-21 EXISTING UTILITIES:

A. In the preparation of plans and specifications, the engineer has endeavored to indicate the location of existing underground utility lines which are known to the engineer. It is not guaranteed that all lines or structures have been shown on the plans. Prior to the start of construction, the Contractor shall communicate with the local representative of all utility companies and advise said representatives of the route of the proposed construction in order to obtain the assistance of the utility companies in the location of and in the avoidance of the conflicts with utility lines.

B. The Contractor should not assume the City has Surface Utility Engineering (SUE) maps for any of the proposed locations. Contractor will be responsible for calling for ALL locates (1-800-DIGTESS) in a timely matter to ensure utility issues are addressed and resolved within the allotted contract time. Contractor will also be responsible for complying with all State regulation and requirements.

C. For the City's Streetlights, Storm Water, Signals, Fiber Optics, Water and Sewer line locates, request must be made online through the City's web site or through the "Ask Arlington" App. For emergency locates, as defined as a situation that endangers life, health, or property; or a situation in which the public need for uninterrupted service and immediate re-establishment of service, or if services are interrupted compels immediate action, call (817) 459-5900. If a request is falsely called in as an emergency, Contractor will be liable for payment of the emergency line locate service call.

D. The Contractor shall contact the proper utility representative for questions or coordination of construction related to existing utilities. It is the Contractor's responsibility to uncover and determine the elevation and location of all potential conflicts well ahead of the excavation.

E. The Contractor shall make every effort to protect existing utilities and other lines or structures. The Contractor shall not adjust, remove, or operate existing utilities unless specifically requested to do so in these specifications or authorized to do so by the City.

F. Contractor shall protect all utility pole(s) impacted by the construction. Protection shall include temporary bracing of the utility poles where adjacent excavation could reasonably compromise the stability of the utility pole(s). Contractor shall coordinate the utility pole bracing with the owner of the utility pole(s) and the City. Unless there is a specific pay item for temporary pole bracing of utility pole(s), bracing of utility poles shall be incidental to other pay items included in the contract. Any utility damaged by the Contractor during the construction shall be suitably replaced at the Contractor's expense.

G. Where excavation endangers adjacent structures and utilities, the Contractor shall, at his/her own expense, carefully support and protect such structures and/or utilities so that there will be no failure or settlement. Where it is necessary to move services, poles, guy wires, pipe lines, or other obstructions, the Contractor shall notify and cooperate with the utility owner.

H. Should damage to any existing structure or utility occurs, whether from failure or settlement, the Contractor shall restore the structure or utility to its original condition and position without compensation from the City. All costs of temporarily or permanently relocating the conflicting utilities shall be borne by the Contractor without extra compensation from the City.

12-22 SITE PREPARATION:

A. Site preparation shall consist of preparing the right-of-way, designated easements, and additional areas made available for construction of this project by the removal and disposal of all obstructions. Such obstructions shall be considered to include: remains of houses not completely removed by others, foundations, floor slabs, concrete, brick, lumber, plaster, septic tanks, basements, abandoned utility pipes and conduits, equipment and other foundations, fences, retaining walls, outhouses, shacks, sheds, curb and gutters, driveways, paved parking areas, miscellaneous stone, brick, concrete sidewalks, concrete and asphalt pavement, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron, trees, stumps, bushes, vegetation, roots, shrubs, brush, logs, limbs, rubbish, and other debris, whether above or below ground except live utility facilities. Clearing and grubbing shall be done in a matter that will not damage adjacent property. (Rev 7/2021)

B. It is the intent of this specification to provide for the removal and disposal of all obstructions and objectionable materials not specifically provided for elsewhere in the plans and specifications. (Rev 7/2021)

C. Site preparation construction methods shall be in accordance with the NCTCOG Standard Specifications for Public Works Construction – North Central Texas, Section 203.1.2. The contractor shall leave the construction site and disturbed areas in a neat and presentable condition. (Rev 7/2021)

D. The lump sum bid for this item shall not exceed ten percent (10%) of the total amount bid for the entire project. A prorated portion of the lump sum bid shall be paid monthly until such work is completed. The Contractor should take special precautions to avoid damaging any trees outside the construction limits and any other trees which the City may designate to remain.

12-23 TREE REMOVAL:

A. All trees to be removed shall be tagged and approved by the City prior to removal. (Rev. 7/2021)

B. All trees and bushes that are cut down shall be hauled off the same day. (Rev. 7/2021)

C. Contractor will fully comply with any and all federal, State and local laws related to the removal of trees including but not limited to the Migratory Bird Treaty Act. Contractor will be responsible for any fines, penalties, or damages due to any such violations of law and any such fines, penalties, or damages will be subject to the indemnification provision of this contract.

D. Payment for tree removal is included in the Tree Removal bid item. A prorated portion of the lump sum bid shall be paid monthly until all tree removal is completed. (Rev. 7/2021)

12-24 TREE TRIMMING:

A. All trees shall be trimmed back to avoid damage by construction equipment. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears. Tree trimming shall be done in accordance with the International Society of Arborists or National Association of Arborists Standards. Trees shall also be protected to avoid damage by construction activities. (Rev 1/2019)

B. Prior to initial acceptance of the project, Contractor shall trim the lower branches of all trees that overhang the sidewalk to a minimum height of 7-feet above the sidewalk. (Rev 1/2019)

C. Payment for tree trimming and protection is considered subsidiary to the contract unless a separate pay item has been included in the Proposal. (Rev 1/2019)

12-25 SITE GRADING:

A. All vegetation shall be removed from areas where fill is to be placed. Topsoil shall be grubbed, removed, and stockpiled. After the fill has been placed and compacted, the topsoil shall be spread to a thickness of 4-inches in all proposed areas that require it. The topsoil shall be free from grass, roots, sticks, stones, or other foreign materials. After placement is complete, the surface of the topsoil shall be finished to a reasonably smooth surface so grass may be planted and maintained.

B. Site grading will be based on the elevations and grades shown on the Grading and Paving Drawings. Filling, construction of embankments, removal, stockpiling, and spreading

topsoil and offsite disposal of excess material will be considered incidental and subsidiary to excavation and shall not be a separate pay item.

C. No extra payment shall be made for rock excavation or crushing rock material for placement in fill areas. This work shall be considered incidental to site grading and shall not be a separate pay item.

12-26 BORROW:

A. It is the Contractor's responsibility to locate a suitable source of select borrow material for completing the fills on the project if there is insufficient material from the street excavation to complete all fills as shown on the construction plans. Prior to using any offsite borrow material, the material must be approved by the City. The following will be required prior to approval:

1. The Contractor must obtain a written, notarized certification from the landowner of each proposed borrow source stating that to the best of the landowner's knowledge and belief there has never been contamination of the borrow source site with hazardous or toxic materials.

2. The Contractor shall provide adequate testing to determine that the borrow source material is not contaminated with hazardous or toxic materials. The geotechnical engineer performing the testing for the Contractor shall notify the City in writing of his/her approval of the material.

3. Based on geotechnical testing performed on existing soil from the project site, a lime/cement application rate has been determined for subgrade stabilization as set forth in these Special Provisions. The quantities included in the PROPOSAL are based on the determined application rate. Before using any offsite borrow material for subgrade purposes, the Contractor shall provide necessary testing to determine the lime/cement application rate for the proposed borrow material. The results of these tests shall be submitted to the City in writing by the geotechnical engineer performing the testing for the Contractor. If the lime/cement application rate required for the offsite borrow material is greater than the rate specified in these Special Provisions, the Contractor shall be responsible for the cost of the additional lime/cement required or locate an alternative borrow source. If the application rate required for the borrow material is less than the rate specified in these Special Provisions, the Contractor will be paid for the actual quantity of lime/cement used on the project.

4. The Contractor shall provide testing (ASTM D 698) to determine the optimum density and moisture content for the borrow material if used as treated subgrade.

5. The borrow material shall be tested for the presence of soluble sulfates. Any soil with a content of soluble sulfate in excess of 2000 ppm will not be approved.

6. No organic material, trash, debris, trees, clippings or other deleterious material will be allowed in offsite borrow material.

7. Payment for Borrow is based on plan quantity. Contractor shall verify excavation/fill quantities and shall notify City in writing of concurrence or disagreement with plan quantities prior to start of construction. Any discrepancies in quantities shall be resolved prior to beginning excavation. No adjustments to plan quantities shall be allowed once excavation/fill activities have begun.

12-27 FILLING:

A. Fills shall be constructed at the locations and to the lines and grades indicated on the drawings. When rock excavation is used, it shall be broken or crushed so that the maximum dimension is 4-inches. No rock will be allowed in the upper 12-inches of the fill.

B. Equipment for compacting fills shall be sheep foot rollers, rubber-tired rollers, and other approved equipment capable of obtaining required density.

C. The combined excavation and fill placing operation shall be blended sufficiently to secure the best practicable degree of compaction. Fill shall be compacted to at least ninety-five percent (95%) Density per ASTM D698, +/- two percent (2%) optimum moisture content. The suitability of the materials shall be subject to approval of the City's laboratory. Dump, then spread and mix successive loads of material to give a horizontal layer of not more than 8-inches in depth, loose measurement. After each layer of fill has been spread to the proper depth, it shall be thoroughly manipulated with a disc plow or other suitable and approved equipment until the material is uniformly mixed, pulverized, and brought to a uniform approved moisture content.

D. No fill material shall be rolled until the layer of material has a uniform moisture content which will permit the proper compaction under that degree of moisture content which is the optimum for obtaining the required compaction.

E. Dry any material having moisture content too high for proper compaction by aeration until the moisture content is lowered to a point where satisfactory compaction may be obtained. If the moisture of the fill material is too low, add water to the material and thoroughly mix by blading and discing to produce a uniform and satisfactory moisture content.

F. If, in the opinion of the City's laboratory or Inspector, the rolled surface of any layer or section of the fill is too smooth to bond properly with the succeeding layer or adjacent section, roughen by discing or scarifying to the satisfaction of the City's laboratory before placing succeeding layer or adjacent sections.

12-28 SELECT FILL:

A. Select fill shall be in accordance with the construction plans. Contractor shall provide laboratory test reports for each soil select fill source used to supply general select fill and select fill materials. Contractor shall provide a test load to the project site for testing purposes. Once material has been tested and has passed all requirements, the Contractor shall then be permitted to deliver material for the project.

B. Payment shall be in cubic yards in its final position using the average end area method as indicated on the plans. The bid price shall include transporting or hauling the material, furnishing, placing, compacting, proof rolling, disposal of excess or waste material, and reworking or replacement of undercut material. No additional compensation will be made for rock or shrinkage/swell factors.

12-29 SPRINKLER RELOCATIONS:

A. Sprinkler relocations may be required on this project. The City will be responsible for sprinkler relocations. Prior to construction, the Contractor and Inspector shall identify and document the sprinkler systems that will be affected by the construction of the project. The Contractor shall contact the owner of each sprinkler system and arrange to test each system. In the presence of the Inspector, the Contractor shall:

1. determine if the system functions properly

2. identify the layout of the system and

3. document in writing the layout and function of the system. The work described above is required by the Contractor for all projects and should be considered subsidiary to the unit prices bid for other items.

B. When construction activity approaches a sprinkler system, the Contractor shall provide the Inspector seven (7) days notice to allow for relocation of the sprinkler system. Should the Contractor damage any sprinkler system, it will be the Contractor's responsibility to repair or replace the same at no additional charge to the City.

12-30 CRUSHED STONE CUSHION:

A. When in the opinion of the City the subgrade material encountered at grade is soft spongy, and unsuitable, it shall be removed to a depth necessary below the barrel of the pipe to achieve stable layers and replaced with a crushed stone cushion so as to provide an unyielding stable foundation. The stone used in cushion shall be 1-inch washed crushed stone and shall be free from silt, loam, or vegetable matter and shall be of a gradation of from ¾-inch to 1-inch.

B. Crushed stone cushion will be paid for at the contract unit price per ton in place and shall be the total compensation for furnishing all labor, materials, tools, and equipment for performing this particular phase of work. Crushed stone cushion shall be paid for the amount of stone placed at a depth greater than 6-inches below the bottom of the pipe.

C. Subgrades that have been allowed to become unstable by neglect or fault of the Contractor, by improper drainage or lack of drainage, the City shall order the Contractor to remove the unstable subgrade and replace the same with crushed stone cushion at the expense of the Contractor.

12-31 BACKFILL & BACKFILL MATERIAL:

A. Backfill operations shall begin immediately following removal of the forms on the permanent improvements. All loose concrete, rocks, roots, trash, and other debris shall be removed from the excavation prior to any backfill being placed.

B. Backfill material shall consist of the native material obtained from excavation unless in the opinion of the City, this material is unsuitable for use. The material shall not contain trash, rocks, concrete, asphalt, gravel, roots, or other debris. Sand shall not be used for backfill material unless the native soil in the construction area is sandy in nature. All backfill material will be considered subsidiary.

12-32 MECHANICALLY COMPACTED BACKFILL:

A. Areas shall be backfilled with native material and compacted by mechanical methods. Compaction must be achieved with equipment specifically designed for compaction only. If hand pneumatic tampers are used, the backfill shall be placed in layers not exceeding 6-inches in loose thickness and thoroughly compacted to at least ninety-five percent (95%) density per ASTM D698, +/- two percent (2%) optimum moisture content.

B. Backfill shall be placed in uniform layers completely across the area, and compaction shall proceed in an orderly, uniform manner. If compaction is performed by the use of heavy tamping (sheep's foot) rollers, backfill shall be placed in layers not exceeding 9-inches in loose thickness and compacted to at least ninety-five percent (95%) density per ASTM D698, +/- two percent (2%) optimum moisture content. The use of walk behind and remote compacting rollers will not be permitted.

C. Payment for backfill shall be subsidiary to unit prices bid for pipe.

12-33 TRENCHLESS TECHNOLOGY: This specification is for general application only and not for pipe bursting or other trenchless rehabilitation methods.

A. Prior to construction, all existing public facilities shall be physically located in the field when crossing over or under water lines, sanitary sewer, or storm drains or where the existing facility is running in the same direction and is within 5-feet of the proposed facility.

B. Construction shall be done in such a manner that will minimize interference with vehicular traffic and shall not weaken or damage the existing street.

1. The location of the boring pits shall be a minimum of 5-feet from the roadway to prevent undermining of the curb, gutter, or shoulder section.

2. The pit shall be dug to a depth sufficient to maintain a minimum boring depth of 48-inches below the traffic surface. Jetting types of boring equipment are not allowed.

3. All overcutting shall be remedied by pressure grouting the entire length of the installation.

4. The pits or trenches excavated to facilitate this operation shall be backfilled and compacted immediately after work is completed.

C. The Contractor shall be able to locate the bore head at all times in accordance with the latest technologies and provide the location of the bore to the City upon request.

D. All directional boring shall have the locator place bore marks and depths while the bore is in progress. Locator shall place a mark at each stem with a paint dot and indicate the depth at every other stem.

12-34 BACKFILL AND CLEANUP:

A. Backfill and cleanup shall be done daily. This work shall progress immediately behind pipe laying and shall be within 50-feet of the pipe laying operation at all times. It shall also include the disposal of all excess material on a daily basis. Ditch lines, storm drains, inlets, bar ditches, and other drainage facilities shall be maintained and cleaned on a daily basis so they will function for their intended purposes.

B. Where lines or services are laid in, along, or across the street pavement, the ditch line shall be backfilled and an approved all weather surface, such as flexbase or CTB shall be installed upon the completion of that day's work. Approved barricades shall be erected at these locations and shall be maintained by the Contractor until the permanent pavement is replaced. No later than the second day following the installation of a line, the specified asphalt shall be placed in the ditch and the street repair shall be completed. In the event these procedures are not followed, pipe laying shall cease immediately and not resume until the cleanup is completed and the roadway is safe for traffic.

C. Particular care shall be taken during inclement weather to ensure that driveways are backfilled with an approved all weather surface. No driveway shall be blocked for longer than two (2) hours and only after notifying the affected property owner.

D. All concrete shall be backfilled as soon as possible. If "honeycomb" appears, the Contractor shall grout back side to smooth out the surface within twenty-four (24) hours of form removal. (Rev. 1/2022)

E. Where lines or services are laid in, along, or across street pavement the pavement shall be left in a clean and acceptable condition. At the end of each work day the Contractor shall sweep and/or wash the pavement to leave the roadway completely clean of dirt and debris. Dirt, debris, and/or wash water shall be collected for appropriate disposal and shall NOT be washed into waterways or storm drains. Other suitable methods of maintaining the pavement in a clean, unobstructed condition may be utilized by the Contractor. No additional payment will be made for cleaning of pavement. Backfill and clean-up shall be considered subsidiary to the work performed under this contract. (Rev. 1/2022)

12-35 FLOWABLE BACKFILL: Use of flowable backfill shall be preapproved by the City prior to application.

A. FLOWABLE BACKFILL:

1. Flowable backfill shall consist of a mixture of native sand or a blend of native sand/manufactured sand, cement, fly ash and water which produces a material with unconfined compressive strength of between two hundred fifty (250) and four hundred fifty (450) psi after twenty-eight (28) days.

2. The flowable mixture shall be mixed at a concrete batch plant or a mobile transit mixer and shall have a minimum slump of 5-inches. Unless otherwise allowed by the City, the flowable mixture must be allowed to set at a minimum of forty-eight (48) hours prior to the placement of any overlying material.

B. MODIFIED FLOWABLE BACKFILL:

1. Modified flowable backfill in areas of possible future excavation such as utility installations shall consist of a mixture of native sand or a blend of native sand/manufactured sand, cement, fly ash and water which produces a material with unconfined compressive strength of between fifty (50) and one hundred fifty (150) psi after twenty-eight (28) days.

2. Modified flowable backfill in permanent areas such as abandoned pipe closures, abutments and embankments shall contain the same materials with an unconfined compressive strength of greater than one hundred fifty (150) psi after twenty-eight (28) days.

3. The flowable mixture shall be mixed at a concrete batch plant or a mobile transit mixer and shall have a minimum slump of 5-inches.

4. Unless otherwise allowed by the City, the flowable mixture must be allowed to set at a minimum of forty-eight (48) hours prior to the placement of any overlying material.

5. The Contractor shall submit to the City a mix design for the type of flowable backfill to be used ten (10) days prior to the start of the backfill operation. When the mix design has been approved by the City there shall be no changes or deviation from the proportions or sources of supply except as approved by the City.

12-36 TEMPORARY STREET REPAIR:

A. A temporary driving surface will be required on all street cut openings. It shall be composed of permanent type paving material, specifically excluding gravel or flexbase as the surface material, unless approved by the City.

B. A minimum of 4-inches hot mix asphaltic concrete (Type "D") over a minimum of 6-inches flexbase on compacted native material shall be used for all streets regardless of classification. (Rev. 9/2019)

C. All flexbase shall be in accordance with the latest TxDOT Standard Specifications and shall be Type "A" Grade 1 material. An acceptable alternative to Type "A" Grade 1 flexbase is crushed concrete. Crushed Concrete shall be categorized as Type "D" Grade 1

Flexbase. Flexbase shall be thoroughly compacted and placed to a depth specified on the City's detail and shall be subsidiary to the temporary street repair items.

D. Installation of temporary street repairs will be completed by the Contractor as soon as possible after completing the backfill, but always within five (5) business days after completion of the work involving the cut.

E. Road plates may not be used for more than five (5) business days. Any temporary driving surface that fails to provide an acceptable driving surface shall be removed and replaced at the Contractor's expense, as directed by the Inspector.

12-37 VERTICAL ADJUSTMENT OF WATER VALVES, MANHOLES, ACCESS CHAMBERS AND CLEANOUTS:

A. Contractor shall identify, verify, and mark locations of all water valves, manholes, access chambers, and cleanouts. It is the Contractor's responsibility to maintain their functionality at all times during construction. Any damage through carelessness or negligence will be the contractor's responsibility to repair or replace the same at no additional charge to the City.

B. For concrete pavement, all water valves, manholes, access chambers, and cleanouts shall be brought to the final grade before placement of concrete. Valve boxes shall be adjusted to the final grade by adjustment of the screw type valve box.

C. For asphalt pavement reclamation, all new water valves, manholes, access chambers, and cleanouts shall be adjusted to approximately 1-foot below the bottom of the proposed subgrade prior to the application of cement or lime slurry. Adjustment to the final grade and installation of the concrete pad per details shall be made after placement of the top layer of surface course. The valve boxes shall be adjusted to the final grade by adjustment of the screw type valve box.

D. For asphalt pavement mill & overlay, ductile iron valve box extension for valve box and grade ring for manholes and access chamber may be used for adjustment to the final grade.

E. The existing lids for water valves, manholes, access chambers, and cleanouts may be reused if instructed by the City. All grade rings, frames and covers, and cones (if cone replacement is instructed by the City) for adjustments shall be furnished and installed by the contractor and subsidiary to other unit prices bid in the PROPOSAL. (Rev. 2/2021)

F. This paragraph is only applicable to the **City's Asphalt Pavement Maintenance Projects**. All the ductile iron valve box extensions, grade rings, frames and covers for adjustments will be furnished by the City. Contractor shall provide a minimum of two (2) weeks notice to the Inspector prior to picking up from the South Service Center Warehouse, 1100 SW Green Oaks Boulevard, and transporting to the job site. Any damage to the materials once they leave the warehouse will be the contractor's responsibility to replace the same at no additional charge to the City. The valve boxes shall be adjusted to the final grade by adjustment of the screw type valve box.

12-38 GREEN CEMENT:

A. In striving to improve air quality in the North Texas area, an alternate bid item to add the additional cost of "green" cement above the cost of cement supplied from an unspecified source will be considered as part of this project. Utilization of "green" cement will be considered for raw cement and for items where concrete is placed or cast-in-place (examples: pavement, driveways, cement for stabilization, sidewalk, barrier free ramps, curb inlets, curb and gutter, flumes, and channel lining).

B. "GREEN" cement is defined as cement that is generated from a kiln whose emission rates:

1. Are in compliance with all applicable state and federal environmental standards relating to the emission of NOx, including all applicable TCEQ and EPA rules and regulations; and

2. Operate kilns that exceed the standards for NOx emissions set out in 30 Tex. Admin. Code § 117.3110(a)(1)-(4) (as provided presently and as may be amended in the future) by the following percentage amounts:

   a. For each long wet kiln, ten percent (10%) lower than the standard for long wet kilns located in Ellis County, Texas as set out in 30 Tex. Admin. Code § 117.3110(a)(1)(B);
   b. For each long dry kiln, twenty percent (20%) lower than the standard for long dry kilns, as set out in 30 Tex. Admin. Code § 117.3110(a)(2);
   c. For each preheater kiln, twenty percent (20%) lower than the standard for preheater kilns, as set out in 30 Tex. Admin. Code § 117.3110(a)(3); and
   d. For each preheater-precalciner kiln or precalciner kiln, thirty-five percent (35%) lower than the standard for preheater-precalciner or precalciner kilns, as set out in 30 Tex. Admin. Code § 117.3110(a)(4).

C. Should the City award the contract with this alternate, the Contractor and the material supplier will need to sign a certified compliance statement. Form will be provided by the City. No payment on the alternate item for utilizing "green" cement will be made unless this statement is executed and returned to the City.

12-39 REINFORCING STEEL:

A. All reinforcing steel used on this project shall comply in all respects to TxDOT Item 440, "Reinforcing Steel".

B. Rebar that requires bending in the field shall be Grade 40 reinforcing steel. Payment for reinforcing steel shall be considered subsidiary to the various bid items.

12-40 RESTORATION OF EXISTING PAVED SURFACES:

A. The Contractor shall be responsible for maintenance of existing paved roadway surfaces within the project limits throughout the duration of the project. The Contractor shall

perform daily inspections and restoration work required to provide an acceptable driving surface, as determined by the City.

B. Restoration of paved surfaces shall be of asphalt, unless otherwise approved by the City. Should the Contractor be notified of unacceptable roadway conditions, the Contractor shall restore the surface within twenty-four (24) hours. Should it become necessary for the City to provide for the restoration of the surface, the cost of such will be billed to the Contractor. All asphalt for restoration of existing paved surfaces shall be considered subsidiary to the various bid items on this contract.

12-41 GALVANIZED GABIONS WITH PVC COATING:

A. Gabion structures consist of rectangular, compartmented, woven wire mesh baskets filled with stone used to build earth retaining and erosion control structures such as: retaining walls, channel linings, headwalls and flexible aprons for pipes, slope protection, bridge revetments and weirs.

B. MATERIALS:

1. Gabions:

a. Gabions shall be prefabricated in *accordance* with ASTM A975-97 to the size called for on the plans, or as otherwise approved. Gabions shall consist of galvanized wire with an additional PVC coating woven into a uniform, hexagonal-shaped double twist pattern with openings approximately 3¼ -inches x 4½-inches. The mesh shall be fabricated in such a manner as to be non-raveling and to provide the required flexibility and strength.

b. All wire used for gabions, including lacing wire, shall have a tensile strength of 54,039-68,259 psi in accordance with ASTM A641-92 Class 3, soft temper. Elongation shall not be less than 12% in accordance with ASTM A370-92. The zinc coating shall meet the requirements of ASTM A641-92, Class 3, soft temper coating and shall be a minimum quantity of 0.70 oz/ft^2 for wire 0.087" in diameter, 0.80 oz/ft^2 for wire 0.106-inch in diameter, 0.85 oz/ft^2 for wire 0.120-inch and 0.134-inch in diameter and 0.90 oz/ft^2 for wire 0.154-inch in diameter.

c. Mesh wire, selvedge wire and lacing wire diameters for galvanized gabions with a PVC coating shall be in *accordance* with the nominal diameters listed in the below table. Tolerances of all wire diameters shown shall be +/- 0.004-inch. All testing of wire diameters shall be prior to fabrication.

	Galvanized Wire with PVC Coating
MeshWire	0.106-inch (US 12 gauge)
Selvedge Wire	0.134-inch (US 10 gauge)
Lacing Wire	0.087-inch (US 13-1/2 gauge)

d. Polyvinyl Chloride (PVC) used to coat gabion wire shall meet the following specifications:

Color - gray; *Nominal Thickness* - 0.020-inch; *Minimum Thickness* - 0.015-inch; UV *Resistance* - 3000 hours using apparatus Type E when tested according to ASTM D1499 and ASTM G23; *Salt Spray Test* - 3000 hours when tested according to ASTM Bl17; *Abrasion Resistance* - weight loss not more than 12% according to ASTM D1242. The PVC coating shall be uniformly applied and shall be free from cracks, splits, stretched or stressed areas.

e. Unless otherwise specified, gabion cells shall generally be 3-feet by 3-feet by 3-feet, whereas Gabions mattress will generally form a rectangular unit with a minimum thickness of 12-inches. The base and sides are to be woven into a single unit. The bottom of the end panels shall be factory connected to the body in such a manner that the strength and flexibility at the point of connection is approximately equal to that of the mesh. The lid for specially fabricated gabions may be separate construction. The gabion shall be divided into cells of approximately equal size by factory connected diaphragm panels using mesh of the same type and gauge as the body of the gabion. The diaphragm panels shall be secured in proper position on the base in such a manner that no additional tying is necessary. The length of the cell shall not exceed its horizontal width. All perimeter edges of the wire mesh forming the body, end and diaphragm panels shall have a heavier gauge selvedge wire woven into the edge of the mesh panel. All cut edges of the mesh panels forming the body, tops of ends and diaphragms shall be securely attached to a heavier gauge selvedge wire by a minimum of two complete turns of the wire mesh around the selvedge wire.

f. Lacing wire shall be supplied for securely fastening the gabions during all steps of assembly and construction. Lacing wire shall be included with the gabions in sufficient quantity for tying gabions in accordance with the specifications. No other wire except of the type supplied with the gabions may be used.

g. Gabions furnished by a manufacturer shall be of uniform size and subject to dimension tolerance limits of +/- five percent (5%). The gabions shall be certified by a notarized, sworn affidavit from the manufacturer showing compliance with the specification requirements.

2. Gabion Rock. Used to fill the gabions, shall be uniform in color, be clean, hard, durable, 4-inches to 8-inches well-graded crushed limestone. Not more than fifteen percent (15%) of the rock (by weight) shall pass a 4-inches opening. The rock shall be clean and shall be stored and handled in a manner to prevent contamination. Prior to placing the rock, samples shall be delivered to site and shall be approved for gradation and appearance by the City.

3. Geotextile Fabric. Used as a filter media, when specified on the plans, shall be placed along the gabion structure as shown in the plans. The fabric to be used shall be: Mirafi 140N or approved equal.

B. CONSTRUCTION:

1. General: The gabions shall be installed in accordance with the locations, size, type, and alignment as shown on the plans. Areas over excavated beyond the limits of proposed gabions or natural rock will be backfilled with excavated material free of large rocks, stones, vegetation or debris. This backfilling will not be paid for separately but shall be incidental to items bid.

2. Geotextile Fabric Placement: After excavation to the subgrade elevation has been performed, the geotextile fabric (when specified) shall be placed to the limits as shown on the plans. Where splices occur, adjacent pieces of geotextile shall be overlapped a minimum of 18-inches. Fabric shall be secured, when necessary, by pins or other suitable means before placing the gabions. Excess fabric protruding past the finished gabions shall be cut off.

3. Tying Method: Proper tying of gabions at all steps in the assembly and construction of the gabion structure is critical to the performance of the finished gabion structure.

   a. Gabions must be tied in the specified manner at each step of construction:
      1 - Initial assembly
      2 - Tying to adjacent gabions along all contacting edges
      3 - Tying of lid to sides
      4 - Tying of lid to top of diaphragms
      5 - Re-tying of the cut gabions

   b. All tying of gabions shall be performed in the following manner:
      1 - Cut a length of lacing wire approximately 5-feet long.
      2 - Secure the lacing wire onto the gabion at the end by looping and twisting the tie wire together.
      3 - Proceed tying with double loops (made at the same point) every 5-inches apart. The basket pieces should be pulled tightly together during the tying operation.
      4 - Secure the other end of the lacing wire by again looping and twisting the wire around itself. No other wire except of the type supplied with the gabions may be used for tying the gabions.

4. Gabion Placement: After each gabion has been assembled, it shall be placed in position empty and shall be tied to adjacent gabions along all contacting edges in order to form a continuously connected structural unit. The gabions shall be placed in a staggered pattern.

5. Filling Gabions: It is critical to the performance of the finished gabion structure that

gabions are filled to their maximum density with voids in the gabion minimized.

When the assembled empty gabions have been installed and tied together, the gabions shall be filled in the following manner:

a. The gabions may be filled by machine but shall be filled in layers or lifts not exceeding 12-inches. Care shall be taken when placing the rock into the gabions to ensure that the gabions are not damaged or bent. Do not drop rock from a height greater than 3-feet. Suitable sized and appropriate machinery will help prevent damage to the gabions during the filling operation. Edges of gabions and diaphragms may be protected when necessary by tying steel reinforcement to the edges of the gabions or other suitable guard mechanisms to prevent damage or deformation of the gabions.

b. After a 12-inches layer of rock has been placed in the cell, sufficient hand manipulation for the rock shall be performed to minimize voids and result in a maximum density of rock in the gabion.

c. Gabions that are 3-feet high shall have a looped inner tie wire installed in each cell connecting the front and back faces of any unsupported face at the vertical third points, or 12-inches and 24-inches from the base of the gabions. Individual cells may not be filled to a height greater than 12-inches above any adjacent cell unless looped inner tie wires are installed in both directions.

d. Each gabion shall be filled to its maximum density, which is slightly higher than the sides and the surface smoothly leveled minimizing voids.

6. Closing Gabions: After the rock has been leveled, the lids shall be pried down and over with a bar or lid closing tool until the edge of the lid and the edge of the gabion are together. Care shall be taken so that the mesh is not excessively deformed. It should require a light stretching in order to bring the two gabion pieces together. The heavy projecting selvedge wire of the lid shall then be twisted around the heavy selvedge wire on the sides two (2) complete turns. The lid shall then be tied to the sides of the gabions and the tops of the diaphragms in the specified tying method. The lids of the gabions shall also be tied to adjacent gabions along all contacting edges to insure the formation of a continuous, connecting structural unit. Special attention shall be given that all projecting sharp ends of wire are turned in on the completed gabion structure.

7. Cutting Gabions: Gabions may be cut to form curves or bevels. Overlap the cut pieces and re-tie in the specified manner. Re-tying shall be in a manner so as to produce a closed cell when completed. Excess mesh wire shall be cut off or shall be tightly and neatly laced down. Care shall be taken that all projecting wire ends are turned inwards or cut off.

8. Tie Backs: If tie backs are used, they shall be installed in accordance with manufacturer's specifications.

C. MEASUREMENT AND PAYMENT: Measurement and payment of gabion structures shall be based on the volume in cubic yards of gabions installed and shall include all appurtenances necessary for proper installation. The unit price shall include full compensation for placing all materials (gabions, rock, geotextile and/or granular filter media) and for furnishing all tools, labor, equipment, and other incidentals necessary to complete and install the gabion structure in accordance with the intent of the plans and specifications. Excavation and removal items shall be subsidiary to gabion installation unless a separate item has been included in the PROPOSAL. Filling required to prepare finish grade for gabion placement will be incidental to payment for excavation.

12-42 CONDUIT:

A. MATERIAL:

Conduits for installation of City's fiber optics shall be purple High Density Polyethylene (HDPE) Standard Dimension Ratio (SDR) 13.5 plastic conduits. All other conduits shall be schedule 40, polyvinylchloride (PVC), certified to UL Standard 651.

B. CONSTRUCTION METHODS:

1. Prior to the installation of conduits, the City shall be notified so that a representative may be present to inspect the installation of the conduit. Failure to contact the City shall constitute grounds for rejecting conduit which has been installed without the presence of a representative of the City.

2. All conduits shall be placed in accordance with line and grade, details and dimensions as shown on the plans, or as directed by the City. All ends of pipe shall be reamed to remove burrs and fitted with appropriate sized bell end. All splicing of conduit shall be done by using standard couplings manufactured for this purpose. All bare ends of conduit for future connections by others shall be capped with standard conduit caps. The location of ends of all conduit for future electric circuits in structures shall be marked by a "Y" at least 3-inches high, cut into the face of curb, gutter or wall directly above the conduit.

3. All conduits shall be placed a minimum depth of 36-inches below the top of curb. Conduit shall extend 6-inches behind back of curb unless otherwise called for on the plans. Installation under existing pavement may be accomplished by jacking, tunneling, or drilling.

4. Where pullboxes or junction boxes are required in medians which are to be surfaced, they shall be installed by the Contractor at the location and grade as shown on the plans or as directed by the City. Unless otherwise indicated on the plans, Type "C" pull boxes shall be used for signals and fiber; and Type "A" for streetlights.

5. All necessary fittings for proper installation of conduit in the pull-box shall be furnished and installed by the Contractor. Where it is required that pull-boxes be installed, the conduit shall be fitted with standard ninety degree (90°) ell fittings to enter the pull-box from the bottom. A nipple shall be attached to the ell of sufficient

length so that the distance from the top of the pull-box to the end of the nipple shall be 8-inches.

6. A mule tape shall be placed in all conduits. Prior to the placement of paving, the tape shall be moved back and forth to ensure that the conduit is free from obstructions. Before final acceptance of the conduit work, this method of checking shall again be incorporated to ensure that the paving operations have not rendered the conduit useless. It shall be the Contractor's responsibility to remove and replace all damaged conduit at his/her own expense.

7. All plastic conduit shall have factory bends.

8. Conduit locations shown on the plans are for bidding purposes only and may be changed with permission of the City to avoid underground obstacles. If necessary, the Contractor shall furnish and install conduit to an electrical service point as determined by the City prior to the beginning of construction.

C. MEASUREMENT AND PAYMENT:

1. Conduit of the size specified on the plans shall be measured by the linear foot along the main line of conduit. Fittings shall not be measured directly but shall be considered subsidiary to this item.

2. Conduit, as measured in this item, shall be paid for at the unit price bid for "conduit" of the size specified, excavation, backfill, labor, tools, equipment, materials, fittings and all incidentals necessary to complete the work.

12-43 SLOPE EROSION CONTROL:

A. Erosion control material shall be "Curlex Blanket" heavy jute netting, such as "AMXCO Curlex Blanket," or approved equal (no plastic meshes are allowed), and shall be applied after seeding is complete. Heavy jute mesh shall be open plain weave of unbleached single jute yarn, averaging one hundred and thirty (130) pounds per spindle of 14,400 yards. Jute mesh shall be furnished in approximately ninety (90) pound rolled strips.

B. Other criteria for jute mesh shall be as follows:

Length	- approximately 75-yards.
Width	- 48-inches (+/- 1-inch).
0.78 warp ends per width of cloth.	
Forty-one (41) weft ends per yard.	
Weight of cloth	- 1.22 pounds per linear yard (+/- 5%).

C. Staples shall be of No. 11 gauge steel wire formed into a "U" shape 6-inches long.

D. To install erosion control material on channel slopes, bury the up-channel end in a trench 6-inches deep. After the jute is buried, the trench shall be tamped firmly closed. Using a steel tube or ¾-inch pipe through the paper core of the roll with a rope on each end will

enable the operator to lower the roll down the slope. The material should be applied without stretching. The material should lie smoothly, but loosely on the soil surface. In order to keep the area as smooth as possible, workers should avoid, as much as possible, walking directly on the seed bed, either before or after the jute is applied. In cases where one roll ends and another is needed, the up-channel piece should overlap the second roll by at least 18-inches. Where two or more widths are applied side by side, an overlap of at least 4-inches shall be maintained. The material shall be brought to level area before terminating. The end shall be across the fold on 12-inches centers. Outside edges, centers, and overlaps on banks shall be stapled on 2-feet intervals. Each width of cloth will have a row of staples down the center as well as along each edge. On soft or sandy soil or windy areas, apply staples in alternate slanting position and space at closer intervals (12-inches to 18-inches). For extra hard soil or shale areas, use sharp pointed, hardened steel 3-inches fence-type staple. Outside edges shall have loose topsoil spread over them to allow for smooth entry of water. The entire jute covered area should be rolled with a smooth roller weighing fifty (50) to seventy-five (75) pounds per foot of length.

E. Any clumps, debris, etc., which hold the jute off the ground, shall be tamped into the soil. The netting shall completely cover all areas to be protected from erosion. Overlaps must be ample and well stapled so that no gapping can occur. The material shall be in intimate contact with the surface at all points. If some areas experience severe erosion, two layers shall be in intimate contact with the surface at all points.

F. The quantity shown in the PROPOSAL is a rough estimate as the actual amount and location of the jute mesh will be determined in the field as directed by the City in areas where excessive slopes exist. Overlapping of material will not be paid for double.

G. Heavy jute netting will be paid for at the unit price bid per square yard, which price will be full compensation for furnishing and placing all materials, including all labor, tools, equipment, and incidentals necessary to complete the work.

12-44 TOPSOIL:

A. A minimum of 4-inches of topsoil shall be placed on all disturbed areas within and adjacent to permanent improvements within the project limits. Topsoil shall be approved by the City prior to application. The topsoil shall be free from stone, rock, lumps, clods of hard earth, plants or their roots, sticks and other foreign material and shall be brought to the lines and grades as established by the City. Under no circumstances will topsoil be accepted unless it is free from the aforementioned contaminants. (Rev. 9/2019)

B. Contractor may use approved means of treating the topsoil to ensure its acceptability. This item shall be considered subsidiary to the other items in this project and shall not be a separate pay item.

C. The existing topsoil from the project limits may be used if Contractor stockpiles and protects it properly. No trash, lime shavings or other foreign material, shall be added to this stockpile. All topsoil including existing topsoil that is stockpiled shall meet the following specification:

D. The soil texture shall be classified as loam or sandy loam according to the following criteria:

	(% Passing) Loam	(% Passing) Sandy Loam
Sand (0.074 to 4.76 mm diameter)	25-50%	45-85%
Silt (0.002 to 0.074 mm diameter)	30-50%	Less than 50%
Clay (Smaller than 0.002 mm) (Hydrometer analysis)	5-25%	Less than 20%

Soil texture shall be determined by utilizing processes as prescribed in ASTM D 422.

E. Topsoil material shall be stockpiled at locations approved by the City. After completion of the permanent improvements, topsoil shall be placed on all disturbed areas so as to provide a minimum 4-inches depth of topsoil. Clumps shall be reduced to less than 1-inch diameter.

12-45 HYDRO-MULCH SEEDING:

A. DESCRIPTION: This item shall consist of preparing ground, providing, and planting seed, or a mixture of seeds, of the kind specified along and across such areas as are designated by the City.

B. MATERIALS: The type seed used shall be in accordance with COG Specification, Section 202.6, and approved by the City. All seed must carry a Texas Seed Label showing purity and germination, name and type of seed, and that it meets all requirements of the Texas Seed Law. Seed furnished shall be of the previous season's crop and the date of analysis shown on each tag shall be within nine (9) months of the time of delivery to the project. Each variety of seed shall be furnished and delivered in separate bags or containers. The City may require a sample of each variety of seed to be furnished for analysis and testing. Grass seed shall equal or exceed ninety-five percent (95%) purity and ninety percent (90%) germination.

C. PLANTING SEASON: Planting of hulled bermuda grass seed shall be done between the months of April through September. The density of seeds planted shall be eighty (80) pounds per acre. A blend of thirty (30) pounds Rye grass and forty (40) pounds unhulled bermuda may be used between the months of September through April.

D. CONSTRUCTION METHODS: The designated areas shall be raked, leveled and fine graded as necessary to provide a smooth uniform grade, free of ruts, depressions, humps and objectionable soil clods, prior to seeding. The area shall also be free of weeds, rubbish, and building materials. Any low areas shall also be filled to prevent ponding. All particles in the seed bed shall be reduced to less than 1-inch in diameter or they shall be removed. The areas to be seeded shall be moisture conditioned prior to placement of seed. In areas that appear to be overly compacted or to destroy existing vegetation, the soil shall be loosen

or disked, at the direction of the City. The cost of any chemical treatment to the soil in order to establish a uniform stand of grass will be subsidiary to "Hydro-mulch Seeding." Seeding of the type specified shall be performed in accordance with the requirements in COG Specification 202.6 except as hereinafter described:

1. Watering: The seeded areas shall be watered as necessary to establish grass as described in Establishment and Acceptance of Seeding.

2. Hydro-Mulch Seeding: In accordance with COG Specification 202.6.4.4 alternate methods for placement of seed may be used if approved by the City

E. MEASUREMENT: Work and acceptable material for "Hydro-mulch Seeding" will be measured by the unit bid, complete in place.

F. ESTABLISHMENT AND ACCEPTANCE OF SEEDING: Regardless of unseasonable climatic conditions or other adverse conditions affecting planting operations and the growth of the grass, it shall be the sole responsibility of the Contractor to establish a uniform stand of grass as herein specified. When adverse conditions such as drought, cold weather, high winds, excessive precipitation, or other factors prevail to such an extent that satisfactory results are unlikely, the City may, at his/her own discretion, stop any phase of the work until conditions change to favor the establishment of grass.

G. MAINTENANCE: Maintenance shall begin immediately after each portion of grass area is planted. It will be the Contractor's responsibility to maintain the existing grades and leave them in a true and even condition after planting. All planted areas will be protected and maintained by watering, weed control, mowing, and replanting as necessary for at least thirty (30) days after initial planting and for as much longer as necessary to establish a uniform stand with complete coverage of the specified grass.

H. FERTILIZER: (Subsidiary to Seeding Item)

1. Description: This item shall consist of providing and distributing fertilizer over the seeded areas.

2. Materials: Shall be in accordance with COG Specification 202.4.1 and Section 12-46 below.

3. Construction Methods: The fertilizer shall be pelleted or granular fertilizer and shall be applied uniformly over the entire area specified to be fertilized and in the manner directed for the particular item of work. The fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer for the particular item of work shall meet the approval of the City.

Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of four hundred (400) pounds per acre for all types of seeding.

I. PAYMENT:

1. The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit price bid for "Seeding" which price shall be full compensation for furnishing all materials and for performing all operations necessary to complete the work, including fertilizer. Once a "uniform stand of grass" is provided, the City will provide payment for the seeding. See definition of "uniform stand of grass" below.

2. Uniform Stand of Grass: A uniform stand with complete coverage of the specified grass shall be defined as not less than one hundred-fifty (150) growing plants per square foot seeded. Growing plants shall be defined as healthy grass plants of two blades or more at least 2-inches tall.

12-46 SODDING/TURFGRASS PLANTING: This work includes labor, material, and equipment for soil preparation, fertilization, planting, and other requirements regarding turfgrass planting areas. Payment for sodding shall include the cost of all fertilizer and water. Grass sod variety shall match existing and adjacent property.

A. SUBMITTALS: Samples and Producers' Specifications: Various samples, certificates, and specifications of seed, fertilizer, sand, compost, other soil amendments and other materials shall be submitted for approval as required by subsequent sections of this specification.

B. TURFGRASS:

1. Buffalograss Sod, Bermuda Sod or Saint Augustine: Turfgrass sod shall be "Buchloe dactyloides" (Buffalograss) 'Prairie Grass' variety, “Cynodon dactylon” Common Bermuda Grass, or “Stenotaphrum secundatum” Saint Augustine Grass.. Sod shall consist of stolons, leaf blades, rhizomes, and roots with a healthy, virile system of dense, thickly matted roots throughout the soil of the sod for a thickness not less than ¾-inches. Sod shall be alive, healthy, vigorous, free of insects, disease, stones, and undesirable foreign materials and grasses. The grass shall have been mowed prior to sod cutting so that the height of the grass shall not exceed 2-inches. Sod shall have been produced on growing beds of clay or clay-loam topsoil. Sod shall not be harvested or planted when its moisture condition is so excessively wet or dry that its survival will be affected. All sod is to be harvested, delivered, and planted within a thirty-six (36) hour period of time. Sod shall be protected from exposure to wind, sun and freezing. If sod is stacked, it shall be kept moist and shall be stacked roots-to-roots and grass-to-grass.

2. Dimensions: All sod shall be machine cut to uniform soil thickness of 1-inch plus or minus ¼-inch. All sod shall be of the same thickness. Rectangular sections of sod may vary in length, but all shall be of equal width and of a size that permits the sod to be lifted, handled, and rolled without breaking. Broken pads and torn, uneven ends will be unacceptable.

3. Solid Sodding: Prior to laying the sod, the planting beds shall be raked smooth to true grade and moistened to a depth of 4-inches, but not to the extent causing

puddling. The sod shall be laid smoothly, tightly butted edge to edge, and with staggered joints. The sod shall be pressed firmly into contact with the sod bed by rolling or by hand tamping with an approved tamper so as to eliminate all air pockets, provide a true and even surface, and insure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Following compaction, fine screened soil of good quality shall be used to fill all cracks between sods. Excess soil shall be worked into the grass with suitable equipment and shall be well watered. The quantity of fill soil shall be such that it will cause no smothering of the grass.

4. If sod is placed after September 15, final acceptance on the grass will not occur until after April 15. The grass shall not be over-seeded with rye. The Contractor shall water the grass until the grass is accepted.

C. FERTILIZER:

1. General: Fertilizer shall be an organic commercial product uniform in composition, free flowing, and suitable for application with approved equipment. Fertilizer shall be delivered to the site in fully labeled original containers. Fertilizer which has been exposed to high humidity and moisture, has become caked or otherwise damaged making it unsuitable for use, will not be acceptable.

2. Planting Application: Fertilizer shall be an organically based product (nutrients contained in the project shall be derived solely from the remains, part of the remains, or a by-product of a once-living organism) supplying nitrogen, phosphorus and potassium in a 1-1-1 to 5-5-5 analysis, such as Green Sense (3-1-2) or Sustane (5-4-2), or approved alternate formulation. The fertilizer shall contain a variety of cultures of soil-borne bacteria and trace elements, and be high (min. 18% each) in humus and humic acid. The Contractor shall submit a sample label or specification of the fertilizer proposed to be used for the City's approval. The specified fertilizer shall be applied at the rate of twenty (20) pounds per one thousand (1,000) square feet according to specific label. Fertilizer shall be applied over sodded areas after planting, but not more than two (2) days later.

D. HERBICIDES:

1. General: Herbicides will be applied as necessary for the eradication of weeds. The Contractor will choose an appropriate herbicide for application with respect to the kind of turfgrass being planted, climatic conditions, site conditions, and the state of work and the approved City chemical list available through the Parks Department. The applied herbicides shall not be detrimental to the establishment of turfgrass. Herbicides shall be approved for application by relevant U.S. Government agencies such as the U.S. Department of Agriculture and the Environmental Protection Agency. A pre-emergent that will not cause root pruning of new sod must be applied when sod is laid.

2. Application: The rates and methods of application shall be in strict conformance with local, state and federal laws and regulations. Applications shall follow the manufacturer's recommendations. All applications must be licensed by Texas Structural Pest

Control Board or Texas Department of Agriculture.

3. Weed Control: The Contractor shall apply appropriate herbicides in the following situations:
    a. Where weeds are present in the prepared soil, prior to the commencement of planting operations.

    b. Where weeds are present in the planted turfgrass areas, prior to the establishment of the turfgrass to a uniform stand.

    c. In the planted turfgrass areas, where the presence of weeds precludes the acceptability of the turfgrass as a uniform stand.

    d. In other situations where the City judges that the presence of weeds is detrimental to the establishment or acceptability of the turfgrass.

E. PLACEMENT: All turfing operations shall be executed across the slope, parallel to finished grade contours.

F. SOIL PREPARATION:
1. Scarification: Scarification shall be accomplished to loosen the soil, destroy existing vegetation, and prepare an acceptable sod bed. Initial tillage shall be done in a crossing pattern for double coverage, then followed by a disc harrow. Depth of scarification shall be 1-inch to 1½-inches.

2. Cleaning: Soil shall be further prepared by the removal of debris, building materials, rubbish, weeds, and stones larger than 2-inches in diameter. During the soil preparation process, a "Rock Pick" or other approved piece of machinery shall be used to gather surface stones as small as 1-inch in diameter. The Contractor shall be responsible for the disposal of collected materials.

3. Fine Grading: After scarifying and cleaning, all areas to be planted shall be leveled, fine graded, and dragged with a weighted spike harrow or float drag. The required result shall be the elimination of ruts, depressions, humps, and objectionable soil clods. Unless specified by the City medians shall be crowned in the center with cross slopes of approximately two percent (2%). This shall be the final soil preparation step to be completed before the commencement of fertilizing and planting.

4. City shall approve bed preparation before grass planting begins.

G. PROTECTION: No heavy equipment shall be moved over the planted lawn area unless the soil is again prepared, graded, leveled and replanted. It will be the responsibility of this Contractor to protect all paving surfaces, curbs, utilities, plant materials, and any other existing improvements from damage. Any damage shall be repaired or replaced as soon as possible at no cost to the City. The City may repair emergency conditions or noncompliance hazards at the cost of the Contractor.

H. ESTABLISHMENT AND ACCEPTANCE: Regardless of unseasonable climatic conditions or other adverse conditions affecting planting operations and the growth of the turfgrass, it shall be the sole responsibility of the Contractor to ESTABLISH A UNIFORM STAND OF TURFGRASS AS HEREIN SPECIFIED. When adverse conditions such as drought, cold weather, high winds, excessive precipitation, or other factors prevail to such an extent that satisfactory results are unlikely, the City may stop any phase of the work until conditions change to favor the establishment of turfgrass.

1. Uniform Stand of Turfgrass: A uniform stand with complete coverage of the specified grass shall be defined as not less than one hundred fifty (150) growing plants per square foot. Growing plants shall be defined as healthy grass plants of two blades or more at least 1½-inches tall. A uniform stand of turfgrass shall be free of weeds. No payment will be made for turfgrass until a uniform stand of grass has been established. Partial projects will not be accepted. A uniform stand of grass over 4-inches in height will not be accepted.

2. Thirty (30) days following planting, the City will inspect the medians to verify establishment as described above. Contractor will be required to replant and/or maintain any areas of grass that are unacceptable to the City until they meet the standards above.

I. MAINTENANCE: Maintenance shall begin immediately after each portion of grass area is planted. All planted areas will be protected and maintained by watering, weed control, and replanting as necessary to establish a UNIFORM STAND WITH COMPLETE COVERAGE OF THE SPECIFIED GRASS. The entire project will continue to be replanted and maintained by the Contractor until complete coverage and acceptance are achieved over one hundred percent (100%) of the area. Any water equipment deemed necessary by the Contractor will be provided by the Contractor.

1. Watering: Use a temporary irrigation system to irrigate the entire planted area daily for the first ten (10) days on which less than ½-inch of rain has fallen in the previous twenty-four hours and then two (2) times per week for the balance of the month following planting. Water trucks will be permitted as a means of irrigating the sodded areas.

2. Weed Control: Appropriate herbicides shall be applied as necessary as previously specified.

3. Grass shall be edged where it is adjacent to concrete areas.

4. All concrete areas where weeds are growing in the joints must be trimmed or chemically sprayed. These areas must have all growth removed.

5. Ant infestations must be treated with Award, Amdro or approved equivalent.

J. GRADING: It is the Contractor's responsibility to maintain the existing grades and leave them in a true and even condition after planting turfgrass.

K. EROSION CONTROL: Throughout the project and the maintenance period for turfgrass, it is the Contractor's responsibility to maintain the topsoil in place at specified grades. Topsoil and turfgrass losses due to erosion will be replaced by the Contractor until establishment and acceptance is achieved.

L. CLEAN-UP: The Contractor shall remove any excess material or debris brought onto the site or unearthed as a result of his/her turfgrass operations.

M. GUARANTEE: The Contractor shall guarantee all materials used for this work to be type, quality, and quantity specified.

12-47 FINAL CLEANUP: The intent of this section is to ensure that an adequate cleanup job be performed by the Contractor. Prior to accepting the project by the City, Contractor shall sweep and remove all trash, debris and remnants from all locations or areas affected by construction activities. All necessary cleanup work shall be considered subsidiary to the various bid items on this contract.

12-48 FINAL INSPECTION: The City will make final inspection of all work included in the contract as soon as practicable after the work is completed and ready for acceptance. If the work is not acceptable at the time of such inspection, the City will inform the Contractor as to the particular defects to be remedied before final acceptance will be made.

END OF SECTION

SECTION NO. 13

SPECIAL PROVISIONS – PAVING SPECIFICATIONS

NUMERICAL LISTING

Section No.	
~~13-01~~	~~ROADWAY EXCAVATION~~
~~13-02~~	~~COMPACTED ROADWAY FILL & EMBANKMENT~~
~~13-03~~	~~CEMENT TREATED BASE (CTB)~~
~~13-04~~	~~HYDRATED LIME~~
~~13-05~~	~~LIME AND CEMENT TREATED SUBGRADE~~
~~13-06~~	~~CEMENT TREATED SUBGRADE~~
~~13-07~~	~~EPOXY BONDING AGENT~~
13-08	MISCELLANEOUS CONCRETE TESTING REQUIREMENTS
13-09	RECONSTRUCT DRIVES
13-10	CONCRETE CURB AND GUTTER
~~13-11~~	~~CONCRETE VALLEY GUTTERS~~
13-12	CONCRETE DRIVEWAYS
~~13-13~~	~~CONCRETE SIDEWALKS~~
~~13-14~~	~~BARRIER FREE RAMPS~~
~~13-15~~	~~CONCRETE PANEL REPLACEMENT~~
~~13-16~~	~~CONCRETE PAVEMENT~~
~~13-17~~	~~CONCRETE MEDIANS~~
~~13-18~~	~~MEMBRANE CURING~~
~~13-19~~	~~ASPHALTIC PRIME COAT~~
~~13-20~~	~~TACK COAT~~
~~13-21~~	~~NON-TRACKING TACK COAT~~
~~13-22~~	~~HOT MIX ASPHALTIC CONCRETE~~
~~13-23~~	~~PAVING FABRIC (PETRO-MAT)~~
~~13-24~~	~~STEEL GUARD RAIL~~
~~13-25~~	~~GPS MONUMENT~~
~~13-26~~	~~TEMPORARY BATCH PLANT~~

SECTION NO. 13

SPECIAL PROVISIONS – PAVING SPECIFICATIONS

13-01 ROADWAY EXCAVATION: **N/A**

13-02 COMPACTED ROADWAY FILL & EMBANKMENT: **N/A**

13-03 CEMENT TREATED BASE (CTB): N/A

13-04 HYDRATED LIME: **N/A**

13-05 LIME AND CEMENT TREATED SUBGRADE: N/A

13-06 CEMENT TREATED SUBGRADE: **N/A**

13-07 EPOXY BONDING AGENT: **N/A**

13-08 MISCELLANEOUS CONCRETE TESTING REQUIREMENTS:

A. The strength of the concrete shall be determined during the construction by taking a minimum of four (4) test cylinders during each fifty (50) cubic yards of continuous placement. These tests shall be conducted by an approved testing laboratory and the initial tests shall be paid for by the City. The cost of additional testing to isolate areas not complying with the specifications shall be paid for by the Contractor.

B. Strength tests permitted by the specifications for early form removal shall be conducted by an approved testing laboratory and the cost shall be borne by the Contractor.

13-09 RECONSTRUCT DRIVES:

A. Existing drives which will be affected by proposed construction and which will be reconstructed are specifically called out on the plans. After construction operations are completed in the street area, these drives shall be reconstructed to original or better condition than existed before construction and to satisfaction of the City. Existing surface and base materials and storm drain pipe may be reused if approved by the City.

B. All work shall conform to the applicable standard and special project specifications. Work shall include all materials, labor, and supervision for the reconstructing the drives and be paid per unit price as stated in the PROPOSAL.

13-10 CONCRETE CURB AND GUTTER:

A. Concrete curb and gutter shall be placed at locations along the project where portions of the existing curb and gutter is removed. Unless otherwise approved by the City, all curb and gutter shall be standard 30-inches curb and gutter sections and be replaced at a minimum thickness of 6-inches or match existing curb and gutter thickness, whichever is greater. Contractor shall remove additional 8-inches thick, 1-foot back of curb of existing material under new curb and gutter limits and replace with 8-inches CTB compacted to ninety-five percent (95%) TEX-113E at optimum to plus four percent (4%).

B. All concrete used for curb and gutter in the City will have a cement content of not less than five and a half (5.5) sacks of cement per cubic yard of concrete, four and a half percent (4.5%) entrained air (+/- 1.5%), and a minimum compressive strength at twenty-eight (28) days of thirty-six hundred (3,600) pounds per square inch. The unit price bid for curb and gutter shall include all reinforcing steel, including No. 4 "L" bars at every 18-inches. Curb & gutter, including additional excavation and CTB will be paid by the linear foot.

C. Expansion joints shall be placed at all intersections, P.Cs, P.Ts, driveways, inlets, other curb and gutter or every 200-feet. Tooled joints shall be placed at every 5-feet intervals. All expansion joints shall not be less than ½-inch in thickness with longitudinal dowels. Dowels shall be three No. 4 smooth bars, 24-inches in length. One-half of the dowel shall be coated with asphalt and terminated with an expansion cap.

D. All work shall be in compliance with C.O.G. Section 305.1. All loose material between the forms will be removed and the grade wetted prior to the placing of the concrete. An approved curing compound shall be applied to the surface in accordance with the Curing Specification. All curbs shall be vibrated to eliminate "honeycomb" appearance.

E. Locations where homeowners have installed drain pipes that run through the curb, curb opening casting will be required to discharge water through the curb. Drain outfall (R3262 Neenah Foundry or equivalent) shall be installed flush with the curb and the location be approved by the City prior to installation. It is the Contractor's responsibility to connect existing pipe to the curb opening casting and ensure connection is secure with no water leaks or dirt infiltration.

F. Refer to Section 13-16 for additional concrete specifications. (Rev 1/2022)

13-11 CONCRETE VALLEY GUTTERS: N/A

13-12 CONCRETE DRIVEWAYS:

A. All concrete driveways shall have a minimum thickness of 5-inches for residential driveways and 6-inches for commercial driveways or shall match existing driveway thickness, whichever is greater.

B. Driveways shall be composed of concrete having a minimum cement content of five and a half (5.5) sacks per cubic yard of concrete, four and a half percent (4.5%) entrained air (+/- 1.5%) and a minimum compressive strength at twenty-eight (28) days of thirty-six hundred (3,600) pounds per square inch. The unit bid price shall also include No. 4 bars on 18-inches centers both ways. All concrete shall be vibrated and an approved curing compound shall be applied to the surface.

C. The City will replace only those existing driveways specified. Any new drives installed by the Contractor under criteria other than the above will be at his/her own expense.

D. Refer to Section 13-16 for additional concrete specifications. (Rev 1/2022)

13-13 CONCRETE SIDEWALKS: **N/A**

13-14 BARRIER FREE RAMPS: **N/A**

13-15 CONCRETE PANEL REPLACEMENT:

13-16 CONCRETE/CONCRETE PAVEMENT: N/A

13-17 CONCRETE MEDIANS: **N/A**

13-18 MEMBRANE CURING: N/A

13-19 ASPHALTIC PRIME COAT: **N/A**

13-20 TACK COAT: **N/A**

13-21 NON-TRACKING TACK COAT: **N/A**

13-22 HOT MIX ASPHALTIC CONCRETE: **N/A**

13-23 PAVING FABRIC (PETRO-MAT): N/A.

13-24 STEEL GUARD RAIL: **N/A**

13-25 GPS MONUMENT: N/A

13-26 TEMPORARY BATCH PLANT: **N/A**

END OF SECTION

SECTION NO. 14

SPECIAL PROVISIONS – WATER AND SANITARY SEWER SPECIFICATIONS

NUMERICAL LISTING

Section No.	
~~14-01~~	~~POLY-VINYL CHLORIDE (PVC) WATER PIPE AND FITTINGS~~
~~14-02~~	~~EMBEDMENT REQUIREMENTS FOR WATER PIPE & FITTINGS~~
~~14-03~~	~~THRUST BLOCKINGS~~
~~14-04~~	~~VALVE OPERATIONS NOTIFICATION~~
~~14-05~~	~~INTERRUPTION OF WATER SERVICE~~
~~14-06~~	~~CLEANING OF NEW WATER MAIN~~
~~14-07~~	~~FIRE HYDRANTS~~
~~14-08~~	~~RELOCATION OF EXISTING FIRE HYDRANTS~~
~~14-09~~	~~REMOVE/SALVAGE EXISTING FIRE HYDRANTS~~
~~14-10~~	~~GATE VALVES~~
~~14-11~~	~~WATER SERVICES~~
~~14-12~~	~~WATER METER REPLACEMENT~~
~~14-13~~	~~WATER METER RELOCATION OR ADJUSTMENT~~
~~14-14~~	~~WATER METER BOX REPLACEMENT~~
~~14-15~~	~~ABANDONING EXISTING VALVE BOX AND MANHOLE~~
14-16	POLY-VINYL CHLORIDE (PVC) SANITARY SEWER PIPE & FITTINGS
14-17	EMBEDMENT REQUIREMENTS FOR SANITARY SEWER PIPE & FITTINGS
14-18	LOW PRESSURE AIR TEST OF SANITARY SEWER LINES
14-19	DEFLECTION TESTING OF FLEXIBLE SANITARY SEWER
~~14-20~~	~~SANITARY SEWER SERVICE~~
14-21	BYPASS PUMPING
~~14-22~~	~~CAST-IN-PLACE MANHOLES~~
14-23	CCTV INSPECTION OF SANITARY SEWER MAINS
14-24	DISPOSAL OF EXCESS MATERIAL
14-25	PIPE HANDLING
14-26	TYING INTO EXISTING LINES
14-27	PLUGGING EXISTING LINES TO BE ABANDONED
~~14-28~~	~~DUCTILE IRON PIPE~~
~~14-29~~	~~DUCTILE IRON FITTINGS~~
14-30	GPS DATA ON WATER & SANITARY SEWER INSTALLATION

SECTION NO. 14

SPECIAL PROVISIONS – WATER AND SANITARY SEWER SPECIFICATIONS

Water and Sanitary Sewer improvements shall be in accordance with the latest version of the CITY OF ARLINGTON STANDARD SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION located at the City's web page, https://www.arlingtontx.gov/city_hall/departments/public_works_transportation/engineering/standard_specifications_special_provisions, hereinafter referred to as "Standard Specifications". References in parentheses located in the heading of each section below correspond to sections of the Standard Specifications. (Rev. 4/2019)

14-01 POLY-VINYL CHLORIDE (PVC) WATER PIPE & FITTINGS (B 4A and B 4B): N/A

14-02 EMBEDMENT REQUIREMENTS FOR WATER PIPE & FITTINGS (B 19 & C 3.14): N/A

14-03 THRUST BLOCKINGS (C 4.11 and C 6.10): N/A

14-04 VALVE OPERATIONS NOTIFICATION: N/A

14-05 INTERRUPTION OF WATER SERVICE: N/A

14-06 CLEANING OF NEW WATER MAIN (C 20.6): N/A

14-07 FIRE HYDRANTS (B 9): N/A

14-08 RELOCATION OF EXISTING FIRE HYDRANTS (C 12): N/A

14-09 REMOVE/SALVAGE EXISTING FIRE HYDRANT: N/A

14-10 GATE VALVES (B 10): N/A

14-11 WATER SERVICES: N/A

14-12 WATER METER REPLACEMENT: N/A

14-13 WATER METER RELOCATION OR ADJUSTMENT: N/A

14-14 WATER METER BOX REPLACEMENT: N/A

14-15 ABANDONING EXISTING VALVE BOX AND MANHOLE: N/A

14-16 POLY-VINYL CHLORIDE (PVC) SEWER PIPE & FITTINGS (B 7):

A. SCOPE:

This specification designates general requirements for unplasticized, poly-vinyl chloride (PVC), plastic gravity sewer pipe with integral wall bell and spigot joints for the conveyance of domestic sewage. The pipe and fittings shall be in accordance with the latest ASTM

D3034 or F679 SDR 26 pipe, or as specified in the bid PROPOSAL.

B. MATERIALS:
Pipe shall be made from clean, virgin, approved Class 12454 BC PVC compound conforming to ASTM resin specification D 1784. Clean reworked material generated from the manufacturer's own production may be used.

C. PIPE:
All pipe shall be suitable for use as a gravity sewer conduit. Provisions must be made for contraction and expansion at each joint with a rubber ring. The rings shall securely lock the solid cross section rubber ring into position. Standard lengths shall be 20-feet and 13-feet, +/- 1-inch.

D. FITTINGS:
All fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and spigot configurations identical to that of the pipe. Adapters appropriate for the existing pipe material shall be used to tie into existing pipe for the service lines and laterals. No separate payment will be made for adapters, tees, bends or other necessary fittings used in the installation of this line but shall be considered to be subsidiary to the unit prices for pipe and services.

E. PHYSICAL AND CHEMICAL REQUIREMENTS:
Pipe shall be designated to pass all tests at seventy-three (73) degrees F (+/- three (3) degrees F).

F. PIPE STIFFNESS:
Minimum "pipe stiffness" (F/Y at 5% deflection) shall be calculated in accordance with ASTM Designation D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading.

G. JOINT TIGHTNESS:
Assemble two sections of pipe in accordance with the manufacturer's recommendations. Subject the joint to an internal hydrostatic pressure of twenty-five (25) psi for one hour. Consider any leakage failure of the test requirements.

H. FLATTENING:
There shall be no evidence of splitting, cracking, or breaking when the pipe is tested as follows:

Flatten specimen of pipe, 6-inches long between parallel plates in a suitable press until the distance between the plates is forty percent (40%) of the outside diameter of the pipe. The rate of loading shall be uniform and such that the compression is completed within two (2) to five (5) minutes.

I. DROP IMPACT TEST:

Pipe (6-inches (long section) shall be subjected to impact from a free falling tup (20 lb.Tup A) in accordance with ASTM method D 2444. No shattering or splitting (denting is not a failure) shall be evident when the following energy is impacted:

Nominal Size	4"	6"	8"	10"	12"
Ft. - Lbs.	150	210	210	220	220

J. ACETONE IMMERSION TEST:
After two (2) hours immersion in a sealed container of anhydrous (99.5% pure) acetone, a 1-inch long sample ring shall show no visible spalling or cracking. (Swelling or softening is not a failure when tested in accordance with ASTM D 2152.)

K. PAYMENT:
The price bid per linear foot for PVC pipe at the various depths shall be full compensation for all material, labor, equipment, and incidental work required to complete the line ready for use, including embedment and seepage collars. The cost of trenching, embedment, seepage collars, backfill, compaction of backfill and exfiltration testing should be included in the unit price bid per linear foot, complete in place.

14-17 EMBEDMENT REQUIREMENTS FOR SANITARY SEWER PIPE & FITTINGS (B 19 & C 3.14): Unless otherwise specified, all sanitary sewer pipes shall be in accordance with Class "B" embedment detail.

14-18 LOW PRESSURE AIR TEST OF SANITARY SEWER LINES (C 29):

A. After completing backfill of a section of sanitary sewer line, the Contractor shall, at his/her expense, conduct a Line Acceptance Test using low-pressure air. The test shall be performed using the below stated equipment according to stated procedures and under the supervision of the City.

1. EQUIPMENT: The equipment used shall meet the following minimum requirements:

   a. Pneumatic plugs shall have a sealing length equal to or greater then the diameter of the pipe to be inspected.

   b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

   c. All air used shall pass through a single control panel.

   d. Three individual hoses shall be used for the following connections:

      i. From the control panel to pneumatic plugs for inflation.

      ii. From the control panel to a sealed line for introducing the low-pressure air.

      iii. From a sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

2. GENERAL PROCEDURE:
   a. All pipe shall be backfilled prior to air testing.

   b. Air tests shall be made by the pressure drop versus time method. The air test shall be performed by testing sections of pipe of various lengths. The Contractor shall furnish all material, equipment and labor necessary to perform the air test. Air gauges shall be recently calibrated and shall be stamped showing the date of calibration. Should the sanitary sewer system fail air tests, the Contractor shall repair the leaks and retest at his/her own expense.

3. TESTING PIPE LESS THAN 36 INCHES IN DIAMETER:
   a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking. All air used shall pass through a single control panel.

   b. Three individual hoses shall be used for the following connections: from the control panel to pneumatic plugs for inflation; from the control panel to a sealed line for introducing the low-pressure air; and from a sealed line to the control panel for continually monitoring the air pressure rise in the sealed line.

   c. The air compressor shall be of adequate capacity for charging the system.

   d. The following procedure shall be used for air testing a sewer system: all pneumatic plugs shall be seal-tested before being used in the actual test installation; one length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked; air shall be introduced into the plugs to twenty-five (25) psig; the sealed pipe shall be pressurized to five (5) psig; the plugs shall hold against this pressure without bracing and without movement of the plugs out of this pipe.

   e. After a manhole-to-manhole reach of pipe has been backfilled and the pneumatic plugs checked, the plugs shall be placed in the line and inflated to twenty-five (25) psig. Low pressure air shall be injected into the line until the internal pressure reaches four (4) psig. Two (2) minutes shall then be allowed for the pressure to stabilize.

   f. In areas where ground water is known to exist, the Contractor shall install a ½-inch diameter capped pipe nipple, approximately 10-inches long, through the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the Line Acceptance Test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clean it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height (in feet) of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height shall be divided by 2.3-feet to establish the pounds of pressure that will be added to all readings.

g. After the pipe pressure has stabilized at three and a half (3.5) psig or the adjusted pressure due to ground water submergence, a stop watch shall be started and the time required for the internal pressure to reach two and a half (2.5) psig determined. Minimum permissible holding time for runs of single pipe diameter are indicated in the table under Section C 29.

4. EXAMPLE: If the height of water is 11½-feet, then the added pressure will be psig. This will increase the three and a half (3.5) psig to eight and a half (8.5) psig and the two and a half (2.5) psig to seven and a half (7.5) psig. The allowable drop and the timing remain the same. Refer to the City's Standard Specification for Water and Sanitary Sewer Construction, Section C 29 for air test tables.

5. TESTING PIPE 36 INCHES AND LARGER IN DIAMETER: For pipes 36-inches in diameter and over, the air test may be performed by testing each joint connection individually utilizing a joint tester similar to the Cherne Joint Tester. No joint shall be air tested until the pipe has been backfilled. At no time shall pipe installation exceed 100-feet from the latest joint tested. The method of testing shall be described in this section. The time allowed for the pressure drop for three and a half (3.5) psig to two and a half (2.5) psig shall be ten (10) seconds. Failure to pass the air test shall be cause for rejection. Rejected pipe shall be removed. Reinstallation and/or repairs may be made at the option of the City.

6. MEASUREMENT AND PAYMENT: No separate payment will be made for the tests specified herein, but the cost thereof shall be subsidiary to the various bid items.

B. IF THE INSTALLATION FAILS TO MEET THIS REQUIREMENT, THE CONTRACTOR SHALL DETERMINE, AT HIS/HER OWN EXPENSE, THE SOURCE OF LEAKAGE. CONTRATOR SHALL REPLACE ALL DEFECTIVE MATERIALS AND/OR WORKMANSHIP UNTIL RETEST(S) IS IN COMPLIANT.

14-19 DEFLECTION TESTING OF FLEXIBLE SANITARY SEWER (C 27):

A. PVC and any other flexible sewer pipe shall pass a deflection test conducted under the inspection of the City. A rigid mandrel shall be used to measure deflection. The rigid mandrel shall have an outside diameter (OD) equal to ninety-five percent (95%) of the inside diameter (ID) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two (2) minimum wall thicknesses for an OD controlled pipe and the average inside diameter for an ID controlled pipe. Statistical or other tolerance packages shall not be considered in mandrel sizing.

B. Deflection tests shall be conducted after the final backfill has been in place at least thirty (30) days. No pipe shall exceed a deflection of five percent (5%). If a pipe fails to pass the deflection test, the Contractor, at his/her own expense, shall replace one complete length of pipe at the point of failure.

C. No separate payment will be made for the tests specified herein, but the cost thereof shall be included and considered subsidiary to the various other items.

14-20 SANITARY SEWER SERVICE: N/A

14-21 BYPASS PUMPING: Bypass pumping required for performance of the project will be considered subsidiary to the unit prices bid on this project unless otherwise indicated in the bid PROPOSAL as a pay item.

14-22 CAST-IN-PLACE MANHOLES (C 18.3): N/A

14-23 CCTV INSPECTION OF SANITARY SEWER MAINS (C 28):

A. SCOPE

This section of the specifications covers the City inspection of sanitary sewer mains by closed circuit television (CCTV).

B. GENERAL

The final inspection on all projects shall include a CCTV inspection of the completed sanitary sewer main installation, exclusive of services. The CCTV inspection, including furnishing of necessary personnel, equipment and materials, shall be performed by the Contractor. All defects in the installed facility revealed by the CCTV inspection shall be remedied by the Contractor prior to the acceptance of the project.

C. CONTRACTOR'S RESPONSIBILITIES

1. Prior to pavement placement (if sanitary sewer is under pavement) or prior to sanitary sewer main acceptance (if sanitary sewer is in parkway), the Contractor shall inspect all newly constructed mains, excluding services, by CCTV in accordance to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment & Certification Program (PACP) standards, latest edition. The Contractor shall provide the City a CCTV inspection video and a PACP inspection report summarizing the inspection with all PACP observation codes with their corresponding Structural Grade and O&M condition grades clearly marked. The inspection shall be performed by a NASSCO PACP Certified Inspector, and the report shall clearly show the CCTV Inspector's name and registration number. In addition to defects noted for NASSCO PACP sanitary sewer standards, the CCTV Inspector shall note any defects that meet the NASSCO PACP definition of 'Joint Offset Small (JOS)', Joint Separated Small (JSS)', or 'Joint Angular Small (JAS)'. Such defects shall be clearly highlighted, embolden, circled or marked in a way to distinguish them from the other observation codes.

2. The sanitary sewer main shall be thoroughly cleaned and flushed with water, by the Contractor, prior to CCTV inspection. The pipe shall have flow depth less than a quarter (1/4) pipe full unless approved by the City in writing.

3. The Contractor will be held liable for all damages to the public and private property caused directly and/or indirectly by the CCTV inspection or by surcharging of sanitary sewer mains. The Contractor is responsible for any fines, penalties or other costs imposed upon the City by any agency or private party as a result of the CCTV inspection or improper discharges by the Contractor. The

Contractor shall ensure no equipment or other obstructions remain in the line after inspection. All costs associated with retrieving any lodged equipment, shall be incidental to the inspection.

D. BASIS FOR CCTV REPORT ACCEPTANCE

CCTV inspection report must indicate under C 28.3 has a PACP Overall Pipe Structural and O&M Rating of 0, and contains no defects meeting the NASSCO PACP definition of JOS, JSS, or JAS. Any defects observed shall be corrected and re-inspected by the Contractor prior to completion at the Contractor's expense.

E. MEASUREMENT AND PAYMENT

Payment will be at the unit price bid per linear foot of CCTV inspection of sanitary sewer mains.

14-24 DISPOSAL OF EXCESS MATERIAL (C 3.12): The disposal of excess material resulting from construction **including asbestos-cement pipe** shall be removed and disposed of by the Contractor. Removal and disposal of **asbestos-cement pipe** shall be in accordance with the latest Federal and State regulations. The location of suitable disposal sites is solely the responsibility of the Contractor; the City shall in no way be responsible for the actions of the Contractor. Unless otherwise indicated in the bid PROPOSAL, this work will be considered subsidiary to various bid items.

14-25 PIPE HANDLING:

A. Pipe, fittings, valves and other accessories shall at all times be handled with care to avoid damage. In loading and unloading they shall be lifted by hoists, cranes or rolled on skidways in a manner which avoids sudden shock. Under no circumstance shall pipe be dropped. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground. Pipe shall be placed on the site of the work parallel with the trench alignment and with the bell ends facing the direction in which the work will proceed.

B. Proper implements, tools, equipment and facilities shall be provided and used by the Contractor for the correct and safe execution of the work. All pipe, fittings, specials, valves, etc. shall be lowered into the trench by means of a suitable machine and shall not be rolled or dumped into the trench. The equipment shall have sufficient capacity to handle the pipe. The method of construction shall be subject to the City's approval. Before being lowered into the trench, each joint of pipe shall be inspected and any unsound or damaged pipe shall be repaired or rejected.

C. Pipe shall be kept free of all debris during the laying operation. The pipe shall be swept or swabbed prior to installation. At the close of each operating day, the open end of the pipe shall be effectively sealed with an approved water tight plug. The swab and plug shall be of a design acceptable to the City. No pipe shall be laid in water or when the trench conditions or the weather are unsuitable for such work, except in an emergency and then only upon permission of the City.

D. All pipe shall be laid accurately to established lines and grades with valves and fittings at the required locations and with joints centered and spigots pushed home. Where it becomes

necessary to make deflections in the line of the pipe, sections of pipe beveled ends or fabricated fittings shall be used. Minor deflection of the line of the pipe may be obtained in standard pipe joints; however, the maximum joint opening caused by such deflection shall not exceed the recommendations of the pipe manufacturer. Random length pipe and/or grade adapters may be used to make unforeseen changes in the field.

14-26 TYING INTO EXISTING LINES (C 25): The unit price bid for tying into existing lines shall include all labor and material necessary to tie the old main into the new main. The Contractor shall furnish all labor, material, equipment, and services required for the locating and uncovering of the existing line, the making of cuts in the line, the removal, relocation, and lowering or raising of existing lines as required, de-watering of the trench, connecting of the existing line into the new main and all appurtenant work required for a complete connection. This shall include the cost of offset bends as necessary for vertical and/or horizontal alignment. The new water lines will have to be tested, chlorinated, and a good sample received before the old lines can be plugged or abandoned and the new line tied in.

14-27 PLUGGING EXISTING LINES TO BE ABANDONED: All dead ends and abandoned lines shall be capped or plugged accordingly. Bell ends shall be plugged whereas spigot ends and plain ends shall be capped. Unit price for plugging existing lines shall include the cost of all labor and material necessary to perform this work.

14-28 DUCTILE IRON PIPE (B 5): N/A

14-29 DUCTILE IRON FITTINGS (B 15): N/A

14-30 GPS DATA ON WATER & SANITARY SEWER INSTALLATION: (Rev 6/2020)
City crew will collect the GPS data on the water and sanitary sewer attributes installed with this project, including construction of new or adjustment and relocation of existing water and sanitary attributes. Examples of water and sewer attributes includes: Gate Valves, Blow-off Valves, Air Release Valves, Fire Hydrants, Meter Boxes, Pig Wye Vaults, Manhole Lids and Flowlines, and Cleanout Lids.

Contractor shall notify the Project Inspector prior to the final walk through that all the attributes are ready for GPS data collections.

The final payment will not be processed until any missing attributes are exposed and brought to the final grades.

END OF SECTION

SECTION NO. 15

SPECIAL PROVISIONS – DRAINAGE SPECIFICATIONS

NUMERICAL LISTING

New Section No.	
~~15-01~~	~~REINFORCED CONCRETE PIPE~~
~~15-02~~	~~HIGH DENSITY POLYETHYLENE PIPE (HDPE)~~
~~15-03~~	~~UNCLASSIFIED DRAINAGE STRUCTURAL EXCAVATION~~
~~15-04~~	~~CONCRETE DRAINAGE STRUCTURES~~
~~15-05~~	~~UNCLASSIFIED CHANNEL EXCAVATION~~
~~15-06~~	~~REINFORCED CONCRETE CHANNEL/SLOPE~~
~~15-07~~	~~CCTV INSPECTIONS OF STORM DRAIN SYSTEMS~~
~~15-08~~	~~GPS DATA ON STORMWATER ATTRIBUTES~~
~~15-09~~	~~TEMPORARY SHORING~~

SECTION NO. 15

SPECIAL PROVISIONS – DRAINAGE SPECIFICATIONS

15-01 REINFORCED CONCRETE PIPE: N/A

15-02 HIGH DENSITY POLYETHYLENE PIPE (HDPE): N/A

15-03 UNCLASSIFIED DRAINAGE STRUCTURAL EXCAVATION: N/A

15-04 CONCRETE DRAINAGE STRUCTURES: N/A

15-05 UNCLASSIFIED CHANNEL EXCAVATION: N/A

15-06 REINFORCED CONCRETE CHANNEL/SLOPE: N/A

15-07 CCTV INSPECTIONS OF STORM DRAIN SYSTEMS: N/A

15-08 GPS DATA ON STORMWATER ATTRIBUTES: N/A

15-09 TEMPORARY SHORING: N/A

END OF SECTION

SECTION NO. 16

TRENCH SAFETY AND OSHA

A. Pursuant to law, trench safety systems are required for all trench excavations that exceed a depth of five feet and shall require a safety program which governs the presence and activities of individuals working in and around the trench excavation. The trench safety systems and safety program shall be in accordance with current Occupational Safety and Health Administration (OSHA) standards. A copy of the 2012 OSHA standards is included for the Contractor's convenience. However, the Contractor must check current and future OSHA Rules as they may change from time to time.

B. The low bidder shall be required to submit a trench safety plan to the project engineer at least 10 days prior to beginning work on the project that will involve trenching operations. The trench safety plan shall be in accordance with current OSHA rules and regulations. The trench safety plan shall specify the method or methods of trench safety to be used with specific information given for each. If the Contractor chooses to use an option from OSHA in the design of sloping and benching systems or design of support systems, shield systems, and other protective systems which requires that the soil be classified as Type A, B, or C, the Contractor shall be required to provide soil investigations and testing necessary to classify the soil type. Soil investigation information must include location and depth. The review of the trench safety plan by the City of Arlington is only for general conformance with OSHA rules and regulations and to ensure sufficient information for inspection purposes. The review in no way relieves the Contractor from responsibility for trench safety in accordance with current law.

C. Each bidder shall satisfy himself, by personal examination of the location of the proposed work and by such other means as he may prefer, as to the requirements of the work to enable him to construct his proposal intelligently. The bidder shall make himself familiar with all of the Contract Documents and other instructions before submitting his proposal (bid) in order that no misunderstanding shall exist in regard to the nature and character of the work to be done. No allowance will be made for any claim that the proposal is based upon incomplete information as to the nature and character of the site or the work involved. Conditional proposals will not be accepted.

D. The Contractor shall make daily inspections of the Trench Safety Systems to ensure that the systems meet OSHA requirements. Daily inspection is to be made by a "competent person" provided by the Contractor. If evidence of possible cave-ins or slides is apparent, all work in the trench shall cease until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the

Contractor, not the owner or the Engineer, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project.

E. **The Contractor shall indemnify and hold harmless the City, its employees and agents, from any and all damages, costs, (including, but not limited to, attorney's fees, court costs, and costs of investigation) judgments or claims by anyone for damage to property, injury or death or persons resulting from the collapse or failure of any trenches, ditches or other excavations constructed under or associated with this contract.**

It is the express intention of the parties, both Contractor and the City, and the Contractor acknowledges and agrees that this indemnity provision provides indemnity by the Contractor to indemnify and protect the City from the consequences of the City's own negligence, whether that negligence is the sole of concurring cause of the injury, death or damage and in the case the City is negligent either by act or omission in providing for trench safety, including but not limited to inspections, failure to issue stop work orders, and the hiring of the Contractor.

F. Included in the proposal is a separate pay item for the trench safety system and the trench safety program. This pay item will be a linear foot basis and will be full compensation for labor, tools, materials, equipment, and incidentals to complete the work. All requirements as outlined in this section will be incorporated within this bid item. Should conditions during construction require that alternate methods of trench safety be used, the Contractor shall submit a revised trench safety plan following the same guidelines as in B. There will be no additional compensation for changes in the trench safety plan as may be required during construction due to changes in conditions. 9/27/04

(c) *Coaming*—The raised frame, as around a hatchway in the deck, to keep out water.

(d) *Jacob's ladder*—A marine ladder of rope or chain with wooden or metal rungs.

(e) *Rail*, for the purpose of §1926.605, means a light structure serving as a guard at the outer edge of a ship's deck.

Subpart P—Excavations

AUTHORITY: Sec. 107, Contract Worker Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable, and 29 CFR part 1911.

SOURCE: 54 FR 45959, Oct. 31, 1989, unless otherwise noted.

§ 1926.650 Scope, application, and definitions applicable to this subpart.

(a) *Scope and application.* This subpart applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

(b) *Definitions applicable to this subpart.*

Accepted engineering practices means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed, specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or *sides* means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout means the accidental release or failure of a cross brace.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any

state is deemed to be a ''registered professional engineer'' within the meaning of this standard when approving designs for ''manufactured protective systems'' or ''tabulated data'' to be used in interstate commerce.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as ''trench boxes'' or ''trench shields.''

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See ''Faces.''

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box. See ''Shield.''

Trench shield. See ''Shield.''

Uprights means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called ''sheeting.''

Wales means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

§1926.651 Specific excavation requirements.

(a) *Surface encumbrances.* All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) *Underground installations.* (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility companies or owners shall be contacted within established or customary local response times, advised of

the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) *Access and egress*—(1) *Structural ramps.* (i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) *Means of egress from trench excavations.* A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(d) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

(e) *Exposure to falling loads.* No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with §1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

(f) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(g) *Hazardous atmospheres*—(1) *Testing and controls.* In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50–1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous

atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(2) *Emergency rescue equipment.* (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(i) *Stability of adjacent structures.* (1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(j) *Protection of employees from loose rock or soil.* (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

[54 FR 45959, Oct. 31, 1989, as amended by 59 FR 40730, Aug. 9, 1994]

§ 1926.652 Requirements for protective systems.

(a) *Protection of employees in excavations.* (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) *Design of sloping and benching systems.* The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in appendix B to this subpart.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) *Design of support systems, shield systems, and other protective systems.* Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) *Option (1)—Designs using appendices A, C and D.* Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with appendix D.

(2) *Option (2)—Designs Using Manufacturer's Tabulated Data.* (i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) *Materials and equipment.* (1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) *Installation and removal of support*—(1) *General.* (i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) *Additional requirements for support systems for trench excavations.* (i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) *Sloping and benching systems.* Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) *Shield systems*—(1) *General.* (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

(ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) *Additional requirement for shield systems used in trench excavations.* Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full

depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

APPENDIX A TO SUBPART P OF PART 1926—SOIL CLASSIFICATION

(a) *Scope and application*—(1) *Scope.* This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) *Application.* This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) *Definitions.* The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653–85 and D2488; The Unified Soils Classification System, The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS–121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil means soil which is underwater or is free seeping.

Type A means cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock),

silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) *Requirements*—(1) *Classification of soil and rock deposits.* Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) *Basis of classification.* The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the America Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) *Visual and manual analyses.* The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) *Layered systems.* In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) *Reclassification.* If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) *Acceptable visual and manual tests*—(1) *Visual tests.* Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) *Manual tests.* Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) *Plasticity.* Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as ⅛-inch in diameter. Cohesive material can be successfully rolled into

threads without crumbling. For example, if at least a two inch (50 mm) length of ⅛-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488—''Standard Recommended Practice for Description of Soils (Visual—Manual Procedure).'') Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a miminum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as a unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

APPENDIX B TO SUBPART P OF PART 1926—SLOPING AND BENCHING

(a) *Scope and application.* This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in §1926.652(b)(2).

(b) *Definitions.*

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) *Requirements*—(1) *Soil classification.* Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) *Maximum allowable slope.* The maximum allowable slope for a soil or rock deposit shall be determined from Table B–1 of this appendix.

(3) *Actual slope.* (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall

determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) *Configurations.* Configurations of sloping and benching systems shall be in accordance with Figure B–1.

TABLE B-1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)[1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP. [3]
STABLE ROCK TYPE A [2] TYPE B TYPE C	VERTICAL (90°) 3/4 : 1 (53°) 1:1 (45°) 1½: 1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

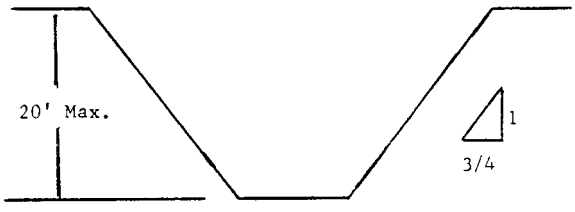
Figure B–1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

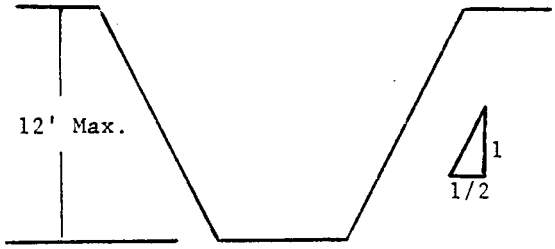
B–1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



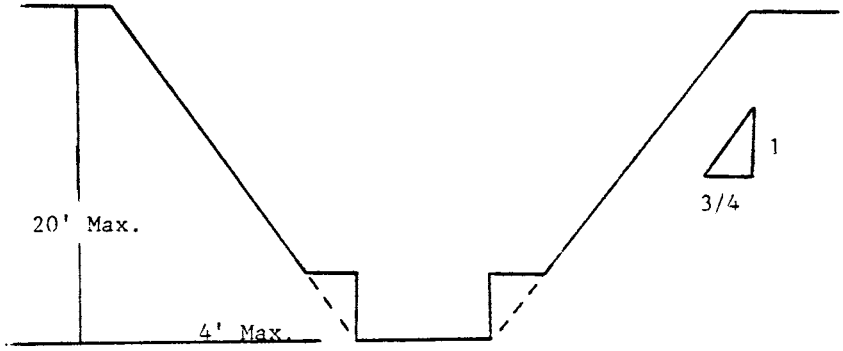
SIMPLE SLOPE—GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

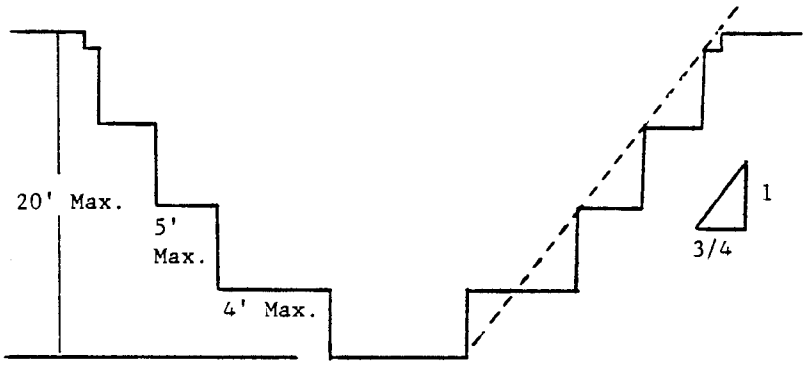


SIMPLE SLOPE—SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of ¾ to 1 and maximum bench dimensions as follows:

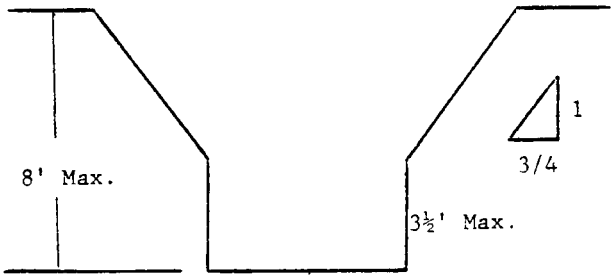


SIMPLE BENCH



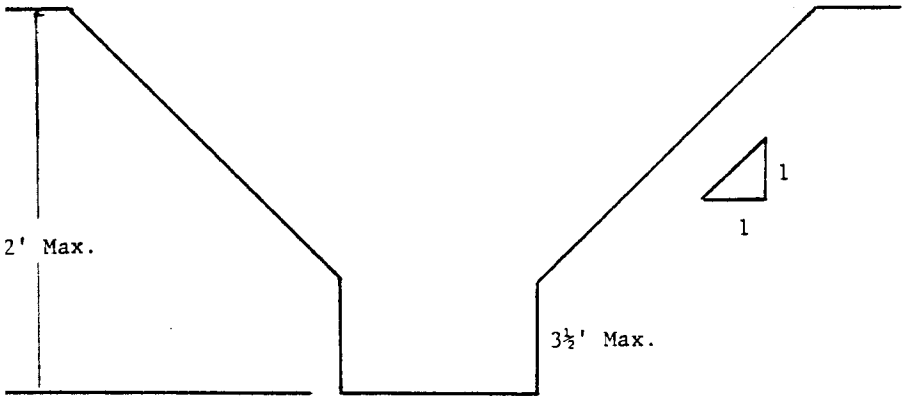
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.



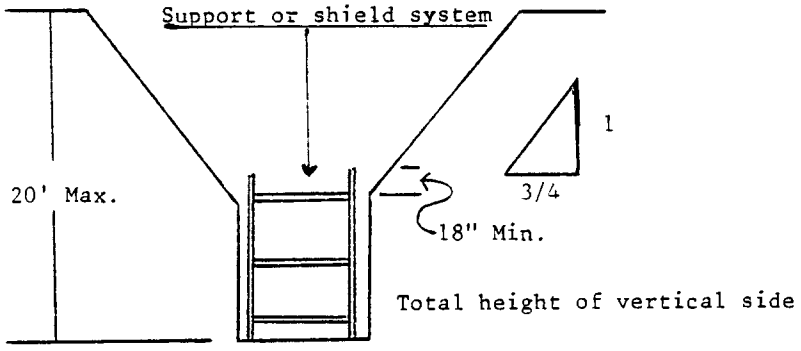
UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 8 FEET IN DEPTH

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 12 FEET IN DEPTH

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

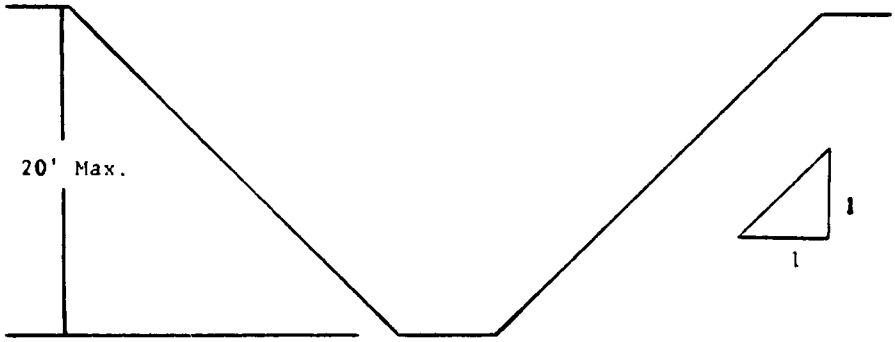


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

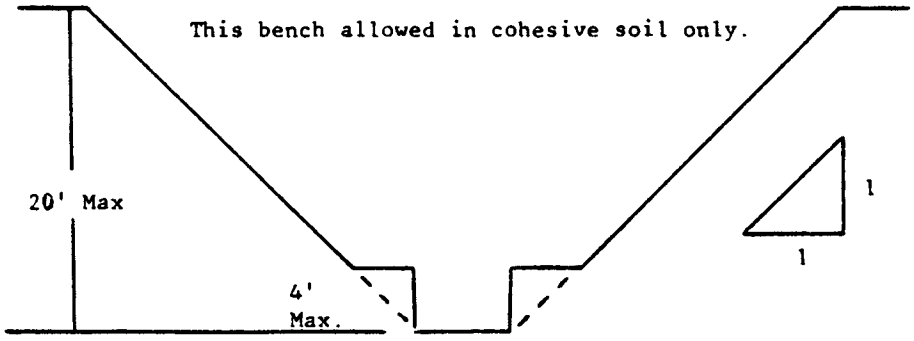
B–1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

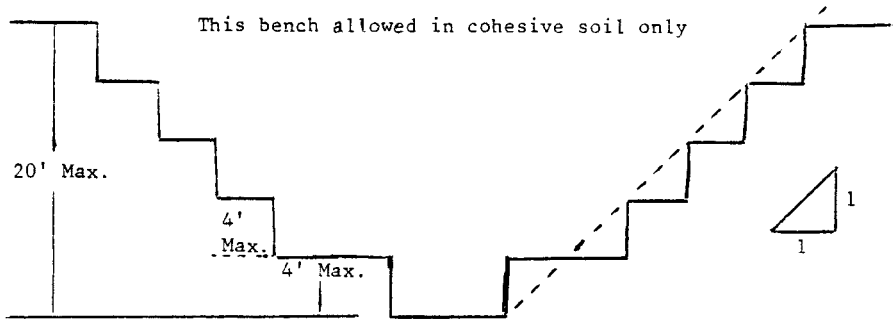


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

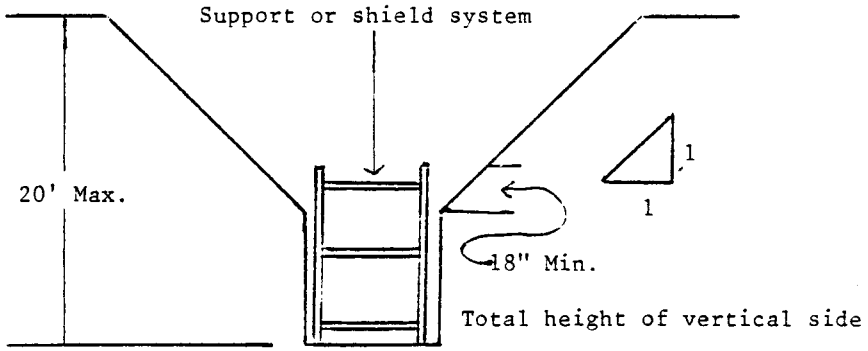


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

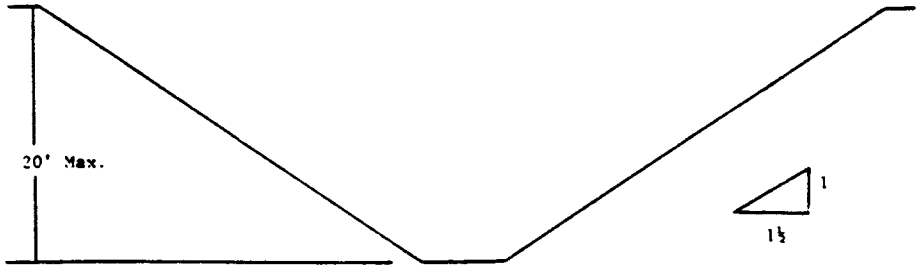


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

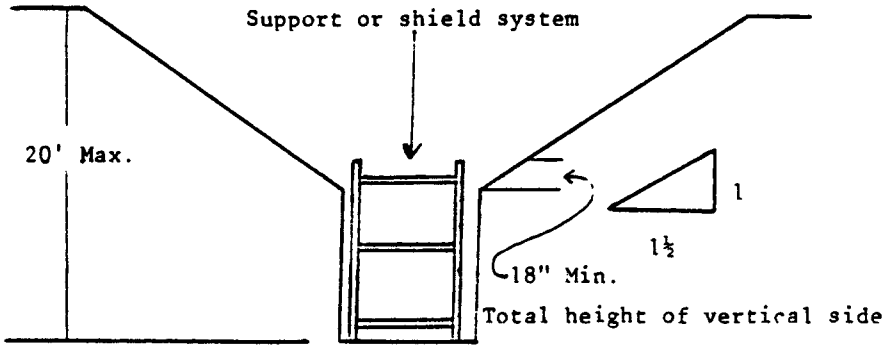
B–1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

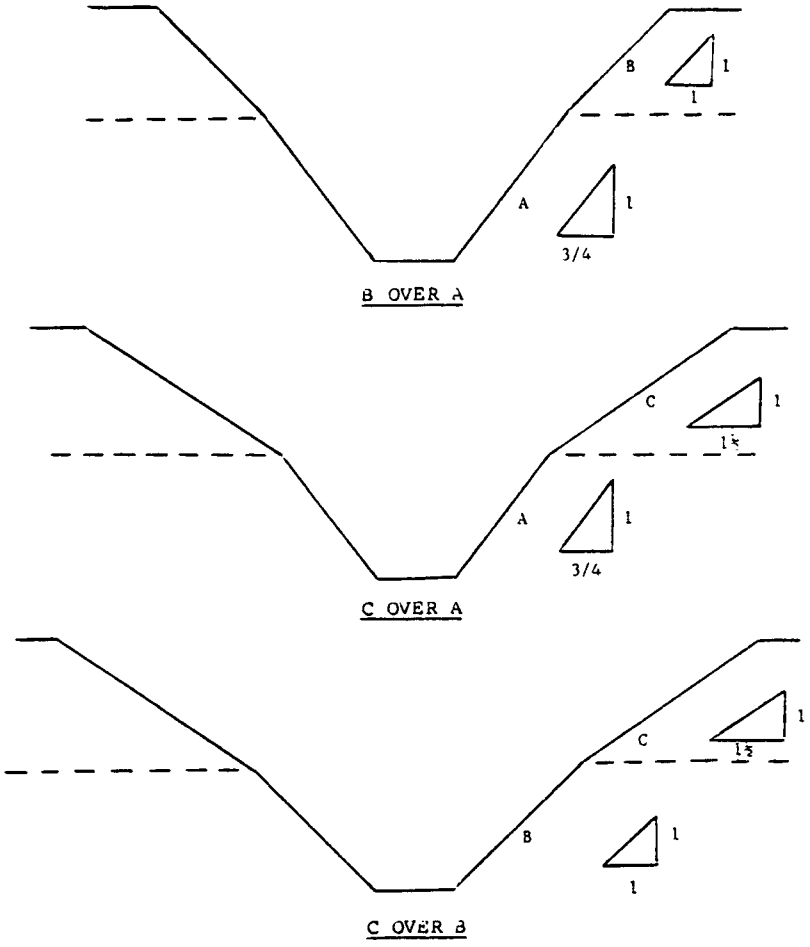


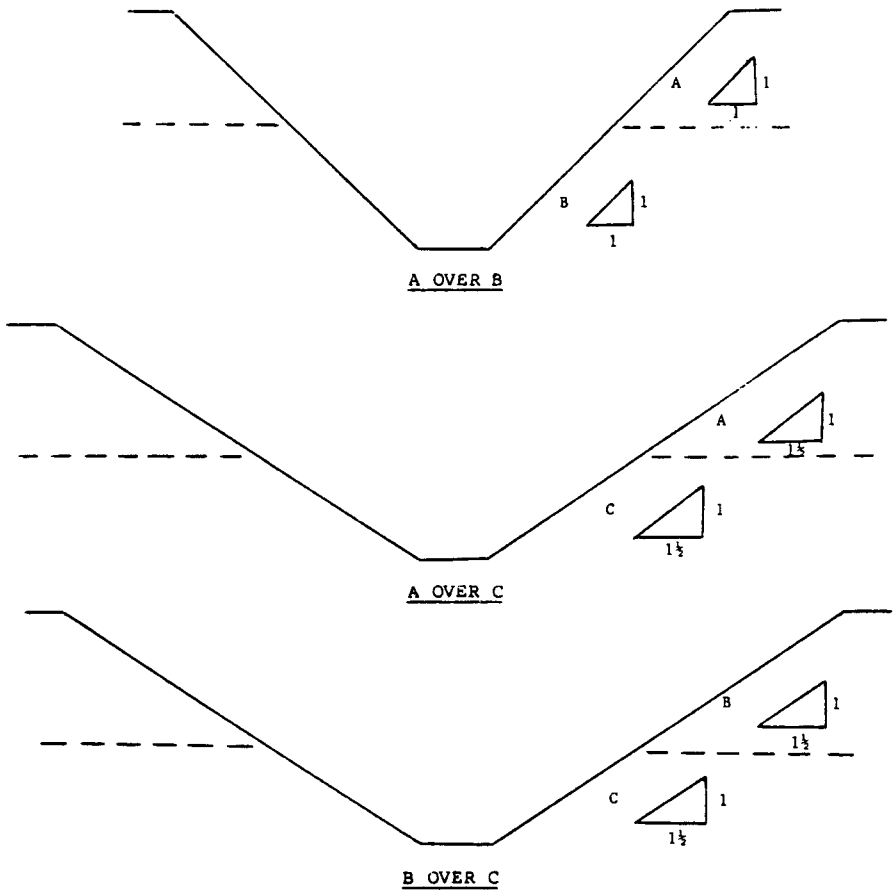
VERTICAL SIDED LOWER PORTION

3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B–1.4 Excavations Made in Layered Soils

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.





2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

APPENDIX C TO SUBPART P OF PART 1926—TIMBER SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used timber shoring is provided as a method of protection from cave-ins in trenches that do not exceed 20 feet (6.1 m) in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with §1926.652(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in §1926.652(b) and §1926.652(c).

(b) *Soil Classification.* In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of this part.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C–1.1, C–1.2, and C–1.3, and Tables C–2.1, C–2.2 and C–2.3 following paragraph (g) of the appendix. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of

the excavation is made. The data are arranged to allow the user the flexibility to select from among several acceptable configurations of members based on varying the horizontal spacing of the crossbraces. Stable rock is exempt from shoring requirements and therefore, no data are presented for this condition.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix, and on the tables themselves.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations regarding Tables C–1.1 through C–1.3 and Tables C–2.1 through C–2.3 are presented in paragraph (g) of this Appendix.

(d) *Basis and limitations of the data*—(1) *Dimensions of timber members.* (i) The sizes of the timber members listed in Tables C–1.1 through C–1.3 are taken from the National Bureau of Standards (NBS) report, ''Recommended Technical Provisions for Construction Practice in Shoring and Sloping of Trenches and Excavations.'' In addition, where NBS did not recommend specific sizes of members, member sizes are based on an analysis of the sizes required for use by existing codes and on empirical practice.

(ii) The required dimensions of the members listed in Tables C–1.1 through C–1.3 refer to actual dimensions and not nominal dimensions of the timber. Employers wanting to use nominal size shoring are directed to Tables C–2.1 through C–2.3, or have this choice under §1926.652(c)(3), and are referred to The Corps of Engineers, The Bureau of Reclamation or data from other acceptable sources.

(2) *Limitation of application.* (i) It is not intended that the timber shoring specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with §1926.652.

(A) When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a two-foot soil surcharge. The term ''adjacent'' as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

(B) When vertical loads imposed on cross braces exceed a 240-pound gravity load distributed on a one-foot section of the center of the crossbrace.

(C) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(D) When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables.* The members of the shoring system that are to be selected using this information are the cross braces, the uprights, and the wales, where wales are required. Minimum sizes of members are specified for use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is then made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the crossbraces. Instances where a choice of horizontal spacing of crossbracing is available, the horizontal spacing of the crossbraces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench, and the horizontal spacing of the crossbraces are known, the size and vertical spacing of the crossbraces, the size and vertical spacing of the wales, and the size and horizontal spacing of the uprights can be read from the appropriate table.

(f) *Examples to Illustrate the Use of Tables C–1.1 through C–1.3.*

(1) *Example 1.*

A trench dug in Type A soil is 13 feet deep and five feet wide.

From *Table C–1.1,* for acceptable arrangements of timber can be used.

Arrangement #B1

Space 4×4 crossbraces at six feet horizontally and four feet vertically.

Wales are not required.

Space 3×8 uprights at six feet horizontally. This arrangement is commonly called ''skip shoring.''

Arrangement #B2

Space 4×6 crossbraces at eight feet horizontally and four feet vertically.

Space 8×8 wales at four feet vertically.

Space 2×6 uprights at four feet horizontally.

Arrangement #B3

Space 6×6 crossbraces at 10 feet horizontally and four feet vertically.
Space 8×10 wales at four feet vertically.
Space 2×6 uprights at five feet horizontally.

Arrangement #B4

Space 6×6 crossbraces at 12 feet horizontally and four feet vertically.
Space 10×10 wales at four feet vertically.
Spaces 3×8 uprights at six feet horizontally.

(2) *Example 2.*

A trench dug in Type B soil in 13 feet deep and five feet wide. From Table C–1.2 three acceptable arrangements of members are listed.

Arrangement #B1

Space 6×6 crossbraces at six feet horizontally and five feet vertically.
Space 8×8 wales at five feet vertically.
Space 2×6 uprights at two feet horizontally.

Arrangement #B2

Space 6×8 crossbraces at eight feet horizontally and five feet vertically.
Space 10×10 wales at five feet vertically.
Space 2×6 uprights at two feet horizontally.

Arrangement #B3

Space 8×8 crossbraces at 10 feet horizontally and five feet vertically.
Space 10×12 wales at five feet vertically.
Space 2×6 uprights at two feet vertically.

(3) *Example 3.*

A trench dug in Type C soil is 13 feet deep and five feet wide.

From Table C–1.3 two acceptable arrangements of members can be used.

Arrangement #B1

Space 8×8 crossbraces at six feet horizontally and five feet vertically.
Space 10×12 wales at five feet vertically.
Position 2×6 uprights as closely together as possible.
If water must be retained use special tongue and groove uprights to form tight sheeting.

Arrangement #B2

Space 8×10 crossbraces at eight feet horizontally and five feet vertically.
Space 12×12 wales at five feet vertically.
Position 2×6 uprights in a close sheeting configuration unless water pressure must be resisted. Tight sheeting must be used where water must be retained.

(4) *Example 4.*

A trench dug in Type C soil is 20 feet deep and 11 feet wide. The size and spacing of members for the section of trench that is over 15 feet in depth is determined using Table C–1.3. Only one arrangement of members is provided.

Space 8×10 crossbraces at six feet horizontally and five feet vertically.
Space 12×12 wales at five feet vertically.
Use 3×6 tight sheeting.

Use of Tables C–2.1 through C–2.3 would follow the same procedures.

(g) *Notes for all Tables.*

1. Member sizes at spacings other than indicated are to be determined as specified in §1926.652(c), ''Design of Protective Systems.''

2. When conditions are saturated or submerged use Tight Sheeting. Tight Sheeting refers to the use of specially-edged timber planks (e.g., tongue and groove) at least three inches thick, steel sheet piling, or similar construction that when driven or placed in position provide a tight wall to resist the lateral pressure of water and to prevent the loss of backfill material. Close Sheeting refers to the placement of planks side-by-side allowing as little space as possible between them.

3. All spacing indicated is measured center to center.

4. Wales to be installed with greater dimension horizontal.

5. If the vertical distance from the center of the lowest crossbrace to the bottom of the trench exceeds two and one-half feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest crossbrace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mudsills are wales that are installed at the toe of the trench side.

6. Trench jacks may be used in lieu of or in combination with timber crossbraces.

7. Placement cf crossbraces. When the vertical spacing of crossbraces is four feet, place the top crossbrace no more than two feet below the top of the trench. When the vertical spacing of crossbraces is five feet, place the top crossbrace no more than 2.5 feet below the top of the trench.

TABLE C-1.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H + 72 psf (2 ft Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				2X6	
	UP TO 8	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---					2X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			2X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				2X6	
10 TO 15	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				3X8	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	8X8	4		2X6			
	UP TO 10	6X6	6X5	6X6	6X8	6X8	4	8X10	4			2X6		
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	10X10	4				3X8	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X8	6X8	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X8	6X8	4	8X8	4	3X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X10	4	8X10	4	3X6				
	UP TO 12	8X8	8X8	8X8	8X8	8X10	4	10X10	4	3X6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B P_a = 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**												
	CROSS BRACES						WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)				VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15			CLOSE	2	3		
5 TO 10	UP TO 6	4X6	4X6	6X6	6X6	6X6	5	6X8	5			2X6		
	UP TO 8	6X6	6X6	6X6	6X8	6X8	5	8X10	5			2X6		
	UP TO 10	6X6	6X6	6X6	6X8	6X8	5	10X10	5			2X6		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5		2X6			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5		2X6			
	UP TO 10	8X8	8X8	8X8	8X8	8X10	5	10X12	5		2X6			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	3X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	3X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.3

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**													
	CROSS BRACES								UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET) (See Note 2)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	2X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
10 TO 15	UP TO 6	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 8	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed Oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C–2.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES					WALES		UPRIGHTS						
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)				VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)					
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X4	4X4	4X6	4	Not Req'd	Not Req'd				4X6	
	UP TO 8	4X4	4X4	4X4	4X6	4X6	4	Not Req'd	Not Req'd					4X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			4X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				4X6	
10 TO 15	UP TO 6	4X4	4X4	6X6	6X6	6X6	4	Not Req'd	Not Req'd				4X10	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	6X8	4		4X6			
	UP TO 10	6X6	6X6	6X6	6X6	6X6	4	8X8	4			4X8		
	UP TO 12	6X6	6X6	6X6	6X6	6X6	4	8X10	4		4X6		4X10	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X6	6X6	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X6	6X6	4	8X8	4	3X6	4X12			
	UP TO 10	6X6	6X6	6X6	6X6	6X8	4	8X10	4	3X6				
	UP TO 12	6X6	6X6	6X8	6X8	6X8	4	8X12	4	3X6	4X12			
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B P_a = 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)				VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15			CLOSE	2	3	4	6
5 TO 10	UP TO 6	4X6	4X6	4X6	6X6	6X6	5	6X8	5			3X12 4X8		4X12
	UP TO 8	4X6	4X6	6X6	6X6	6X6	5	8X8	5		3X8		4X8	
	UP TO 10	4X6	4X6	6X6	6X6	6X8	5	8X10	5			4X8		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5	3X6	4X10			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5	3X6	4X10			
	UP TO 10	6X8	6X8	8X8	8X8	8X8	5	10X12	5	3X6	4X10			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	6X8	8X8	5	8X10	5	4X6				
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X12	5	4X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C–2.3

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **															
	CROSS BRACES							WALES			UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)				VERT. SPACING (FEET)	SIZE (INS)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)							
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15			CLOSE							
5 TO 10	UP TO 6	6X6	6X6	6X6	6X6	8X8	5	8X8	5	3X6						
	UP TO 8	6X6	6X6	6X6	8X8	8X8	5	10X10	5	3X6						
	UP TO 10	6X6	6X6	8X8	8X8	8X8	5	10X12	5	3X6						
	See Note 1															
10 TO 15	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	10X10	5	4X6						
	UP TO 8	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6						
	See Note 1															
	See Note 1															
15 TO 20	UP TO 6	8X8	8X8	8X8	8X10	8X10	5	10X12	5	4X6						
	See Note 1															
	See Note 1															
	See Note 1															
OVER 20	SEE NOTE 1															

* Douglas fir or equivalent with a bending strength not less than 1500 psi.
** Manufactured members of equivalent strength may be substituted for wood.

APPENDIX D TO SUBPART P OF PART 1926—ALUMINUM HYDRAULIC SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used when aluminum hydraulic shoring is provided as a method of protection against cave-ins in trenches that do not exceed 20 feet (6.1m) in depth. This appendix must be used when design of the aluminum hydraulic protective system cannot be performed in accordance with §1926.652(c)(2).

(b) *Soil Classification.* In order to use data presented in this appendix, the soil type or types in which the excavation is made must

first be determined using the soil classification method set forth in appendix A of subpart P of part 1926.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables D–1.1, D–1.2, D–1.3 and E–1.4. Each table presents the maximum vertical and horizontal spacings that may be used with various aluminum member sizes and various hydraulic cylinder sizes. Each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. Tables D–1.1 and D–1.2 are for vertical shores in Types A and B soil. Tables D–1.3 and D1.4 are for horizontal waler systems in Types B and C soil.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations (footnotes) regarding Table D–1.1 through D–1.4 are presented in paragraph (g) of this appendix.

(6) Figures, illustrating typical installations of hydraulic shoring, are included just prior to the Tables. The illustrations page is entitled ''Aluminum Hydraulic Shoring; Typical Installations.''

(d) *Basis and limitations of the data.* (1) Vertical shore rails and horizontal wales are those that meet the Section Modulus requirements in the D–1 Tables. Aluminum material is 6061–T6 or material of equivalent strength and properties.

(2) Hydraulic cylinders specifications. (i) 2-inch cylinders shall be a minimum 2-inch inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufaturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.

(3) Limitation of application.

(i) It is not intended that the aluminum hydraulic specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be otherwise designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the Tables are not considered adequate. In this case, an alternative aluminum hydraulic shoring system or other type of protective system must be designed in accordance with §1926.652.

(A) When vertical loads imposed on cross braces exceed a 100 Pound gravity load distributed on a one foot section of the center of the hydraulic cylinder.

(B) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(C) When only the lower portion or a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables D–1.1, D–1.2, D–1.3 and D–1.4.* The members of the shoring system that are to be selected using this information are the hydraulic cylinders, and either the vertical shores or the horizontal wales. When a waler system is used the vertical timber sheeting to be used is also selected from these tables. The Tables D–1.1 and D–1.2 for vertical shores are used in Type A and B soils that do not require sheeting. Type B soils that may require sheeting, and Type C soils that always require sheeting are found in the horizontal wale Tables D–1.3 and D–1.4. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is made. The selection is based on the depth and width of the trench where the members are to be installed. In these tables the vertical spacing is held constant at four feet on center. The tables show the maximum horizontal spacing of cylinders allowed for each size of wale in the waler system tables, and in the vertical shore tables, the hydraulic cylinder horizontal spacing is the same as the vertical shore spacing.

(f) *Example to Illustrate the Use of the Tables:*

(1) Example 1:

A trench dug in Type A soil is 6 feet deep and 3 feet wide. From Table D–1.1: Find vertical shores and 2 inch diameter cylinders spaced 8 feet on center (o.c.) horizontally and 4 feet on center (o.c.) vertically. (See Figures 1 & 3 for typical installations.)

(2) Example 2:

A trench is dug in Type B soil that does not require sheeting, 13 feet deep and 5 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinders spaced 6.5 feet o.c. horizontally and 4 feet o.c. vertically. (See Figures 1 & 3 for typical installations.)

(3) A trench is dug in Type B soil that does not require sheeting, but does experience some minor raveling of the trench face. The

trench is 16 feet deep and 9 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinder (with special oversleeves as designated by footnote #B2) spaced 5.5 feet o.c. horizontally and 4 feet o.c. vertically, plywood (per footnote (g)(7) to the D–1 Table) should be used behind the shores. (See Figures 2 & 3 for typical installations.)

(4) Example 4: A trench is dug in previously disturbed Type B soil, with characteristics of a Type C soil, and will require sheeting. The trench is 18 feet deep and 12 feet wide. 8 foot horizontal spacing between cylinders is desired for working space. From Table D–1.3: Find horizontal wale with a section modulus of 14.0 spaced at 4 feet o.c. vertically and 3 inch diameter cylinder spaced at 9 feet maximum o.c. horizontally. 3×12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(5) Example 5: A trench is dug in Type C soil, 9 feet deep and 4 feet wide. Horizontal cylinder spacing in excess of 6 feet is desired for working space. From Table D–1.4: Find horizontal wale with a section modulus of 7.0 and 2 inch diameter cylinders spaced at 6.5 feet o.c. horizontally. Or, find horizontal wale with a 14.0 section modulus and 3 inch diameter cylinder spaced at 10 feet o.c. horizontally. Both wales are spaced 4 feet o.c. vertically. 3×12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(g) *Footnotes, and general notes, for Tables D–1.1, D–1.2, D–1.3, and D–1.4.*

(1) For applications other than those listed in the tables, refer to §1926.652(c)(2) for use of manufacturer's tabulated data. For trench depths in excess of 20 feet, refer to §1926.652(c)(2) and §1926.652(c)(3).

(2) 2 inch diameter cylinders, at this width, shall have structural steel tube (3.5×3.5×0.1875) oversleeves, or structural oversleeves of manufacturer's specification, extending the full, collapsed length.

(3) Hydraulic cylinders capacities. (i) 2 inch cylinders shall be a minimum 2-inch inside diameter with a safe working capacity of not less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe work capacity of not less than 30,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(4) All spacing indicated is measured center to center.

(5) Vertical shoring rails shall have a minimum section modulus of 0.40 inch.

(6) When vertical shores are used, there must be a minimum of three shores spaced equally, horizontally, in a group.

(7) Plywood shall be 1.125 in. thick softwood or 0.75 inch. thick, 14 ply, arctic white birch (Finland form). Please note that plywood is not intended as a structural member, but only for prevention of local raveling (sloughing of the trench face) between shores.

(8) See appendix C for timber specifications.

(9) Wales are calculated for simple span conditions.

(10) See appendix D, item (d), for basis and limitations of the data.

ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS

FIGURE NO. 1
VERTICAL ALUMINUM HYDRAULIC SHORING (SPOT BRACING)

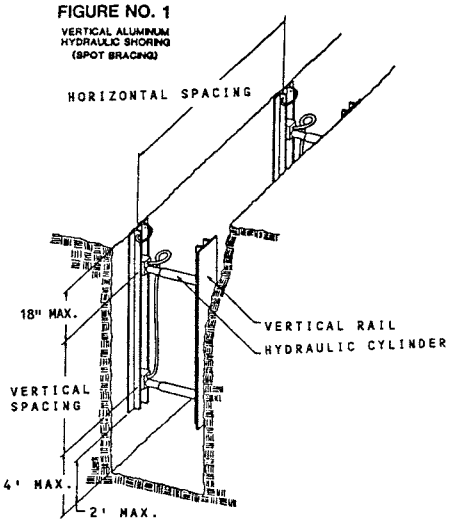


FIGURE NO. 2
VERTICAL ALUMINUM HYDRAULIC SHORING (WITH PLYWOOD)

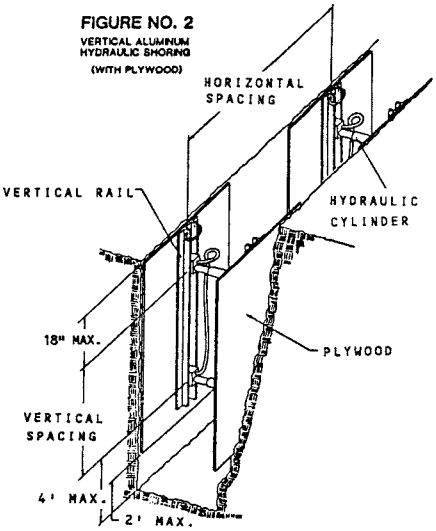


FIGURE NO. 3
VERTICAL ALUMINUM HYDRAULIC SHORING (STACKED)

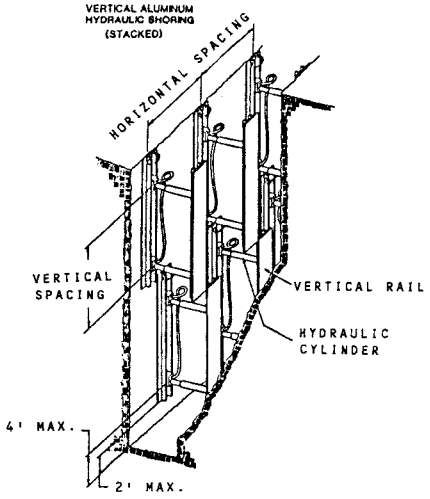


FIGURE NO. 4
ALUMINUM HYDRAULIC SHORING WALER SYSTEM (TYPICAL)

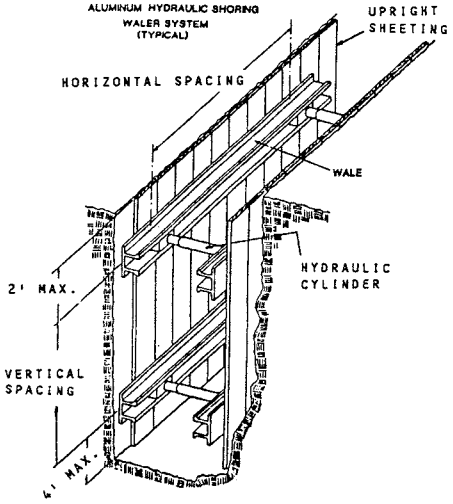


TABLE D - 1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE A

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (**1**): See Appendix D, Item (g) (1)
Note (**2**): See Appendix D, Item (g) (2)

TABLE D - 1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (**1**): See Appendix D, Item (g) (1)
Note (**2**): See Appendix D, Item (g) (2)

TABLE D - 1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
			WIDTH OF TRENCH (FEET)						MAX.HORIZ.SPACING (ON CENTER)		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN NOTE(2)	8.0	3 IN	—	—	3x12
		7.0	9.0	2 IN	9.0	2 IN NOTE(2)	9.0	3 IN			
		14.0	12.0	3 IN	12.0	3 IN	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	—	3x12	—
		7.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN NOTE(2)	5.5	3 IN	3x12	—	—
		7.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
		14.0	9.0	3 IN	9.0	3 IN	9.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (**1**): See Appendix D, item (g) (1)
Notes (**2**): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

TABLE D - 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
			WIDTH OF TRENCH (FEET)						MAX.HORIZ SPACING (ON CENTER)		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	3x12	—	—
		7.0	6.5	2 IN	6.5	2 IN NOTE(2)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE(2)	4.0	3 IN	3x12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE(2)	3.5	3 IN	3x12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (**1**): See Appendix D, item (g) (1)
Notes (**2**): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

APPENDIX E TO SUBPART P OF PART 1926—ALTERNATIVES TO TIMBER SHORING

Figure 1. Aluminum Hydraulic Shoring

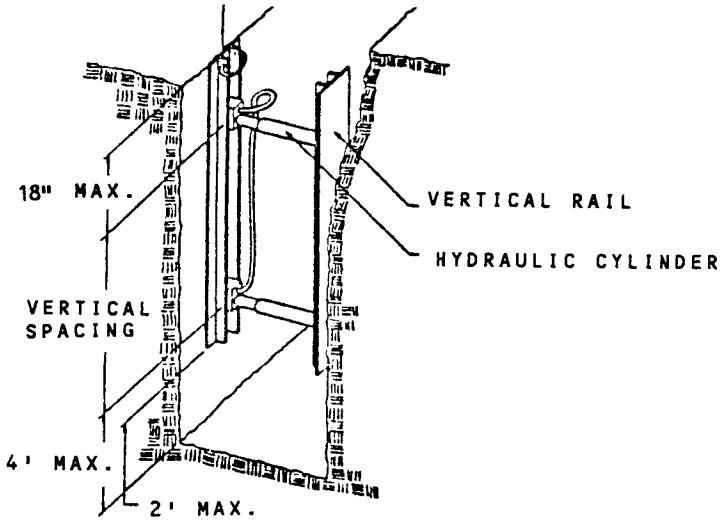


Figure 2. Pneumatic/hydraulic Shoring

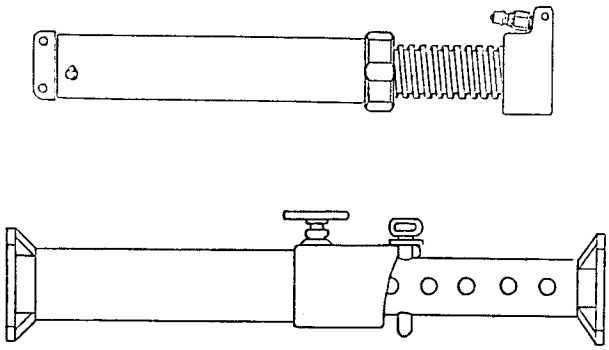


Figure 3. Trench Jacks (Screw Jacks)

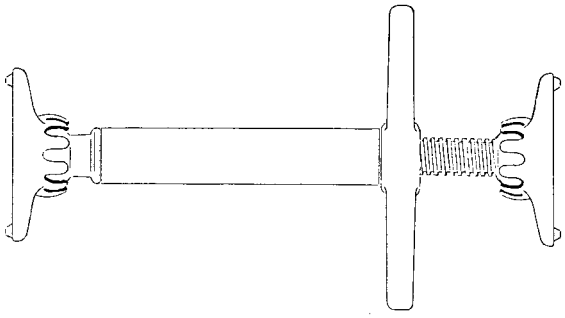
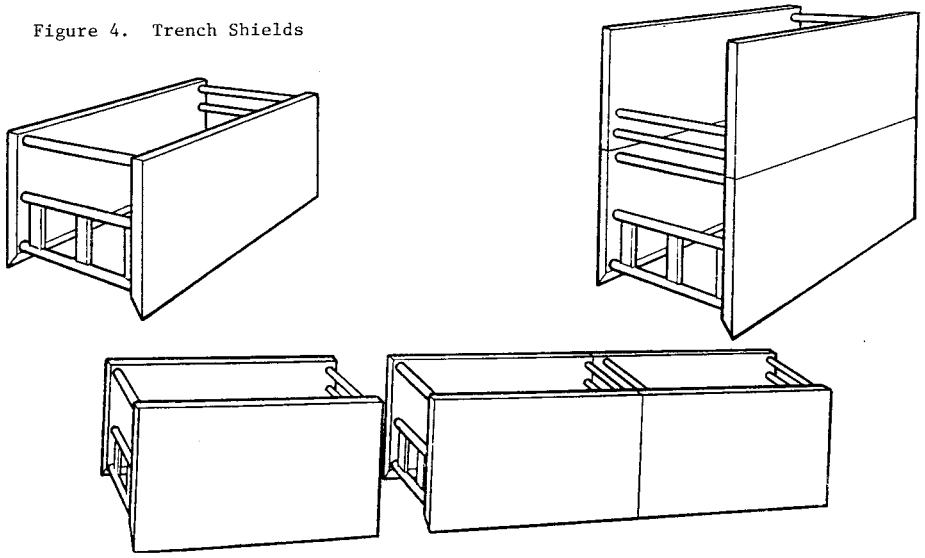


Figure 4. Trench Shields



APPENDIX F TO SUBPART P OF PART 1926—SELECTION OF PROTECTIVE SYSTEMS

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance with §1926.652 (b) and (c).

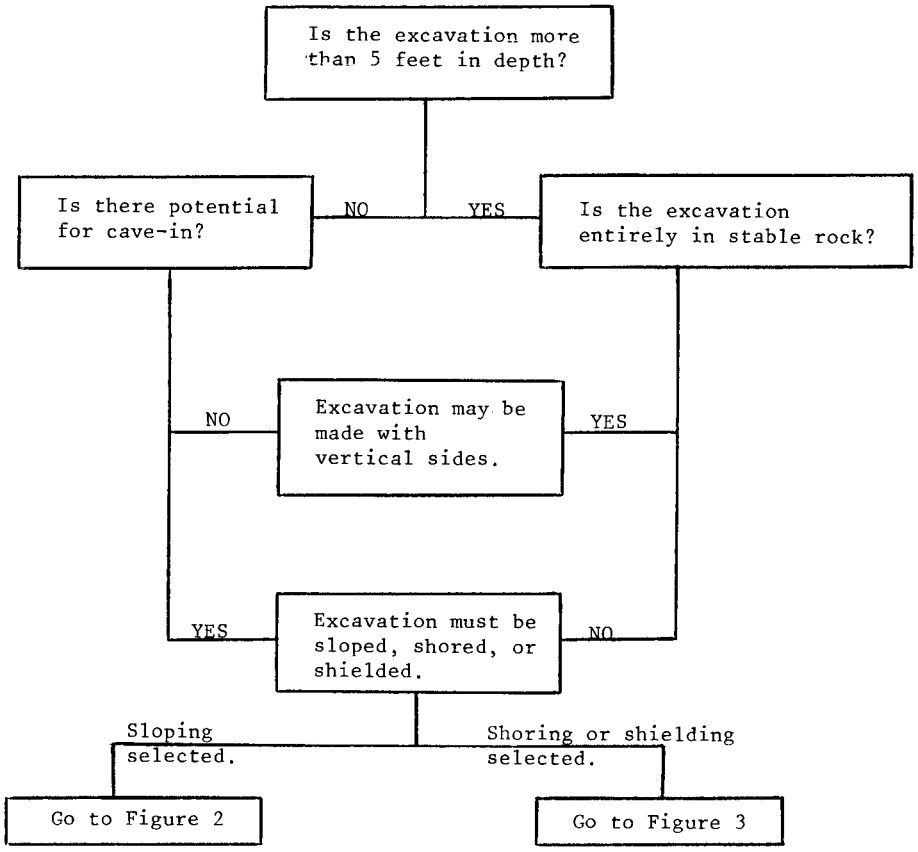


FIGURE 1 - PRELIMINARY DECISIONS

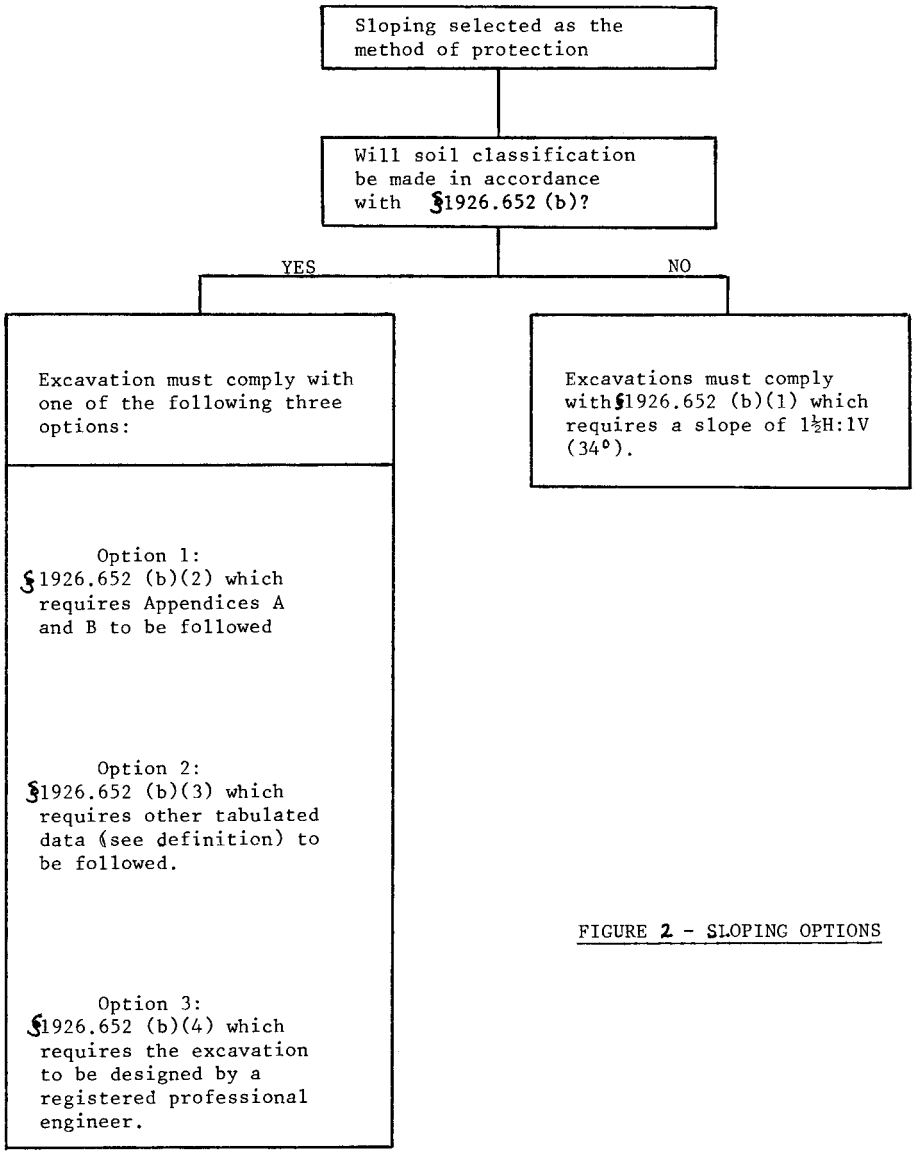


FIGURE 2 - SLOPING OPTIONS

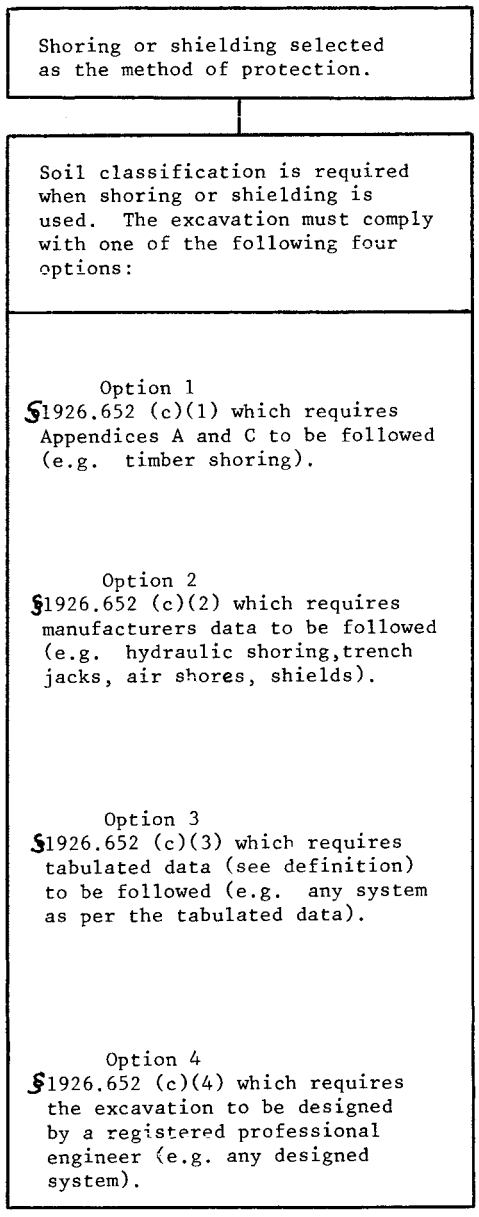


FIGURE 3 - SHORING AND SHIELDING OPTIONS

SECTION NO. 17

SPECIAL PROVISIONS – TECHNICAL SPECIFICATIONS

NUMERICAL LISTING

New Section No.	
33 01 30.51	TEMPORARY BYPASS PUMPING AND PIPING
33 01 30.72	CURED-IN-PLACE PIPE LINING OF SEWERS

SECTION 33 01 30.51

TEMPORARY BYPASS PUMPING AND PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing materials, labor, equipment, power, fuel, maintenance, piping, valves, pipe plugs, pipe specials and appurtenances necessary to implement temporary bypass pumping and piping systems as required to complete the Work.
   1. It is expected that for most of the time, the bypass pumping system will be capable of diverting the range of flows in the following existing sewer pipes:
      a. 24" sanitary sewer pipe flow around upstream manhole up to an average daily flow rate of 2.31 million gallons per day (MGD) and a peak flow rate of 11.54 MGD.

B. The design, installation and operation of the temporary bypass pumping and piping systems shall be the Contractor's responsibility. The Contractor shall engage the services of a bypass pumping and piping subcontractor for the temporary bypass pumping and piping requirements.
   1. The subcontractor shall have the skill, knowledge and expertise in the design and operation of temporary bypass pumping systems. See Paragraph 1.2 for requirements.

1.2 QUALIFICATIONS

A. The bypass pumping subcontractor, through the Contractor, shall demonstrate expertise in temporary bypass pumping and piping systems by submitting a list of at least five references of projects of a similar size and complexity as this project performed within the past five years.

B. The bypass pumping and piping system shall meet the requirements of all national and local codes and regulatory agencies having jurisdiction.

1.3 SUBMITTALS

A. See Arlington specifications for requirements for the mechanics and administration of the submittal process.

B. Documentation of Experience/Qualifications.

C. Shop Drawings:
   1. Detailed drawings and descriptions outlining the details and provisions for the temporary bypass pumping and piping system are required. The submittal shall be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and other incidental items necessary and/or required to ensure proper operation of the bypass pumping systems, including compliance with permit conditions. No bypass pumping or piping shall begin until all provisions and requirements have been reviewed and approved.
   2. Availability and location of replacement pumps of equal size to that specified herein that could be used in the event of a bypass pump failure.
   3. As a minimum, the bypass pumping plan shall include the following:
      a. Staging areas for pumps.
      b. Flow stoppage system, including pipe/channel plugging method and types of plugs.
      c. Number, size, material, location, and method of installation of pump suction piping.
      d. Number, size, materials, method of installation, and location of installation of discharge piping.
      e. Size and location of standby power generator, if required.
      f. Downstream discharge plan.
      g. Method of protecting discharge structure from erosion and damage.

h. Thrust and restraint block sizes and locations.
i. Temporary pipe supports and anchoring required.
j. Hydraulic calculations of static lift, friction losses, and flow velocity.
k. Procedure for when the remote auto-dialer is activated by events specified herein.
1) Contact information for the Contractor and Subcontractor that is programmed into the auto-dialer.
l. Locations requiring temporary fencing.
m. Spill response plan.
n. Method of noise control.
o. Standby power generator size and location.

4. Product technical data:
a. Number of pumps.
b. Bypass pump sizes and capacity.
c. Power requirements.
d. Pump curves.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Firms are acceptable:
1. Rain For Rent.
2. Godwin Pumps.
3. Sunbelt.
4. Barco Pump.

2.2 COMPONENTS

A. A. General:
1. Firm pumping capacity is defined as actual pumping units installed and operational. Redundant pumping capacity is defined as actual pumping units installed, including all suction and discharge piping, controls, and power source, but not in actual operation. One redundant pump equal in sized to the largest pumping unit provided shall be on site and ready for immediate operation and use in the event of an emergency or breakdown.
a. Operation of the redundant pumping system shall occur automatically in the event a portion of the firm pumping capacity system fails. The Contractor shall be notified immediately via the remote auto-dialer during this situation.
b. In the event the firm pumping capacity system fails and the redundant pumping system is operational, replacement of the failed bypass pumping components shall be onsite and operational within 48 hours of the failure in order to maintain 100 percent redundant pumping capacity.
2. The Contractor shall be responsible for cleanup, fines, or other penalties resulting from spills during bypass operation.
3. Pump staging area and suction and discharge pipe tie-ins shall be outlined with temporary fencing.
4. Structures normally sealed that are required to be open for the bypass pumping operation shall be temporarily sealed with cut-outs for suction and/or discharge piping.
5. The bypass pumping systems shall be designed to operate continuously.
6. Select pumping/bypassing equipment that will not have excessive noise levels from pumping/bypassing equipment and shall be restricted to a maximum of seventy decibels (70 db) at a distance of 50 FT or as required to be in compliance with jurisdictional specific noise ordinances. Additional sound attenuation may be required in residential areas or as specified by Arlington Water Utilities.

B. Temporary and Bypass Pumps:

1. Fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system.
2. Provide sound attenuated enclosure per pump. Maximum of seventy decibels (70 db) at a distance of 50 FT is required.
3. Constructed to allow dry running for extended periods of time to accommodate the cyclical nature of sewer flows.
4. A pressure gage shall be provided on the pump discharge.
5. The Contractor shall provide alarms during bypass operations. Bypass operations need alarms to contact Contractor as the primary responder and responsible operator.

C. Temporary and Bypass Piping:
1. 1. Material: High density polyethylene (HDPE).
   a. Join HDPE piping by the butt-fusion method in strict accordance with the manufacturer's recommendations.
   b. Selected dimensional ratio based on hydraulic calculations, but a minimum of DR 17 shall be provided.
   c. Where indicated, the specified diameter of bypass piping shall be the minimum interior diameter of the bypass piping.
2. The layout and joints shall be capable of handling all forces exerted by bends, pressure and thrust.
3. Provide combination air vent/vacuum valve for use during filling and the transfer of flow.
4. Include a tee and valve to be used for dewatering the piping upon completion of the Work.
5. Thrust block concrete: Air entrained, high early strength concrete, 3,000 psi.
6. Each pump shall have a separate leg consisting of a suction isolation valve, a discharge check valve, (separate from pump), and a discharge isolation valve. The layout of which shall be capable of completely isolating the pump and check valve.

D. Power:
1. The pumps may be electric or diesel powered.
2. Generators shall have the same noise restrictions as the pumps.
3. All power or fuel shall be supplied by the Contractor.

E. Flow Measurement:
1. Provide flow meter to measure the total bypassed flow.
2. Record the total flow bypassed each day operating bypass pumping.

F. Controls:
1. The Contractor shall provide all necessary instrumentation and controls to operate each pump including, but not limited to:
   a. Level controls for pump operation.
   b. High water level indicator and alarm.

G. Monitoring:
1. Pumps and equipment shall be continuously monitored and maintained by the Contractor during periods that pumping and bypassing are required.
2. The Contractor shall provide alarms during bypass operations. Bypass operations need alarms to contact Contractor as the primary responder and responsible operator.
3. Provide a remote auto-dialer capable of notifying the Contractor of pumping equipment.
4. Failures and high-water level alarms.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL AND MAINTENANCE

A. Hydrostatic Testing Procedure of Bypass Piping:
1. Test pressure: 50 psi or twice total dynamic head of system, whichever is greater.
2. Provide a means of eliminating pipe movement during pressurization.

3. Apply and maintain test pressure for three hours to allow for initial expansion of the pipe. Reduce test pressure by 10 percent and monitor pressure for one hour. If the test pressure remains steady (within 5 percent of target value) for one hour and no leakage is indicated, then test will be deemed acceptable.
4. Prepare hydrostatic test report and submit to Engineer.

B. The bypass pumping and piping system shall be satisfactorily operating for a period of 24 hours prior to commencing Work in the area requiring bypassing or performing a shutdown of the sewer requiring bypassing unless otherwise specified.

C. Existing Utilities:
1. Locate existing utilities in the area selected for the bypass piping.
2. Locate the bypass piping to minimize disturbance to existing utilities.
3. All costs associated with relocating utilities shall be the responsibility of the Contractor.

D. Protect existing structures and equipment from damage inflicted by bypass pumping equipment. The Contractor shall be responsible for correcting any and all physical damage to the existing structures and equipment.

E. Plugging or Blocking of Flows:
1. If required, blocking of wastewater from flowing downstream of the bypass junction box shall be done by the installation of a temporary plug or bulkhead. Incorporate both a primary and secondary plugging device upstream and downstream of the work area.
2. Remove plugging or blocking in a manner that permits the flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

END OF SECTION

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SECTION 33 01 30.72
CURED-IN-PLACE PIPE LINING OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Install and test the cured-in-place pipe (CIPP) lining and appurtenances complete as shown on the Drawings and as specified herein, including, but not limited to services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning and television inspection of sewers to be lined, liner installation, reinstatement of service connections, quality control, providing samples for performance of required material tests, final television inspection, testing of lined pipe system and warranty work, all as specified herein.

B. Related Sections include but are not necessarily limited to:
   1. Part A – General Provisions
   2. Sewer and Pipe Structure Cleaning is included in Section C 28.
   3. Internal Inspection of Sewers is included in Section C 28.
   4. Temporary Bypass Pumping is included in 33 01 30.51.
   5. Sewer testing is included in Section C 29.

C. Sewer cleaning, pre-rehabilitation, and post-rehabilitation CCTV inspection of all pipes to be rehabilitated by CIPP lining methods are required per applicable Specifications as listed in Section 1.2 of this Specification.

D. Remove obstructions and protruding service connections as required to complete the CIPP rehabilitation. Remove of all pipeline obstructions and protruding service connections required for sewer rehabilitation using cured-in-place pipe lining shall be completed prior to the pre-rehabilitation CCTV inspection. This may involve point repair excavation depending on severity of the obstruction.

E. Neither the CIPP system, nor its installation, shall cause adverse effects to any of the Owner's processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products in the system or at the wastewater treatment plant. Notify the Owner and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements. Cleanup, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. Conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and property Owners or tenants.

F. Do not change any material, design values or procedural matters stated or approved herein, without informing the Owner/Engineer and receiving written approval of the change. Such changes constitute a breach of contract and shall result in rejection and removal of work performed with the unapproved materials or processes at no cost to the Owner.

G. Maintenance and Protection of Traffic, confined space entry, and work site protection shall be the responsibility of the Contractor and costs of these items are included in the cost of the project. Notify Police, Fire, Ambulance agencies, and residents/businesses in advance of any and all road closures. Comply with applicable OSHA trench safety rules and confined space and sewer system entry.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. HS20, Vehicle Loading Standard.
      b. E80, Vehicle Loading Standard.

2. ASTM International (ASTM):
    a. D543, Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents.
    b. D638, Standard Test Method for Tensile Properties of Plastics.
    c. D790, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
    d. D792, Standard Test Methods for Density and Specific Gravity of Plastics by displacement.
    e. D2122, Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
    f. D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
    g. D2990, Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.
    h. D5813, Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems.
    i. F1216, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
    j. F1336, Standard Specification for Polyvinyl Chloride (PVC) Gasketed Sewer Fittings
    k. F1743, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
    l. F2019, Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
    m. F2561, Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner.
    n. F2599, Standard Practice for Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner.
    o. D578, Standard Specification for Glass Fiber Strands
    p. D3567, Standard Practice for Determining Dimensions of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings.
    q. D3681, Standard Test Method for Chemical Resistance of "Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe in a Deflected Condition.
3. National Association of Sewer Service Companies (NASSCO):
    a. NASSCO Pipeline Assessment and Certification Program (PACP) Reference Manual, current edition, including addenda.
4. Water Research Centre, UK:
    a. Sewerage Rehabilitation Manual, Type II Design, 4th edition (April 2001), WRc Publications.

B. Where reference is made to one of the above standards, the latest revision/update in effect at the time of bid opening shall apply.

1.3 SUBMITTALS

A. Submit shop drawings, product data, materials of construction, design calculations, and details of installation. Provide this information without claim to any confidentiality and in accordance with the Schedule of Submittals. Note that there are two different sets of submittals required with different time frames as shown below in Sections 1.3.B. and 1.3.C.

B. Submittals required with the bid shall include the following:
1. Letter to certify that the CIPP will conform to the project requirements as outlined in the Scope of Work and as delineated in these specifications and that the Contractor's personnel have successfully installed a minimum of 100,000 feet (total) of proposed CIPP liner for a continuous period of at least five years installing CIPP liners in pipe of a similar size, length and configuration as contained in this contract as documented by verifiable references.

2. Submit information in following subparagraphs for review and approval before any CIPP lining work is performed.
    a. Number of years of Contractor's experience in installing CIPP lining.
    b. Documentation and a sufficient number of references to meet qualifications requirements as listed in Article 1.4 of this specification.
    c. Names and product information of the CIPP felt tubes and resin materials to be utilized for this project and their suppliers.
    d. A certified statement from manufacturer that Contractor is an approved installer as certified and/or licensed by the CIPP liner manufacturer.
3. A list of a minimum of five municipal clients that CIPP Contractor has performed this type of work for without defects or performance problems for a period of five years after installation. The list shall contain the following:
    a. Names and telephone numbers of persons to be called to verify previous satisfactory performance.
    b. A full description of the actual work performed.
    c. Name of CIPP lining manufacturer and supplier for each referenced project.
4. Five (5) reports from projects within past two years from independent testing laboratory analysis of liner materials showing: Modulus of elasticity as determined by appropriate ASTM standard and flexural stress as determined by ASTM D790 standard. Lining shall be of same resin system and felt tube materials as proposed for this project.

C. Submittals required within 10 days after notice to proceed shall include the following:
1. Detailed information on the CIPP installation procedures (wet-out, heating, curing, and cool down, if applicable) and all tools and equipment required for a complete installation. Identify which tools and equipment will be redundant on job site in the event of equipment breakdown. Equipment to be furnished for the project, including proposed back-up equipment, shall be clearly described. Outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.
2. CIPP lining schedules including field-verified lengths and diameters of all CIPP lining and appurtenances required. Plans should include map(s) that show insertion points for all CIPP installations.
3. Shop drawings and product data to demonstrate compliance with these specifications and identify materials of construction (including resins, catalysts, felt, etc.), felt manufacturer, location of the felt manufacturing facility, location of the wet-out facility, etc., flexible membrane (coating) material (including recommended repair/patching procedure, if applicable).
4. Manufacturers' shipping, storage, and handling recommendations for all components of the CIPP System.
5. MSDS sheets for all proposed products and materials to be furnished for the project.
6. Detailed sample collection, laboratory testing and quality control procedures, including schedule and shipping and storage requirements.
7. Written description and/or plan for odor control that will ensure that project specific odors such as styrene will be minimized at the project site and surrounding area.
8. The end seal material(s) and description of their installation.
9. Detailed written plan of the method of flow maintenance (Bypass Pumping plan) and noise prevention measures.
10. A detailed description of the Contractor's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.
11. A detailed written traffic-control plan that details every street that will be impacted and how impacts will be mitigated.
12. Data on the maximum allowable stresses and elongation of the tube during installation and the means in which the Contractor will monitor stress and elongation (i.e., ideal inversion head and maximum cold head, minimum inversion head, maximum hot head).
13. A detailed public notification plan shall be prepared and submitted including detailed staged notification to residences affected by the CIPP installation.

14. A complete description of the proposed wet-out procedure for the proposed technology.
15. A Safety Plan identifying all competent persons, a description of a daily safety program for the job site and all emergency procedures to be implemented in the event of a safety incident. All work shall be conducted in accordance with the Contractor's submitted Safety Plan.
16. A detailed quality control plan (QCP) that fully represents and conforms to the requirements of these specifications. At a minimum the QCP shall include the following:
    a. A detailed discussion of the proposed quality controls to be performed by the Contractor.
    b. Defined responsibilities of the Contractor's personnel for assuring that all quality requirements for this contract are met. These shall be assigned by the Contractor, to specific personnel.
    c. Proposed procedures for quality control including those pertaining to fit and finish, and product sampling and testing shall be defined and submitted as part of the plan.
    d. Proposed methods for product performance controls, including method of and frequency of product sampling and testing both in raw material form and cured product form.
    e. A schedule for performance and product test result reviews between the Contractor and Owner/Engineer at a regularly scheduled job meeting.
    f. Inspection forms and guidelines for quality control inspections shall be prepared in accordance with the standards specified in this contract and submitted with the QCP.
17. Design data and specification data sheets listing all parameters used in the CIPP liner design and thickness calculations based on ASTM F1216 for "fully deteriorated gravity pipe conditions." Thickness of liners for oval and egg-shaped pipe shall be calculated in accordance with the "Sewerage Rehabilitation Manual" published by the Water Research Center (WRC). All calculations shall be prepared under the supervision of and stamped by a professional engineer registered in the State of Texas.

D. Submittals before, during and after CIPP installation work shall include the following:
    1. Prior to each shipment of CIPP lining, submit certified test reports that the CIPP lining for this Contract was manufactured and tested in accordance with all ASTM Standards specified and referenced herein.
    2. CIPP lining schedules including field-verified lengths and diameters of all CIPP lining and appurtenances required to show that the contractor has physically measured every pipe to be rehabilitated. Plans should include map(s) that show insertion points for all CIPP installations.
    3. Detailed installation procedures and manufacturer's recommended cure method for each diameter and thickness of CIPP liner to be installed, including CIPP lining production schedule, acceptable inversion heads and pressures, inversion or winching procedures, curing and cool-down procedures detailing the curing rate of temperature increases and cool down and the method of application, and times for each stage of the process.
    4. Wet-out forms/reports for each CIPP segment with detailed information including but not limited to: date and time of wet-out, wet-out facility address, volumes and/or weights of resin, length and diameter of CIPP liner (both wet-tube and dry-tube), roller gap settings, start times, finish times, resin used (product name and batch/shipment number) and quantity, gel times, resin injection locations, thickness of CIPP liner (dry and wet), catalyst(s) name and quantity used, and any other pertinent data documenting the wet-out for each section of CIPP liner manufactured. The wet-out forms shall be submitted prior to CIPP liner installation and shall be provided without delay or claim to any confidentiality. Wet out forms shall be submitted to the Owner/Engineer field representative on the day of delivery.
    5. CIPP liner field curing reports documenting the liner installation for all sewer segments. The CIPP liner reports shall document all details of liner installation, including manhole numbers, street names/sewer location, project number, date, time, ambient temperature, heads used during the inversion process, pressures and/or heads (minimum inversion pressure, ideal head, maximum hot head and maximum cold head) used during curing

(including cool down if applicable), curing temperature, curing time, rate of cool down, CIPP liner thickness, etc. A sample report shall be submitted to the Owner/Engineer for approval prior to the installation of any CIPP lining. The reports shall be submitted prior to requesting payment and shall be provided without delay or claim to any confidentiality.

6. For UV cured liners, record the curing and light train speed (feet per minute), light source (number of lamps, intensity and wattage), inner air pressure (psi), exothermic (curing) temperatures per unit time over the length of the liner, and temperature of the internal liner surface. Include liner manufacturer recommended citations in the submittal.
7. Complete certified copies of the report(s) output(s) of the continuous temperature monitoring systems used in the control of the curing, printed and in electronic format. The reports shall be submitted prior to requesting payment and shall be provided without delay or claim to any confidentiality. Provide the Owner/Engineer with access to the website where the secure reports can be obtained.
8. Pre-rehabilitation and post-rehabilitation closed-circuit television (CCTV) inspection data as further defined herein. Post-rehabilitation CCTV inspection data shall be submitted within one week after the CIPP segment is installed.
9. Samples of installed liner(s) for testing to be performed by an ASTM-certified independent testing laboratory, as described further herein.
10. Information on any grouts, epoxy, or cements the Contractor is proposing to use for sealing at manholes or for other uses.
11. Submittals shall be provided in three-ring binders and/or electronic format.
12. Submit daily production reports to the Owner/Engineer's Superintendent and/or field representative at the end of each workday.
13. A list of all service laterals (with distances and clock position) that were abandoned or reconnected as part of the work as further defined herein.
14. Some installations may result in the need to repair or replace a defective CIPP. Submit in writing, for review by the Owner/Engineer, specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair/replacement procedures shall be as recommended by the CIPP system manufacturer and shall be submitted to also include the following:
    a. Defects in the installed CIPP that will not affect the operation and long-term life of the product shall be identified and defined.
    b. Repairable defects that may occur in the installed CIPP shall be specifically defined by the Contractor based on manufacturer's recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these contract specifications. Repairable defects may include but are not limited to blisters, wrinkles, fins, pinholes, over- or under-cut lateral connections, and any voids found between liner and the host pipe.
    c. Un-repairable defects that may occur to the CIPP shall be clearly defined by the Contractor based on the manufacturer's recommendations, including a recommended procedure for the removal and replacement of the CIPP. Un-repairable defects may include but are not limited to thickness below required minimum thickness, structural strength below required limits, lifts, shrinkage, folds, bulges, and delamination.
15. A list of all repair or replacement of CIPP defects that were executed by the contractor including identification of segment, location of the repair, and type of repair.

1.4 QUALIFICATIONS

A. Contractor performing CIPP lining work shall be fully qualified, experienced, and equipped to complete this work expeditiously and in a satisfactory manner and shall be certified and/or licensed as an installer by CIPP lining manufacturer. Contractor's personnel shall have successfully installed a minimum of 200,000 feet (total) of proposed CIPP liner for a continuous period of at least five years installing CIPP liners in pipe of a similar size, length and configuration as contained in this contract as documented by verifiable references. Submit name and experience of each lead individual performing work on this Contract. Personnel replaced by Contractor shall have similar verifiable experience as personnel originally submitted for project.

B. Full-time, on-site superintendent/foreman that will supervise CIPP lining installation shall have a minimum of five (5) years of experience on at least five (5) successfully completed similar projects containing a minimum of 200,000 feet (total) of proposed size range of CIPP liner as documented by verifiable references.

C. Lead personnel including superintendent, foreman and lead crew personnel each shall have a minimum of five years of total experience with CIPP technology proposed and shall have demonstrated competency and experience to perform the scope of work as documented by verifiable references.

D. Owner and/or Engineer reserves the right to approve or disapprove Contractor, Superintendent, and/or manufacturer based on submitted qualifications and a follow-up interview.

E. CIPP felt and resin manufacturer(s) shall have ISO 9001 certification and have successfully produced and supplied a minimum of 1,000,000 feet of proposed liner and one million pounds of resin as documented by verifiable references. The lateral cutter operator is required to have at least 6 months of experience reinstating the connection between the sewer main and lateral lining as documented by verifiable references.

F. The Installer must operate under a quality control system that is ISO 9000 or equivalent.

1.5 GUARANTEE/WARRANTY

A. CIPP lining placed shall be guaranteed by Contractor and manufacturer for a period of two (2) years from date of Substantial Completion. During this period, serious defects discovered in CIPP lining, as determined by Owner and which may materially affect the integrity, strength, function and/or operation of pipe, shall be removed and replaced as recommended by the manufacturer in a satisfactory manner by Contractor at no cost to Owner. Owner may conduct an independent CCTV inspection, at its own expense, of CIPP lining work prior to completion of warranty period. Defects replaced at that time shall be fully warranted by Contractor and manufacturer for a period of two years from date the defect was repaired. Wrinkles in flow stream, blisters that may affect the longevity of CIPP liner, dry spots where liner tube has no resin saturation, or other defects that may affect the integrity or strength of the CIPP or the flow capacity of the pipe, are unacceptable. Contractor is responsible to remove and repair, at Contractor's expense, all such defects in a manner that is satisfactory to Owner/Engineer. Defects also include but not limited to the following:
   1. Leakage through the liner or between liner and pipe.
   2. Reduction of liner thickness of more than ten percent (10%) of the thickness designed and/or required. Final liner thickness shall be delivered by Contractor based on installed product physical properties and as specified in Contract requirements.
   3. Separation of liner from host pipe where an annular space is clearly noticed, shrinkages (longitudinal and/or circumferential), dry spots, delamination of liner, cured lifts, dry spots, bulges due to external loading, reverse curvatures, splits, cracks, lifts, breaks, folds, major wrinkles (as defined further herein), flats, pinholes, crazing and any other defects that in the CIPP lining will compromise the longevity of the installed product.
   4. Circumferential defects (wrinkle, fin, bulge, etc.) in the invert of pipe between 4:00 and 8:00 o'clock shall not exceed three percent of the host pipe diameter or 1/2-inches by visual measurement, whichever is smaller, at the discretion of the Owner.
   5. Longitudinal wrinkles or fins shall not exceed maximum allowable height of five percent of equivalent host pipe diameter or 1-inch, whichever is smaller.
   6. Structural strength below the required limits.

1.6 QUALITY ASSURANCE

A. CIPP linings shall follow the quality control plan submitted by Contractor.

B. CIPP linings shall be from a single manufacturer. Suppliers shall be responsible for provisions of all test requirements specified herein as applicable. In addition, CIPP lining to be installed under this Contract may be inspected at the plant for compliance with these specifications by an

independent testing laboratory provided by Owner. Contractor shall require manufacturer's cooperation with these inspections. Cost of plant inspection of all CIPP lining approved for this Contract will be the responsibility of Owner.

C. Inspections of CIPP lining may also be made by Engineer or other representatives of Owner after delivery. CIPP lining shall be subject to rejection at any time on account of failure to meet any of the requirements specified, even though sample CIPP lining may have been accepted as satisfactory at the place of manufacture. CIPP lining rejected after delivery shall be marked for identification and shall be removed from the job site.

D. In the event that an installation is rejected based on review of the post-rehabilitation CCTV inspection, repair the sewer segment to the satisfaction of the Owner/Engineer at no additional cost to the Owner.

E. Along with the physical properties testing and post installation CCTV survey, deliver a certified copy of the curing report output from the fiber optic continuous temperature monitoring system used in the control of the curing process for pipes; or provide the Owner/Engineer with access to the website where the secure report can be obtained.

1.7 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling, and laying to avoid damaging the CIPP liner. CIPP liner damaged beyond repair in shipment shall be replaced as directed by Owner/Engineer.

B. Any CIPP liner showing a visible split, tear, or defect, shall be repaired per manufacturer's recommendations and to the satisfaction of the Engineer or, if not possible, shall be removed at once from the project site.

C. While stored, CIPP shall be adequately supported and protected in a manner as recommended by manufacturer.

D. CIPP liner shall always be maintained at a proper temperature in refrigerated facilities to prevent premature curing prior to installation. CIPP liner shall be protected from UV light. CIPP liner showing evidence of premature curing will be rejected for use and shall be immediately removed from the site.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contractor is responsible for control of all material and process variables to provide a finished CIPP possessing the minimum properties specified in ASTM F1216, and required herein.

B. The outside of each liner tube shall be labeled by the liner manufacturer with the location of the liner manufacturer, the name of the project, the liner thickness, the liner diameter, the liner length, and the location where it is to be installed.

2.2 CIPP FELT LINER AND RESIN

A. CIPP liner manufacturers shall be as follows:
1. Insituform by Insituform Technologies, Inc.
2. National Liner by National EnviroTech Group LLC,
3. SAK Liner by SAK Construction LLC,
4. CIPP Corp.
5. Diamond Lining Systems by Daystar Composites
6. Premier Pipe CIPP Liners by JWM Environmental
7. Improved Technologies Group
8. Reline America – Alphaliner
9. Saertex
10. Or pre-approved equal.

B. The fabric tube shall be free from tears, holes, cuts, foreign materials, and other surface defects.

C. CIPP liner shall be composed of tubing material consisting of one or more layers of a flexible non-woven polyester felt with or without additives such as woven fiberglass or other fibers and meet the requirements of ASTM F 1216, ASTM F 1743, and ASTM D 5813. Felt content of CIPP liner shall be determined by Contractor but shall not exceed 15 percent of the total impregnated liner volume. Fabric tube shall be capable of absorbing and carrying resins, constructed to withstand installation pressures, and curing temperatures and stretch to fit irregular pipe sections. Submit certified information from felt manufacturer on normal void volume in the felt fabric that will be filled with resin. For carrier material that includes fiberglass or is all fiberglass, the resin to fabric percentage will be adjusted as recommended by the manufacturer.

D. CIPP tubing shall consist of at least two separate tubes of corrosion resistant (E-CR or equivalent glass fibers) according to ASTM D578 and ASTM F2019. Liner shall be constructed in accordance with ASTM F2019. Fabricate the tube to a size that, when installed, conforms to the internal circumference and length of the host pipe. Make allowance for circumferential or longitudinal stretching during installation. The tube shall have a homogeneous wall thickness; shall contain no intermediate or encapsulated elastomeric layers; shall contain no material that may cause delamination in the UV-cured CIPP liner; shall have an inner foil layer or calibration hose to contain resin and be removed after completion of installation, unless inner foil is a permanent part of the system and fabricated as an integral part of the tube by bonding or fusing; and shall have sewn or bonded seams, as recommended by the manufacturer, stronger than the non-seamed material.

E. CIPP liner tube may be made of single or multiple layer construction, with any layer not less than 1.5 mm thick, unless the tube is made of fiberglass material. Wet-out fabric tube shall have a uniform thickness and void space for resin distribution that when compressed at installation pressures will produce a predictable finished thickness that meets or exceeds the design thickness after cure.

F. No material shall be included in fabric tube that may cause de-lamination in cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between felt fabric and activated resin containing a colorant.

G. Wall color of interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. Hue of the color shall be dark enough to distinguish a contrast between fully resin saturated felt fabric and dry or resin lean areas.

H. Seams in the fabric tube, if applicable, shall meet the requirements of ASTM D5813.

I. The outside layer of the tube shall be coated with an impermeable material compatible with the resin and fabric.

J. Resin: The resin used shall be compatible with the CIPP system used, and designed for use in full pipe, low pressure (up to 10 psi) systems. Shall be a corrosion resistant polyester or vinyl ester resin and catalyst system or epoxy and hardener system manufactured specifically for sewer rehabilitation, that, and when properly cured within the tube composite, meets the requirements of ASTM F 1216, ASTM F 1743 or ASTM F 2019, the physical properties herein, compatible with the CIPP system, and those which are to be utilized in the design of CIPP for this project. Resin shall produce CIPP that will comply with or exceed structural and chemical resistance requirements of this specification. Liner material and resin shall be completely compatible. Generally, resin shall not contain fillers, except those required for viscosity control or fire retardance or increase strength, and with applications for which inert fillers would facilitate better heat transfer and retention during installation. Liner contractor may add up to 5 percent by mass, a thixotropic agent for viscosity control, which will not interfere with visual inspection. Resins from recycled materials are not allowed.

K. Resins may contain pigments, dyes, or colorants, which shall not interfere with visual inspection of cured liner. Quantity of resin used for tube impregnation shall be sufficient to fill volume of air voids in tube with additional allowances for polymerization shrinkage and loss of resin through cracks and irregularities in original pipe wall. Use serial vacuum impregnation or pressure impregnation process (or equal) to provide maximum resin impregnation throughout the tube.

L. The resin shall be compatible with the CIPP system used and the installation process and comply with the requirements of ASTM F2019. Resins from recycled materials are not allowed. Resin shall be able to cure by exposure to Ultraviolet (UV) light. Volume of resin may be increased to accommodate expected voids or pipe irregularities. The color of resin shall be in contrast to the color of the tube material. No on-site or mobile wet-out shall be allowed. The project representative may inspect fabrication of the liner and resin impregnation (wet-out) at the manufacturer's facility to ensure compliance with the specifications. On-site wet-out may be required depending on size and length of the installation.

M. Prior to inversion, if applicable, outside and/or inside layer of tube (before inversion/pull-in as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of resin saturation during the resin impregnation (wet out) procedure.

N. Exterior of manufactured tube shall have distance markings along its length at regular intervals not to exceed 5 feet. Use these marks as a gauge to measure elongation during insertion. Should overall elongation of a reach exceed 5 percent, liner tube shall be rejected and replaced.

O. Identify the wet-out facility where all CIPP liner under this Contract will be manufactured. All CIPP liner shall be manufactured from this designated wet-out facility throughout entire Contract unless specifically approved otherwise by Engineer in writing. Multiple wet-out facilities shall not be allowed.

P. Owner and/or an agent of Owner may inspect CIPP liner during manufacturing and wet-out. Owner/Engineer shall be given an opportunity to witness manufacturing of all CIPP liner for this project. Owner is responsible for costs associated with witnessing the manufacturing of CIPP liner.

Q. If Owner/Engineer decides to inspect the manufacturing of CIPP liner, Provide full access to witness wet-out process and shall provide any and all information related to the manufacturing as requested by Owner or Owner's agent without delay and without claims of confidentiality or product privacy.

R. Application of resin to felt tubing (wet-out) shall be conducted under factory conditions using vacuum impregnation and materials shall be fully protected against UV light, excessive heat and contamination at all times. If on-site wet out is required, Contractor is required to maintain ambient conditions similar to those encountered during factory wet outs.

S. Liners that are impregnated at the factory and transported to the project site in refrigerated trucks shall be installed as soon as possible and no more than two (2) weeks after the date of impregnation at the factory.

T. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting out equipment shall be sized to allow an excess of 5 to 10 percent resin to pass during impregnation.

U. When cured, CIPP liner shall form a continuous, tight-fitting, hard, impermeable liner that is chemically resistant to any chemicals normally found in domestic sewage per Table 2.1 in ASTM F 1216. CIPP liner shall be chemically resistant to trace amounts of gasoline and other oil products commonly found in municipal sewerage and soils adjacent to sewer pipe to be lined.

V. CIPP liner tube shall be manufactured or fabricated to a size that will tightly fit internal circumference of sewer being rehabilitated after being installed and cured. CIPP liner shall be

capable of fitting into irregularly shaped pipe sections and through bends and dips within the pipeline. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing CIPP liner. Tube shall be properly sized to diameter of existing pipe and length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. Determine minimum tube length necessary to effectively span designated run between manholes. Verify lengths in field prior to ordering and prior to impregnation of tube with resin, to ensure that tube will have sufficient length to extend entire length of the run, which is defined as the length of the existing host pipe measured from the interior walls of the manholes, and/or from the ends of the pipe when/if the pipe extends into the manholes. Also measure inside diameter and circumference of existing pipelines at face of each manhole in field prior to ordering liner so that liner can be installed in a tight-fitted condition with little or no wrinkling.

W. Length of CIPP liner shall be as deemed necessary by Contractor to effectively carry out insertion of CIPP liner and sealing of CIPP liner at outlet and inlet manholes. Required diameter and length of each pipe segment shall be measured in advance of wet-out and a list of these measurements shall be submitted to Engineer at least one week prior to installation of each CIPP liner.

X. Contractor is responsible for ensuring that correct liner is installed in each sewer reach being rehabilitated.

Y. All pipes of diameter 12-in and greater shall have a minimum finished thickness of 6mm or as designed, whichever is greater.

Z. Verify proposed CIPP liner thicknesses and submit associated calculations. Actual cured liner thickness shall be -5/+10 percent of approved design thickness and shall not include thickness of any non-structural membrane (inner/pre- liner). CIPP liner shall be designed in accordance with applicable provisions of ASTM F 1216 for "fully deteriorated gravity pipe conditions", unless Engineer agrees, in writing, prior to installation that "partially deteriorated gravity pipe conditions" shall apply based upon review of CCTV video.

AA. At locations of voids in the existing pipe to be lined, the nominal wall thickness shall be increased to provide the minimum design thickness taking into consideration stretch and expansion of the liner into the void area. Void locations shall be accurately determined during video inspection.

2.3 DESIGN CRITERIA

A. CIPP liner shall be designed in accordance with the procedures of ASTM F1216. All material properties used in design calculations shall be long-term (time-corrected) values. The CIPP liner shall meet following design conditions, unless Engineer agrees, in writing, of their change:

B. AASHTO H 20 Live Load for street loading or ASSHTO E80 for railroad loading.

C. Constrained soil modulus of native soil in the pipe zone of 1,000 psi.

D. Soil weight of 120 pounds per cubic foot and a coefficient of friction of Ku'=0.130r shall be used for the installed depths.

E. Long-term flexural modulus used in design calculations shall be estimated by multiplying lowest short-term flexural modulus used in design calculations by a retention factor of 0.50 (i.e., long-term retention of mechanical properties equal to 50 percent.)

F. Design safety factor of 2.0.

G. Enhancement Factor of 7.0

H. Typical groundwater levels shall be estimated at one foot above the top of pipe. Groundwater depth used in calculations should be from estimated maximum groundwater level from surface to invert of interior pipe or at elevation specified for bidding purposes in Contract Documents.

I. Service temperature range shall be 40 to 100 degrees F.

J. Minimum ovality of host pipe of two (2) percent.

K. Long-term retention of mechanical properties (flexural strength and modulus of elasticity) equal to 50 percent of initial.

L. Thickness to be used for CIPP liner shall be largest thickness as determined by calculations for deflection, bending, buckling and minimum stiffness.

M. CIPP liner thickness for non-round pipes or circular pipes with greater than 10% ovality shall be designed on accordance with WRc Sewerage Rehabilitation Manual, Type II Design, Section 5.3.2.iii.

N. The cured CIPP liner shall provide a minimum service life of 50 years and shall conform to the following minimum initial and long-term structural properties:

Property	Test Method	Initial (psi)	Long Term (psi)
Flexural Strength (felt)	ASTM D 790	4,500	2,250
Flexural Modulus of Elasticity (felt)	ASTM D 790	350,000	175,000
Flexural Strength (GRP CIPP)	ASTM D 790	6,500	3,250
Flexural Modulus (GRP CIPP)	ASTM D 790	725,000	362,500

O. In addition, if the thickness of the CIPP provided is based on Contractor calculations using strengths greater than the above, the physical strength after curing shall conform to those greater values.

P. The CIPP shall be designed to withstand all imposed loads, including dead and live loads and, if applicable, hydrostatic pressure. The liner shall have sufficient wall thickness to withstand all anticipated external pressures and loads that may be imposed after installation.

2.4 END SEALS

A. End seals shall be composed of hydrophilic rubber and molded as a one-piece, three-inch wide cylinder which when installed will form a 360-degree seal between the host pipe and the newly installed liner. Use of caulking, rope or band type of an end seal shall not be allowed. Acceptable end seals are Insignia™ End Seals by LMK Enterprises or approved equal.

B. Install epoxy at the end of each lined pipe to cover any piece of existing pipe that are exposed at the manhole wall. Acceptable epoxy resins are Sikadur 31 or approved equal.

2.5 SERVICE LATERAL SEALS

A. Where indicated on the drawings or these specifications, install an internal lateral connection sealing system that is compatible with the CIPP lining system.

B. If the sewer is not under the phreatic surface, seal service lateral connection by injecting a chemical hydrophilic grout into the space between the connection and the main line. If the sewer is under the phreatic surface, seal the service lateral connection by installing a hydrophilic rubber connection seal.

C. Rubber connection seals shall be composed of a hat made of hydrophilic polymeric neoprene rubber designed with a specified wall thickness to provide a compression seal at connection of a lateral and a mainline pipe. Use of caulking, rope or band type of an end seal shall not be allowed.

D. Acceptable hydrophilic rubber seals are Insignia™ Hydrophilic Connection Hat by LMK Enterprises or approved equal.

2.6 CIPP SPOT REPAIRS

A. Install a sectional CIPP spot repair for areas where longitudinal shrinkage of the installed CIPP liner near the manholes is three (3) inches or more of exposed host pipe, at no cost to the Owner/Engineer.

B. For any other longitudinal shrinkage observed within a pipe segment, install a sectional CIPP spot repair at exposed sections of host pipe.

C. CIPP spot repair shall be accomplished using a liner tube of a particular length and a thermo-set resin with physical and chemical properties appropriate for the application. The tube positioned within a translucent inversion bladder is vacuum impregnated with the resin, then placed inside a protective launching device and winched through the sewer pipe. The tube shall consist of one or more layers of flexible non-woven needled felt or a reinforced non-woven. The tube shall be continuous in length exhibiting a uniform minimum wall thickness based upon design calculations found in ASTM F1216 appendix XI. No overlapping sections shall be allowed in the circumference or the length of the liner. The tube shall include compressible material at each end forming a smooth transition to the host pipe. The liner shall be capable of conforming to offset joints, bells, and disfigured pipe sections. The resin shall be polyester, vinyl-ester or epoxy with proper catalysts as designed for the specific application. The cured-in-place pipe shall provide a smooth bore interior. Each installation shall have a design report documenting the design criteria for a fully deteriorated pipe section, or a partially deteriorated pipe in cases where the pipe has previously been lined. The installation procedure shall conform to ASTM F2599 "Standard Practice for Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner". The cured-in-place pipe shall meet or exceed the minimum test standards specified by the American Society for Testing Methods as described in the most current ASTM F1216 standard, most current edition. Acceptable CIPP spot repairs are LMK Performance Liner or approved equal.

D. CIPP spot repairs shall be ambient cure and shall have a fiberglass mat consisting of two or more layers of 0/90 degrees bias woven fiberglass with a Trevara felt coating on one side (or Pipe-Patch from Source One) and capable of carrying a two component, 100% solid epoxy or silicate base resin. Acceptable fiberglass CIPP spot repairs are Prime Line sectional lining spot repair or approved equal.

2.7 STYRENE REDUCING AGENT

A. The styrene reducing agent shall be StyRedux by Integrated Chemical & Equipment Corporation or approved equal.

B. The styrene reducing agent shall be a gelatin, water soluble, biodegradable, non-toxic, FDA approved powder and/or capsule. The styrene reducing agent shall be added in a calculated amount according to manufacturer's recommendations into the down-tube for water curing or directly into the water holding tank for steam curing.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION

A. If available, examine Owner’s CCTV video of each pipe segment before starting work.

B. Notify all property Owners or businesses that discharge sewage directly to sewer being lined and whose service lateral will be affected by lining work, that their service will be temporarily discontinued during installation of CIPP liner. Deliver written notification to each such resident or business at least 72 hours in advance, giving the date, start time and estimated completion time for the work being conducted, and any restrictions on use of sewage system facilities including exact days and hours when sewer system cannot be used. Method of notification, and the text included in the notification, shall be approved by Owner.

C. Clean each length of pipe to be lined and shall dispose of all resulting material offsite.

D. Conduct a pre-rehabilitation CCTV inspection of all sewers to be rehabilitated by CIPP lining methods. Inspection shall be for purpose of identifying defects in pipe, to document location of all service lateral connections, and to confirm point repair locations. The Contractor’s project manager and/or superintendent shall review the pre-rehabilitation inspection videos to confirm

the quality of the videos, locations of lateral connections, and locations of point repairs to be performed; only after the Contractor has confirmed that the quality of the videos is adequate for a clear review of pipeline, shall be submitted to the Engineer. Engineer will review pre-rehabilitation inspection videos to confirm locations of point repairs to be performed by Contractor. If an Inspector or Engineer is on site or immediately available, allow the Inspector or Engineer to view the pre-installation video to verify the pipe is ready for CIPP installation which includes proper cleaning, trimming protruding taps and mitigating and significant infiltration.

E. If the data is available, Owner/Engineer will provide Contractor information on location of known active laterals and cleanouts; however, this list may not be interpreted as all-inclusive. Contractor is responsible for verifying active customer service connection prior to rehabilitation. Compare service connections from CCTV video and compare with above ground measurements at approximate location of center of each house or building. Any discrepancies between CCTV data and above ground measurements of laterals shall be brought to attention of Owner/Engineer for a determination of lateral reinstatements. If Contractor discovers an error or addition to the list provided, immediately notify Engineer for additional investigation. Upon completion of rehabilitation work, a list of all service laterals abandoned or reconnected as part of the work shall be submitted to Owner. Compiled list can be in the form of post-inspection installation inspection logs and shall include the following information:
   1. Location of each service lateral based on CCTV inspection logs. Location shall include both accurate distances measured from centerline of starting manhole as well as a notation (by clock-reference) of where on circumference of pipe, the service lateral connects.
   2. Status (Active or Inactive).
   3. Address of each customer and associated active lateral location.

F. Prior to insertion of the liner, take any remediation actions necessary to prepare the host pipe for insertion of the liner. This will include cleaning the pipe using clean, fresh water applied at sufficient pressure to have the pipe free of dust, dirt, oil, grease, fat, efflorescence, hydrogen sulfide corrosion, laitance, other penetrating contaminants, fins, projections, thin crusts, bridging voices and loosely adhering material; removal of obstructions, intrusions; cutting all exposed or hanging pipe gaskets; and/or smoothing of surfaces in order to ensure a proper fit and full expansion of the liner to the host pipe. Choice of method is left to the discretion of the Contractor.

G. During pre-rehabilitation CCTV inspection and prior to installation of CIPP lining, all service lateral connections protruding into main line by 1/2-inch or more shall be internally cut or ground down flush with pipe wall with a robotic cutter specifically designed for this purpose. Internal cutter shall be capable of cutting unreinforced concrete pipe (CP), cast iron pipe, PVC, vitrified clay pipe (VCP), ductile iron pipe, and Orangeburg pipe. All materials / cuttings shall be removed from sewer and properly disposed of.

H. Any infiltration runners or gushers as defined by NASSCO PACP that are observed during the pre-rehabilitation CCTV shall be stopped by injecting a chemical hydrophilic grouting using a remote packer, unless otherwise approved by the Engineer.

I. Provide bypass pumping of sewage flows where indicated. Service connection effluent may be plugged only after proper notification to affected residence and may not remain plugged overnight. Installation of liner shall not begin until Contractor has installed required plugs or a sewage by-pass system and all pumping facilities have been installed and tested under full operating conditions including bypass of mainline and side sewer flows. Once lining process has begun, existing sewage flows shall be maintained, until resin/felt tube composite is fully cured, cooled down, fully televised and CIPP ends finished.

J. Wastewater flows from existing sewers shall not be allowed to enter the new or rehabilitated facilities until the new or rehabilitated facilities have been cleaned and tested as required in the Contract Documents.

K. Provide CIPP liner in full length of sewer as shown on drawings. Installation of CIPP liner shall be in complete accordance with applicable provisions of ASTM F 1216 or ASTM F 1743 and manufacturer's recommendations.

L. Install a hydrophilic end seal at face of each manhole at all manhole penetrations per article 2.4 prior to inverting or pulling in uncured CIPP liner.

M. If in the opinion of CIPP liner manufacturer and/or the Owner/Engineer, rate of infiltration in sewer segment is high enough to risk washout of resin, perform measures, as required, to minimize infiltration prior to installation, including pre-liners, grouting, etc. If during pre-lining CCTV inspection, any infiltration runners or gushers (per NASSCO PACP®) are observed, submit, in writing for approval by Owner/Engineer, methods and materials for mitigating any adverse impacts from the infiltration.

N. Pressure gauges, if used for the ends shall be digital pressure/vacuum gauges with a pressure range of 0 to 50 psi and ±0.25% test gauge accuracy.

O. For pipes 18"in diameter and larger, install and use continuous temperature sensor strips. Provide the Owner's representative with access to the longitudinal temperature monitoring system data during the installation via digital data, web-based or other approved methodology and printed reports.

3.2 INSTALLATION

A. CIPP liner shall be installed via inversion using hydrostatic head or air pressure in accordance with ASTM F 1216 or ASTM F 1743 and manufacturer's recommendations or inserted through a manhole by means and methods required by the manufacturer. Hydrostatic head and/or steam pressure used during installation process shall be sufficient to hold liner tight to pipe wall, producing dimples at all service connections, and flared ends at two access manholes. Closely follow the requirements in the submitted liner field curing reports, including the minimum inversion pressure, ideal head, maximum hot head and maximum cold head for each installation.

B. Install a hydrophilic end seals at liner termination locations prior to inverting or pulling in uncured CIPP liner.

C. If CIPP does not fit tightly against original pipe at its termination points, at no additional cost to Owner, the full circumference of CIPP exiting host pipe shall be filled with a resin mixture compatible with CIPP, approved by CIPP manufacturer and Owner/Engineer. There shall be no significant leakage of groundwater between existing pipe and CIPP at manhole connection or service lateral connections. Any leakage shall be removed and/or eliminated by Contractor at no additional cost to Owner. Any infiltration found at manhole and/or service connections shall be eliminated by Contractor at no additional cost to Owner. Any infiltration runners or gushers as defined by NASSCO PACP shall be stopped with chemical hydrophilic grouting.

D. Fit heat source with monitors to accurately gauge temperature of incoming and outgoing water or steam supply. Place another such gauge between CIPP liner and pipe invert at downstream end to determine temperature during curing process. Temperature in CIPP during curing process shall be as recommended by resin manufacturer. Length of time for allowing curing process to be completed shall be of duration recommended by manufacturer, during which time maintain required temperature throughout CIPP. Provide a written temperature data chart/curing log to Owner's Representative for review to ensure that curing temperatures for resin meet manufacturer's recommendations.

E. The full length from manhole to manhole of the installed resin-impregnated flexible felt tube CIPP liner shall be cured using circulating heated water or steam in accordance with ASTM F 1216 and manufacturer's recommendations or with UV light sources to affect desired cure throughout length of the tube, extending full length from manhole to manhole(s). Resin shall be cured into a hard-impermeable pipe with minimum specified thickness, providing a structurally sound, uniformly smooth interior and tight-fitting liner within existing pipe. Cool-down procedures shall be in accordance with ASTM F 1216 and manufacturer's recommendations.

The cool-down shall follow manufacturer's guidelines, be measured digitally to allow inspector to inspect or record, be linear, and be gradual; no super cooled air shall be allowed to be injected.

F. For pull-in-place liners cured by UV light (ASTM F2019)
   1. Locate all maintenance holes to suit the pipe lining operation. The liner shall be installed following ASTM F2019, as applicable, using the pulled-in-place process and a pre-liner, if required by the proposed method.
   2. Prior to insertion, install a plastic slip sheet inside existing host pipe to protect liner.
   3. Pull the liner into place with constant tension winch capable of recording strain used during insertion. The pulling speed and tension shall not exceed manufacturer's recommendations. Should the overall elongation exceed manufacturer's recommendation, the liner shall be rejected and replaced at no additional cost.
   4. Incrementally pressurize the liner to the recommended liner pressure. The pressure head shall be sufficient to hold the liner tight to the host pipe, overcome external hydrostatic pressure and prevent lifts in the liner. Workers shall not be present in the maintenance hole or insertion pit during pressurization of the liner. Packers and clamping straps shall be properly installed and attached. If constant positive pressure is specified, any internal pressure above the spring line against the crown of the pipe must be maintained from insertion to final curing without any loss of pressure.
   5. Fiberglass liner shall be cured with UV light sources at a constant inner pressure sufficient to maintain the liner tight against the existing wall of the pipe. The UV light train shall have a minimum of one camera for CCTV inspection of the liner and shall be sized according to the pipe diameter so that the UV bulbs are in proper proximity to the liner wall all around the pipe circumference and should include sensors to record the cure progress. Individual UV Lights incorporated in the light train shall not exceed 80% of the logged hours of usage of the manufacturer's stated usage rate. Maintain light train usage log on-site and submit to Project Representative upon request. The ultraviolet curing lamps shall operate at a sufficient output and in a sufficient frequency range to ensure curing of the resin. The multi-lamp ultraviolet curing lights and resin photo- initiator system shall be optimized for curing of the provided resin.
   6. Assemble the UV light train according to the manufacturer's recommendations for the sewer pipe and liner diameter. Cure the liner according to the curing protocol, as approved. Maintain light train speed per the manufacturer's requirements, and to assure exothermic reaction has completed.
   7. All CTV inspection and installation and curing data, including the time, the rate of travel of the ultraviolet light assembly, light sources and the internal pressures shall all be recorded and as specified by the liner manufacturer. This segment curing data shall be submitted to the Owner/Engineer, along with the manufacturer's curing standards.
   8. Temperature sensors, pressure gauges, and any other significant information relating to the installation process shall be used and available for the Project Representative's inspection. Provide the following continuously recorded information: Name and length of segment, date and time log of curing process, curing Speed, light source working wattage, and inner air pressure curing temperatures.

G. Contractor may install CIPP lining in multiple sewer segments at one time where possible. When installing CIPP lining in multiple sewer segments at one time, the top one-half of CIPP liner in intermediate manhole shall be neatly removed, leaving the invert in place, and void between CIPP liner and existing channel shall be filled with non-shrink grout. Manhole bench shall be reconstructed as required to provide a smooth transition to new CIPP liner.

H. All cutting and sealing of CIPP liner at manhole connections shall provide watertight pipe and manhole seals. All cut edges of cured liner shall be thoroughly sealed with same resin as was used in liner. Catalyst or hardener used shall be compatible with resin/catalyst used in liner previously but shall not require an external heat source to begin exothermic reaction (curing).

There shall be no leakage of groundwater into manhole between CIPP liner and existing sewer pipe and between existing sewer pipe and manhole wall.

I. Continuous temperature monitoring systems are required for all 18-inches or larger sewer or any sized sewer in locations with significant known groundwater infiltration or if pipe is within 50 feet of stream, river or lake for liners being cured by heated water or steam. This system shall be installed at the invert of pipe and be installed per manufacturers recommended procedures. Temperature sensors shall be placed at upstream and downstream ends of reach being lined to monitor pressurized fluid's (air or water) temperature during curing process. To monitor temperatures inside tube, wall and to verify proper curing, temperature sensors shall be placed between host pipe and liner in bottom of host pipe (invert) throughout the reach to record the heating and cooling that takes place on the outside of liner during processing. As a minimum, sensors shall be spaced apart at intervals no greater than 20-feet for pipe sizes up to 15-inches in diameter; and no greater than 10-feet for pipe sizes 18-inches and larger. Additionally, sensors shall be strategically placed at points where a significant heat sink is likely to be anticipated. Monitoring of these sensors shall be by a computer that can record temperatures at this interface throughout processing of CIPP utilizing a tamper-proof database. Temperature monitoring systems shall be Zia Systems or Vericure by Pipeline Renewal Technologies.

J. Prior to installing liner in host pipe, temperature monitoring system's proper functioning shall be confirmed by hooking it up to computer and seeing that sensors are reporting their ambient temperatures. No more than two sensors in sequence can be found faulty during this test. If three or more sensors in sequence are discovered faulty, a new sensor array shall be provided and installed at no extra cost to the Owner; and the new array shall be again tested for its proper functioning.

K. Curing of resin system shall be as per recommendations of CIPP system manufacturer of CIPP product. Temperatures achieved and duration of holding the liner at those temperatures shall be per System Manufacturer's established procedures. If any sensor or sensors along reach indicates that there is a localized issue with respect to achieving proper curing per written installation procedure, address the issue prior to acceptance of the liner. Sensor array's database required in above paragraph shall have an output report that identifies each sensor by its station in reach and shows maximum temperature achieved during processing of CIPP and time sustained at or above Manufacturer's required curing temperature at each sensor. The temperature of the liner shall be recorded until the liner has completed the cool-down process.

L. If cool-down is to be accomplished by introduction of cool water into an inversion standpipe to replace water being drained from a small hole made in downstream end, the hardened liner shall be cooled down to a temperature below 100 degrees F (38 degrees C), or ambient temperature, whichever is smaller, before relieving static head in inversion standpipe. Take measures to ensure that, in release of static head, a vacuum will not be produced that could damage the newly installed CIPP liner.

M. Incorporate mitigation measures to control styrene odors during installation and curing of the liner. If any styrene odor complaints occur on the jobsite, have means and methods to immediately mitigate the issue.

N. Vent and/or exhaust noxious fumes or odors generated during and remaining after curing process is completed. This process shall remain in place at all manholes, laterals, etc., until noxious odors have dissipated to an acceptable level in accordance with OSHA requirements for materials used and there is no more air pollution or potential health hazard left to general public or construction workers.

O. Provide piping, pumps, valves, and other equipment to discharge curing water.

P. The new CIPP pipe shall be cut off in the manhole at a suitable location. The finished product shall be continuous over the length of pipe reconstructed and be free of defects. Pipe entries and exits shall be smooth, free of irregularities, and watertight. No visible leaks shall be present. Where the liner extends through a manhole, the liner shall be cut off flush to the existing bench.

3.3 FIELD TESTING AND ACCEPTANCE

A. Field acceptance of CIPP lining shall be based on Owner's and Engineer's evaluation of installation, including a review of the CIPP liner curing data, review of post-rehabilitation CCTV inspection data, and review of certified test data for installed CIPP liner, including air testing. All CIPP sample testing, and repairs to installed CIPP as applicable, shall be completed before final acceptance, meeting requirements of these specifications and documented in written form.

B. Testing shall be performed by an independent testing laboratory certified by the American Association for Laboratory Accreditation (A2LA). Submit to Engineer the name and location of independent testing laboratory, a certified statement from laboratory indicating that they are independent from and not associated with Contractor in any way, and A2lA certification for independent testing laboratory.

C. All expenses for sampling and testing of installed liner shall be paid for by Owner. Chain of custody for test samples shall be through Owner's representative. Cost of all manufacturer's testing to qualify products furnished to project site shall be the responsibility of Contractor.

D. Sampling and testing of the installed CIPP liner shall conform to ASTM F 1216, or ASTM F2019 for UV-cured CIPP, and the following requirements:
   1. Remove one restrained sample of installed CIPP liner at least 18-inches in length. Sample shall be captured by installing CIPP liner through a section of PVC pipe (same diameter as existing sewer diameter) within the most downstream manhole of installation and at all intermediate manholes if multiple sewer segments are lined at same time. Contractor may elect to cut the sample longitudinally and provide 1/2 the sample to Owner's representative or inspector for direct shipping to laboratory and keep other half of sample for additional testing if necessary.
   2. CIPP liner wall thickness shall be measured in accordance with ASTM D 5813. Flexural properties shall be determined in accordance with ASTM D 790. Label and date all samples and provide to inspector or Owner's representative same day of installation for shipping to independent testing laboratory. Engineer shall be copied on all transmittals to independent testing laboratory. Testing results shall be submitted to Engineer or Owner within 30 days after installation of CIPP liner or payment will be withheld.
   3. Samples used for testing shall be individually labeled to record the following:
      a. Contract Name and Number
      b. Sample number
      c. Date of installation
      d. Contractor name including person responsible for collecting samples
      e. Upstream and downstream maintenance hole numbers from where the sample was taken
      f. Initial cure start date and time, sampling date and time, and location of the sample within the maintenance hole-to-maintenance hole segment.
      g. Any other relevant information.
   4. After recalculations performed per 3. 4, B above, any CIPP lining that does not meet new calculated thickness requirements shall be corrected by Contractor in a manner approved by Engineer at no additional cost to Owner. Owner's decision on how to correct deficient CIPP liner installations shall be final. Options for correcting deficient CIPP liner installations that will be considered by Owner include the following: removal of existing CIPP liner and re-lining the sewer or re-lining sewer with existing CIPP liner in place.

E. Perform a post-rehabilitation CCTV inspection of all sewers rehabilitated using CIPP lining methods in accordance with Owner requirements. Post-rehabilitation CCTV inspection shall be performed following installation of CIPP liner and reinstatement of all active service laterals. The Contractor's project manager and/or superintendent shall review the post-rehabilitation inspection videos to confirm the quality of the videos and of the installed CIPP; only after the

Contractor has confirmed that the video is of good quality, the videos shall be submitted to the Owner. If it is determined that any repairs are needed at any segment, a new CCTV inspection shall be performed of the entire segment(s) after the repairs have been completed.

F. Liner Installation Inspection - A visual inspection of the liner will be considered acceptable if liner shows no significant, wrinkles, lifts, ridges, splits, cracks, delaminations, flats, dry spots, pinholes, shrinkage, foreign inclusions, crazing, reverse curvatures, or other type of defects in the CIPP lining. Significant defects shall be defined as those listed in this section; and/or any defect that may create a maintenance issue in future such as inhibiting CCTV cameras or allowing solids to get caught on defect, and/or any defect that appears to reduce long-term structural strength or stability of pipeline. Longitudinal wrinkles/fins in height up to a maximum of five percent of inside diameter of host pipe or 1-inch, whichever is smaller, may be acceptable and shall be evaluated by Engineer for acceptance on a case-by-case basis. Defective lining shall be repaired or replaced at no additional cost to Owner. If during removal process, the pipe is damaged, perform a point repair at Contractor's own expense.

G. Post CCTV Video Inspection and Submittals: Submit a digital CCTV of post-lined sewer within seven business days for each pipe segment. Engineer shall review and approve payment based upon satisfactory completion of a liner that is free of significant defects as defined in paragraph 1.5 of this section.
   1. Removal of wrinkles or fins deemed significant at the discretion of the Owner, shall be removed using a milling head, relined, or replaced by the Contractor as directed by the Owner at no additional cost. There shall be no evidence of other major defects in the CIPP lining.
   2. Longitudinal shrinkage of the CIPP liner's length, of more than three (3) inches from the face of the manhole shall be repaired with a fiberglass reinforced CIPP spot repair per section 2.6 of this specification at no cost to the Owner.
   3. Circular shrinkage shall be measured by the Contractor via man entry to try to insert a 1/16" thick ruler or similar into any gap more than 8 inches past the MH wall. Document these measurements with digital photos that shall be submitted to the Owner/Engineer for approval. Circular shrinkage shall be repaired per manufacturer recommendations at no cost to the Owner.

H. The CIPP liner shall be watertight. Groundwater infiltration through the wall of the liner or around the liner end seals shall be zero.

I. All service connections shall be opened to a minimum of 95 percent and a maximum of 100 percent of opening so that a new lateral or lateral lining can be installed properly. Any overcuts more than 105 percent shall be repaired with hydrophilic seal hat connection, CIPP liner or other approved method by Engineer.

J. All coupons and excess resin shall be removed from reinstated service laterals prior to acceptance of CIPP lining.

K. All pipe-to-manhole connections shall be watertight and free of infiltration.

L. Hydrostatic testing (exfiltration test) of completed liner shall be performed after liner curing and cool down in accordance with ASTM F 1216. Hydrostatic testing shall be performed prior to reinstatement of active services.

M. CIPP installed using water shall be tested for water tightness using an exfiltration test. Maximum allowable leakage shall be 50 gallons per day per diameter inch of pipe per mile in accordance with ASTM F 1216.

3.4 MEASUREMENT AND PAYMENT

A. Payment:
   1. Payment for CIPP pipe liner shall be made at Contract unit price per linear foot for each size as stated in the Bid, complete in place, in accordance with Contract Documents. Payment will be based on actual number of feet installed, as measured by Engineer. Pipe will be measured horizontally, on surface, from center-to-center of manholes to nearest 0.1-foot, unless another method is approved by the Owner/Engineer.
   2. Price paid per linear foot for pipe liner shall include full compensation for furnishing labor, materials, tools, equipment and incidentals necessary to provide CIPP liner, manhole seals, traffic control, sewage bypassing, control of water, service lateral reinstatement service lateral sealing, manhole connections, preconstruction inspection, cleaning, disposal of sewer cleaning materials, final inspection, perform leakage testing of the CIPP pipe liner, post-construction inspection, protection of existing utilities and adjacent property, and all required surface restoration work and traffic control, complete in place, as shown in Drawings and specified herein.

3.5 CLEANUP

A. Following inspection, clean up the entire project area. All excess material and debris, not incorporated into the permanent installation, shall be disposed of offsite by the Contractor at a site approved by the Owner/Engineer.

END OF SECTION

SECTION NO. 18

SPECIAL PROVISIONS – TXDOT NOTICE OF APPROVED INSTALLATION (NPI) APPROVAL

A copy of the permit will be provided at the time of Contract Award.