

**Specifications and
Contract Documents for
2013-2014 CDBG SANITARY SEWER
IMPROVEMENTS**



Galveston County WCID #1

Bid #B151028

HDR Job No. 15-020

August 2015



Kerry Lackey

HDR Engineering, Inc. | Texas Reg. No. F-00754

August 12, 2015

4635 SOUTHWEST FREEWAY, SUITE 1000
HOUSTON, TEXAS 77027
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SPECIFICATIONS AND CONTRACT DOCUMENTS

for

2013-2014 CDBG SANITARY SEWER IMPROVEMENT

in

GALVESTON COUNTY WC&ID No. 1

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2013-2014 CDBG Sanitary Sewer Improvement*

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**BIDDING
REQUIREMENTS**



ITB #B151028
OPEN: 09/17/2015
TIME: 2:00 P.M.

INVITATION TO BID

2013-2015 CDBG SANITARY SEWER IMPROVEMENT

GALVESTON COUNTY, TEXAS

Sealed bids in **sets of four (4), one (1) original and three (3) copies** will be received in the office of the County Purchasing Agent until **2:00 P.M. CST, on 09/17/2015** and opened immediately in that office in the presence of the Galveston County Auditor and the Purchasing Agent. Sealed bids are to be delivered to Rufus G. Crowder, CPPO CPPB, Galveston County Purchasing Agent at the Galveston County Courthouse, 722 Moody (21st Street), Floor 5, Purchasing, Galveston, Texas 77550, (409) 770-5372. **The time stamp clock located in the Purchasing Agent's office shall serve as the official time keeping piece for this solicitation process. Any bid received after 2:00 P.M. CST on the specified date will be returned unopened.**

Purpose:

Bids are invited for several items and quantities of work as follows:

- Rehabilitation of approximately 6,492 linear feet of 6-inch to 8-inch sanitary sewer by pipe bursting
- Service reconnections.
- New manhole construction.
- Cleaning & Television Inspection
- Add Alternate Bid: Rehabilitation of approximately 1,489 linear feet of 6-inch to 8-inch sanitary sewer by pipe bursting.

All proposals must be marked on the outside of the envelope:

ITB #B151028

2013-2014 CDBG Sanitary Sewer Improvement

Bidders name, return address, and the enclosed label should be prominently displayed on the bid package for identification purposes.

Copies of the bidding documents may be purchased from the office of the Engineer at 4635 Southwest Freeway, Suite 1000, Houston, Texas 77027 upon a **NON-REFUNDABLE** payment of **Ninety dollars (\$90.00)** for each set or provided **free of charge in electronic format** (PDF) on CD or DVD. Copies of Bid/Contract Documents may also be obtained from www.CivcastUSA.com search City of Galveston County WCID#1. Bidders must register on this website in order to view and/or download specifications and plans for this project. There is **NO** charge to view or download documents. If copies of the bidding documents are to be mailed, please contact HDR Engineering, Inc. for postage and handling. Return of documents is not required and no refund will be granted. Copies of Bid/Contract documents can also be viewed by visiting the Galveston County website @ <http://www.galvestoncountytexas.gov/pu/Pages/BidListing.aspx>.

Bid/Contract Documents, including Drawings and Technical Specifications are on file at:

HDR Engineering, Inc.
4635 Southwest Freeway, Suite 100
Houston, Texas 77092

F.W. Dodge Corporation
3131 East Side Street, Suite 300
Houston, Texas 77098

Associated General Contractors
3825 Dacoma
Houston, Texas 77092

Associated General Contractors
4100 Westheimer, Suite 227
Houston, Texas 77027

A **NON-MANDATORY** pre-bid meeting will be held at Galveston County Courthouse, 722 Moody, 5th Floor, Galveston, Texas 77550 on Wednesday, September 9, 2015 at 2:00 P.M.

Bid prices shall be either lump sum or unit prices as shown on the proposal sheet, if applicable. The net price will be delivered to Galveston County, including all freight, shipping, and license fees. Galveston County is tax exempt and no taxes should be included in your proposal pricing.

Upon satisfaction of contractual terms (e.g., goods delivered in promised condition, services rendered as agreed, etc.), contractor shall be paid via Galveston County's normal accounts payable process.

Bond Requirement:

A bid bond in the amount of five (5) percent of the bid issued by an acceptable surety shall be submitted with each bid. A certified check or bank draft payable to Galveston County or negotiable U.S. Government Bonds (as per value) may be submitted in lieu of the Bid Bond

Attention is called to the fact that not less than, the federally determined prevailing (Davis-Bacon and Related Acts) wage rate, as issued by the Office of Rural Community Affairs and contained in the contract documents, must be paid on this project. In addition, the successful bidder must ensure that employees and applicants for employment are not discriminated against because of race, color, religion, sex age or national origin.

The Galveston County Commissioners' Court reserves the right to waive any informality and to reject any and all bids and to accept the bid or bids which, in its opinion, is most advantageous to Galveston County with total respect the governing laws.

Bids may be held by HDR Engineering, Inc. for a period not to exceed 30 days from the date of the bid opening for the purpose of reviewing the bids and investigating the bidder's qualifications prior to the contract award.

(name) (contracting officer), (title) (date)

All contractors/subcontractors that are debarred, suspended or otherwise excluded from or ineligible for participation on federal assistance programs may not undertake any activity in part or in full under this project.

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

INSTRUCTION TO BIDDERS FOR CONSTRUCTION

1. Use of Separate Bid Forms

These contract documents include a complete set of bid and contract forms which are for the convenience of the bidders and are not to be detached from the contract document, completed or executed. Separate bid forms are provided for your use.

2. Interpretations or Addenda

No oral interpretations will be made to any bidder. Each request for an interpretation shall be made in writing to the locality or engineer no less than seven (7) days prior to the bid opening. Each interpretation made will be in the form of an Addendum to the contract documents and will be distributed to all parties holding contract documents no less than five (5) days prior to the bid opening. It is, however, the bidder's responsibility to make inquiry as to any addenda issued. All such addenda shall become part of the contract documents and all bidders shall be bound by such addenda, whether or not received by the bidders.

3. Inspection of Site

Each bidder should visit the site of the proposed work and fully acquaint himself with the existing conditions there and should fully inform himself as to the facilities involved, the difficulties and restrictions attending the performance of the contract. The bidder should thoroughly examine and familiarize himself with the drawings, technical specifications and all other contract documents. The contractor by the execution of the contract shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site or acquaint himself with the conditions there existing. The city/county will be justified in rejecting any claim based on lack of inspection of the site prior to the bid.

4. Alternate bid items

No alternate bids or bid items will be considered unless they are specifically requested by the technical specifications.

5. Bids

- a. All bids must be submitted on the forms provided and are subject to all requirements of the Contract Documents, including the Drawings.
- b. All bids must be regular in every respect and no interlineation, excisions or special conditions may be made or included by the bidder.
- c. Bid documents, including the bid, the bid bond, and the statement of bidders' qualifications shall be sealed in an envelope and clearly labeled with the words "Bid Documents", the project number, name of bidder and the date and time of bid opening.
- d. The locality may consider as irregular any bid on which there is an alteration of or departure from the bid form and, at its option, may reject any irregular bid.
- e. If a contract is awarded, it will be awarded to a responsible bidder on the basis of the lowest/best bid and the selected alternate bid items, if any. The contract will require the completion of the work in accordance with the contract documents.

6. Bid Modifications Prior to Bid Opening

- a. Any bidder may modify his bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the locality prior to the closing time, and provided further, the locality is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition, subtractions or other modifications so that the final prices or terms will not be known by the locality until the sealed bid is open. If written confirmation is not received within two (2) days from the closing time, no consideration will be given to the telegraphic modification.
- b. Likewise, any bidder may modify a bid by submitting a supplemental bid in person prior to the scheduled closing time for receipt of bids. Such supplemental bid should mention only additions or subtractions to the original bid so as to not reveal the final prices or terms to the locality until the sealed bid is open.

7. Bid Bond

- a. A bid bond in the amount of 5% of the bid issued by an acceptable surety shall be submitted with each bid. A certified check or bank draft payable to the locality or negotiable U.S. Government Bonds (as par value) may be submitted in lieu of the Bid Bond.
- b. The bid bond or its comparable, will be returned to the bidder as soon as practical after the opening of the bids.

8. Statement of Bidders Qualifications

Each bidder shall submit on the form furnished for that purpose a statement of the bidder's qualifications. The locality shall have the right to take such steps as it deems necessary to determine the ability of the bidder to perform his obligations under the contract, and the bidder shall furnish the locality all such information and data for this purpose as it may request. The right is reserved to reject any bid where an investigation of the available data does not satisfy the locality that the bidder is qualified to carry out properly the terms of the contract.

9. Unit Price

The unit price for each of the several items in the bid shall include its pro rata share of overhead so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price bid represents the total bid. Any bid not conforming to this requirement may be rejected as informal. Special attention is drawn to this condition, as the unit prices will be used to determine the amount of any change orders resulting from an increase or decrease in quantities.

10. Corrections:

Erasures or other corrections in the bid must be noted over the signature of the bidder.

11. Time for Receiving Bids

Bids received prior to the advertised hour of opening shall be kept securely sealed. The officer appointed to open the bids shall decide when the specified time has arrived and no bid received thereafter will be considered; except that when a bid arrives by mail after the time fixed for opening, but before the reading of all other bids is completed, and it is shown to the satisfaction of the locality that the late arrival of the bid was solely due to delay in the mail for which the bidder was not responsible, such bid will be received and considered.

12. Opening of Bids

The locality shall, at the time and place fixed for the opening of bids, open each bid and publicly read it aloud, irrespective of any irregularities therein. Bidders and other interested individuals may be present.

13. Withdrawal of Bids

Bidder may withdraw the bid before the time fixed for the opening of bids, by communicating his purpose in writing to the locality. Upon receipt of such notice, the unopened bid will be returned to the bidder. The bid guaranty of any bidder withdrawing his bid will be returned promptly.

14. Award of Contract/Rejection of Bids

- a. The contract will be awarded to the responsive, responsible Bidder submitting the lowest/best bid. The bidder selected will be notified at the earliest possible date. The locality reserves the right to reject any or all bids and to waive any informality in bids received where such rejection or waiver is in its interest.
- b. The locality reserves the right to consider as unqualified to do the work any bidder who does not habitually perform with his own forces the major portions of the work involved in construction of the improvements embraced in this contract.

15. Execution of Agreement/Performance and Payment Bonds

- a. Performance and Payment Bonds, Requires all prime contractors which enter into a formal contract in excess of \$25,000 with the State, any department, board, agency, municipality, county, school district or any division or subdivision thereof, to obtain a Payment Bond in the amount of the contract before commencing with work and a performance bond for public works contracts in excess of \$100,000.
- b. The failure of the successful bidder to execute the agreement and supply the required bonds within ten (10) days after the prescribed forms are presented for signature, or within such extended period as the locality may grant, shall constitute a default and the locality may, at its option either award the contract to the next lowest responsible bidder, or re-advertise for bids. In either case, the locality may charge against the bidder the difference between the amount of the bid, and the amount for which a contract is subsequently executed irrespective of whether this difference exceeds the amount of the bid bond. If a more favorable bid is received through re-advertisement, the defaulting bidder shall have no claim against the locality for a refund.

16. Wages and Salaries

Attention is particularly called to the requirement of paying not less than the prevailing Davis Bacon Related Acts (DBRA) wage rates specified in the Contract Documents. These rates are minimums to be paid during the life of the contract. It is therefore the responsibility of the Bidder to inform themselves as to local labor conditions.

17. Equal Employment Opportunity

Attention is called to the requirements for ensuring that employees and applicants for employment are not discriminated against because of their race, color, creed, sex, or national origin.

18. Supplemental Pay Items and Minimum Unit Price Bid Items

Approximate quantity and a minimum unit price have been established for certain supplemental items and for certain base bid items shown in the bid proposal section. The Contractor may not bid a unit price less than the minimum value; however, he may increase the minimum unit price. If no entry is made in the spaces provided, the minimum unit prices shown shall apply. The supplemental pay items are included to facilitate payment for changes and alterations that may be required to complete work. The actual work as provided by the General and Special Conditions of the Agreement and Technical Specifications and as shown on Plans is described in Proposal items other than supplemental pay items. When work covered by supplemental items is requested by the Contractor and approved by Owner, payment will be based on the quantity actually constructed and unit prices bid in Proposal.

BID PROPOSAL
BID FOR UNIT PRICE CONTRACT

PLACE: _____
DATE: _____
PROJECT NO. _____

Proposal of

(Hereinafter called "Bidder")

TO: Galveston County, Texas
(Hereinafter called "OWNER")

The Bidder, in compliance with your invitation for bids for the construction of:

2013-2014 CDBG Sanitary Sewer Improvement
HDR Job No. 15-020
Bid #B151028

having carefully examined the plans, specifications, instructions to bidders, notice to bidders and all other related contract documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies and to construct the project in accordance with the plans, specifications and contract documents, within the time set forth therein and at the prices stated in Exhibit "A" attached hereto.

The Bidder binds himself, upon acceptance of his proposal, to execute a contract and any required bonds, according to the accompanying forms, for performing and completing the said work within the time stated and for the prices stated in Exhibit "A" of this proposal.

Bidder hereby agrees to commence the work on the above project on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within **150 consecutive calendar** days thereafter as stipulated in the specifications and other contract documents. Bidder hereby further agrees to pay to Owner as liquidated damages the sum of **\$400.00** for each consecutive calendar day in excess of the time set forth hereinabove for completion of this project, all as more fully set forth in the General Conditions of the contract documents.

The following unit prices are bid and shall be complete compensation as measured in place for all materials, labor, overhead, profits and any other cost that is necessary to complete the job to the Engineers specifications and satisfaction. It is also understood that the quantities shown are only an estimate of the work to be done. No re-negotiation of prices bid will be made for over runs or under runs of quantities.

Bidder understands and agrees that this bid proposal shall be completed and submitted in accordance with the General Instructions to Bidders.

Bidder understands that the Owner reserves the right to reject any or all bids, use deductible bid items and to waive any formality in the bidding.

Bidder agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the scheduled closing time for receiving bids.

Bidder acknowledges receipt of the following addenda:

The undersigned Bidder hereby declares that he has visited the site of the work and has carefully examined the plans, specifications and contract documents pertaining to the work covered by this bid, and he further agrees to commence work on or before the date specified in the written notice to proceed and to substantially complete the work on which he has bid, as provided in the contract documents.

Enclosed with this proposal is a cashier's check or certified check for _____ Dollars (\$_____) or a bid bond in the sum of _____ (\$_____), as which it is agreed shall be collected and retained by the Owner as liquidated damages in the event the proposal is accepted by the Owner and the undersigned fails to execute the necessary contract documents and the required bonds (if any) with the Owner within ten (10) days after the date of receipt of written notification of acceptance of said proposal; otherwise said check or bond shall be returned to the undersigned upon demand.

Unit Prices are to be shown in both Words and Figures. In case of Discrepancy, the amount shown in Words shall govern. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum there of will be resolved in favor of the correct sum.

The unit prices shall include all labor, materials, dewatering, shoring, removal, overhead, incidental costs, fees, profit, insurance, etc., to cover the finished work of the several kinds called for.

Bidder understands and agrees that the contract to be executed by Bidder shall be bound and include all contract documents made available to him for his inspection in accordance with the Notice to Bidders.

Bidder

By: _____
Signature

Type or Print:
Bidder's
Name: _____

(If Bidder is a Corporation)

Bidder's
Address: _____

Attest:

Secretary

(Corporate Seal)

Name of
Person Signing: _____

Office Held: _____

Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project

BID PROPOSAL
EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
<u>BASE BID ITEMS:</u>					
1	6,492	L.F.	Pipe burst exist. 6" and 8" sanitary sewers w/ 8.625" O.D. sanitary sewer, all depths, including external grout sealing at existing manholes, complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
2	88	EA.	4" and 6" service reconnections (by excavation), all depths, including installation of clean out at R.O.W. complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
3	1,760	L.F.	Additional length of service line (4" and 6"), all depths, complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
4	3	EA.	Install end of sanitary sewer main clean out (8" PVC), including box and cover, all depths, complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____

Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project

BID PROPOSAL
EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
<u>BASE BID ITEMS:</u>					
5	6	EA.	Install 4' precast manhole, including 32" hinged frame and cover, up to 8' deep, complete in place the sum of:		
			_____ Dollars &		
			_____ Cents	\$ _____	\$ _____
6	231	L.F.	Cleaning and television inspection of 6" to 8" sanitary sewer, complete in place, the sum of:		
			_____ Dollars &		
			_____ Cents	\$ _____	\$ _____
7	974	L.F.	Trench safety system, incl. installation, operation & removal, all types of soil, all depths, complete in place the sum of:		
			_____ Dollars &		
			_____ Cents	\$ _____	\$ _____
				(\$2.00)*	

*Dollar amounts in parentheses represent minimum unit bid prices as described in the General Instructions to Bidders.

TOTAL BASE BID ITEMS:

_____ Dollars &		
_____ Cents	\$ _____	

*Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project*

BID PROPOSAL

EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
<u>ADD ALTERNATE #1 BID ITEMS:</u>					
8	1,489	L.F.	Pipe burst exist. 6" and 8" sanitary sewers w/ 8.625" O.D. sanitary sewer, all depths, including external grout sealing at existing manholes, complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
9	28	EA.	4" and 6" service reconnections (by excavation), all depths, including installation of clean out at R.O.W. complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
10	560	L.F.	Additional length of service line (4" and 6"), all depths, complete in place, the sum of: _____ Dollars & _____ Cents	\$ _____	\$ _____
11	223	L.F.	Trench safety system, incl. installation, operation & removal, all types of soil, all depths, complete in place the sum of: _____ Dollars & _____ Cents	\$ _____ (\$2.00)*	\$ _____

*Dollar amounts in parentheses represent minimum unit bid prices as described in the General Instructions to Bidders.

TOTAL ADD ALTERNATE #1 ITEMS:

	Dollars &	
	Cents	\$ _____

*Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project*

BID PROPOSAL

EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
<u>SUPPLEMENTAL BID ITEMS:</u>					
12	1	E.A.	Obstruction removal (excavation), 0-10' deep, complete in place, the sum of: _____ Dollars & _____ Cents	\$ <u>(\$450.00)*</u>	\$ <u> </u>
13	20	L.F.	Extra length for obstruction removal (by excavation), all depths, complete in place, the sum of: _____ Dollars & _____ Cents	\$ <u>(\$100.00)*</u>	\$ <u> </u>
14	1	E.A.	Abandonment of service connection, all depths, complete in place, the sum of: _____ Dollars & _____ Cents	\$ <u>(\$70.00)*</u>	\$ <u> </u>
15	100	S.F.	Remove & replace exist. asphalt pavement, complete in place, the sum of: _____ Dollars & _____ Cents	\$ <u>(\$25.00)*</u>	\$ <u> </u>

Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project

BID PROPOSAL

EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
<u>SUPPLEMENTAL BID ITEMS:</u>					
16	100	S.F.	Remove & replace exist. concrete driveway, incl. reinforcement, complete in place, the sum of:		
			_____ Dollars &		
			_____ Cents	\$ _____	\$ _____
				(\$35.00)*	

*Dollar amounts in parentheses represent minimum unit bid prices as described in the General Instructions to Bidders.

TOTAL SUPPLEMENTAL BID ITEMS:

_____ Dollars &		
_____ Cents	\$ _____	

Galveston County WC&ID #1
2013-2014 CDBG Sanitary Sewer Improvement Project

BID PROPOSAL
EXHIBIT "A"

ITEM NO.	EST. QUAN.	UNIT	DESCRIPTION OF ITEM AND UNIT PRICES (IN WORDS AND NUMERALS)	UNIT PRICE	TOTAL AMOUNT
-------------	---------------	------	--	------------	--------------

BASE BID ITEMS:

_____ Dollars &
 _____ Cents \$ _____

ADD ALTERNATE #1 BID ITEMS:

_____ Dollars &
 _____ Cents \$ _____

SUPPLEMENTAL BID ITEMS:

_____ Dollars &
 _____ Cents \$ _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____
_____ as PRINCIPAL, and _____, as SURETY are held
and firmly bound unto _____ hereinafter called the "Local Public
Agency", in the penal sum of _____ Dollars, (\$_____),
lawful money of the United States, 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, firmly by
these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the
Accompanying Bid, dated _____, for _____

NOW, THEREFOR, if the Principal shall not withdraw said Bid within the period specified therein after
the opening of the same, or, if no period be specified, within thirty (30) days after the said opening, and
shall within the period specified therefor, or if no period be specified, within ten (10) days after the
prescribed forms are presented to him for signature, enter into a written contract with the Local Public
Agency in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties,
as may be required, for the faithful performance and proper fulfillment of such contract; or in the event of
the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give
such bond within the time specified, if the Principal shall pay the Local Public Agency the difference
between the amount specified in said Bid and the amount for which the local Public Agency may procure
the required work or supplies or both, if the latter be in excess of the former, then the above obligation
shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS THEREOF, the above-bounded parties have executed this instrument under their several
seals this _____ day of _____, the name and corporate seal of each corporate
party being hereto affixed and these present signed by its undersigned representative, pursuant to
authority of its governing body.

(SEAL)

(SEAL)

Attest:

By: _____

Affix
Corporate
Seal

Attest:

By: _____

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

Affix
Corporate
Seal

Attest:

By: _____

Countersigned

By _____

* Attorney-in-Fact, State of _____

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____, Secretary of the Corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to, for and in behalf of said corporation by authority of this governing body.

Corporate
Seal

Title: _____

* Power-of-attorney for person signing for surety company must be attached to bond.

CONTRACT

FORMS

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____ (Name of Contractor or Company)

_____ (Address)

a _____ hereinafter called Principal, and

_____ (Name of Surety Company)

_____ (Address)

hereinafter called Surety, are held and firmly bound unto

_____ (Name of Recipient)

_____ (Recipient's Address)

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

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, a copy of which is hereto attached and made a part hereof for the construction of:

2013-2014 CDBG Sanitary Sewer Improvement

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties in all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor or Company)

(Address)

a _____, hereinafter called Principal,
(Corporation / Partnership)

and _____
(Name of Surety Company)

(Address)

hereinafter called Surety, are held and firmly bound unto

(Name of Recipient)

(Recipient's Address)

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

THE CONFIDENTIALITY OF THIS OBLIGATION is such that whereas, the Principal entered into a
certain contract with the OWNER, dated the _____ day of _____,
a copy of which is hereto attached and made a part hereof for the construction of:

2013-2014 CDBG Sanitary Sewer Improvement

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUB-
CONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the
WORK provided for in such contract, and any authorized extension or modification thereof, including all
amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools,
consumed or used in connection with the construction of such WORK, and all insurance premiums on said
WORK, and for all labor, performed in such WORK whether by SUB-CONTRACTOR or otherwise, then
this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change,
extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder
or the SPECIFICATIONS accompanying the same shall in any 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 or to the SPECIFICATIONS.

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

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

IN WITNESS WHEREOF, this instrument is executed in _____ counter-parts, each on of
(Number)
which shall be deemed an original, this the _____ day of _____.

ATTEST: _____
(Principal)

(Principal Secretary) By _____ (s)

(SEAL)

(Witness as to Principal) (Address)

(Address)

ATTEST: _____
(Surety)

(Witness as to Surety) By _____
(Attorney in Fact)

(Address) (Address)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

**STANDARD FORM OF AGREEMENT
FOR OWNER-CONTRACTOR PROJECTS**

STATE of TEXAS }

COUNTY of GALVESTON }

THIS AGREEMENT, made and entered into this ____ day of _____, A.D. 201____, by and between Galveston County of the COUNTY of GALVESTON and STATE OF TEXAS, thereunto duly authorized so to do, Party of the First Part, hereinafter termed OWNER, and _____, of the City of _____ County of _____ and the State of Texas, Party of the Second Part, hereinafter termed CONTRACTOR.

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

2013-2014 CDBG Sanitary Sewer Improvement

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

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

The CONTRACTOR hereby agrees to commence work within ten (10) calendar days after the date written notice to do so shall have been given to him, and to substantially complete with **150 consecutive calendar days** after issuance of the “Notice to Proceed” and to be at Final Completion within **180 consecutive calendar days** after the issuance of the “Notice to Proceed”, subject to such extensions of time as are provided by the General and Special Conditions.

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

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

Galveston County
Party of the First Part (OWNER)

By: _____

ATTEST:

Party of the Second Part (CONTRACTOR)

By: _____

ATTEST:

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of person doing business with local governmental entity.

2

Check this box if you are filing an update to a previously filed questionnaire.

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 Describe each affiliation or business relationship with an employee or contractor of the local governmental entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.

4 Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity

FORM CIQ

Page 2

5 Name of local government officer with whom filer has affiliation or business relationship. (Complete this section only if the answer to A, B, or C is YES.)

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or business relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

Yes No

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity?

Yes No

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

Yes No

D. Describe each affiliation or business relationship.

6 Describe any other affiliation or business relationship that might cause a conflict of interest.

7

Signature of person doing business with the governmental entity

Date

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

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

IN WITNESS THEREOF, the said Contractor and Surety have signed and sealed this instrument on the _____ day of _____, 20____, and have attached current Power of Attorney.

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

(Name of Contractor)

By: _____
Name:
Title:

By: _____
Name:
Title:

ATTEST/ SURETY WITNESS: (SEAL)

(Full Name of Surety)

(Address of Surety for Notice)

(Telephone Number of Surety)

By: _____
Name:
Title:

By: _____
Name:
Title:

Insert Contractors Insurance

**CONDITIONS
OF THE
CONTRACT**

GENERAL CONTRACT CONDITIONS FOR CONSTRUCTION

1. Contract and Contract Documents

- (a) The project to be constructed pursuant to this contract will be financed with assistance from the CDBG and is subject to all applicable Federal and State laws and regulations.
- (b) The Plans, Specifications and Addenda, hereinafter enumerated in Paragraph 1 of the Supplemental General Conditions shall form part of this contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth.

2. Definitions

Whenever used in any of the contract Documents, the following meanings shall be given to the terms here in defined:

- (a) The term "Contract" means the Contract executed between Galveston County, hereinafter called the Locality and _____, hereinafter called Contractor, of which these GENERAL CONDITIONS, form a part.
- (b) The term "Project Area" means the area within which are the specified Contract limits of the Improvements contemplated to be constructed in whole or in part under this contract.
- (c) The term "Engineer" means HDR Engineering, Inc., Engineer in charge, serving the Locality with architectural or engineering services, his successor, or any other person or persons, employed by the Locality for the purpose of directing or having in charge the work embraced in this Contract.
- (d) The term "Contract Documents" means and shall include the following: Executed Contract, Addenda (if any), Invitation for Bids, Instructions to Bidders, Signed Copy of Bid, General Conditions, Special Conditions, Technical Specifications, and Drawings (as listed in the Schedule of Drawings).

3. Supervision By Contractor

- (a) Except where the Contractor is an individual and gives his personal supervision to the work, the Contractor shall provide a competent superintendent, satisfactory to the Local Public Agency and the Engineer, on the work at all times during working hours with full authority to act for him. The Contractor shall also provide an adequate staff for the proper coordination and expediting of his work.
- (b) The Contractor shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.

4. Subcontracts

- (a) The Contractor shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has verified the subcontractor as eligible to participate in federally funded contracts.
- (b) No proposed subcontractor shall be disapproved by the city/county except for cause.

- (c) The Contractor shall be as fully responsible to the city/county for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.
- (d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work and required compliance by each subcontractor with the applicable provisions of the Contract.
- (e) Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Locality.

5. Fitting and Coordination of Work

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or material suppliers engaged upon this Contract.

6. Payments to Contractor

(a) Partial Payments

- 1) The Contractor shall prepare his requisition for partial payment as of the last day of the month and submit it, with the required number of copies, to the Engineer for his approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) ten percent (10%) of the total amount, to be retained until final payment and (2) the amount of all previous payments. The total value of work completed to date shall be based on the estimated quantities of work completed and on the unit prices contained in the agreement. The value of materials properly stored on the site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for inspection of the Engineer.
- 2) Monthly or partial payments made by the Locality to the Contractor are moneys advanced for the purpose of assisting the contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Locality. Such payments shall not constitute a waiver of the right of the Locality to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Locality in all details.

(b) Final Payment

- 1) After final inspection and acceptance by the Locality of all work under the Contract, the Contractor shall prepare his requisition for final payment which shall be based upon the careful inspection of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the Contractor under this contract shall be the amount computed as described above less all previous payments.
- 2) The Locality before paying the final estimate, shall require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the Locality deems it necessary in order to protect its interest. The Locality may, if it deems such action advisable, make payment in part or in full to the Contractor without requiring the furnishing of such releases or receipts and any payments made shall in no way impair the obligations of any surety or sureties furnished under this Contract.

- 3) Any amount due the Locality under Liquidated Damages, shall be deducted from the final payment due the contractor.

(c) Payments Subject to Submission of Certificates

Each payment to the Contractor by the Locality shall be made subject to submission by the Contractor of all written certifications required of him and his subcontractors.

(d) Withholding Payments

The Locality may withhold from any payment due the Contractor whatever is deemed necessary to protect the Locality, and if so elects, may also withhold any amounts due from the Contractor to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the Locality and will not require the Locality to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any moneys for their protection unless the Locality elects to do so. The failure or refusal of the Locality to withhold any moneys from the Contractor shall in no way impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

7. Changes in the Work

- (a) The Locality may make changes in the scope of work required to be performed by the Contractor under the Contract without relieving or releasing the Contractor from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless it is expressly provided otherwise. Additionally, all such change orders must be approved by the CDBG staff prior to execution of same.
- (b) Except for the purpose of affording protection against any emergency endangering health, life, limb or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the improvements or supply additional labor, services or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the Locality authorizing the Contractor to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.
- (c) If applicable unit prices are contained in the Agreement, the Locality may order the Contractor to proceed with desired unit prices specified in the Contract; provided that in case of a unit price contract the net value of all changes does not increase the original total amount of the agreement by more than twenty-five percent (25%) or decrease the original the total amount by eighteen percent (18%).
- (d) Each change order shall include in its final form:
 - 1) A detailed description of the change in the work.
 - 2) The Contractor's proposal (if any) or a confirmed copy thereof.
 - 3) A definite statement as to the resulting change in the contract price and/or time.
 - 4) The statement that all work involved in the change shall be performed in accordance with contract requirements except as modified by the change order.

5) The procedures as outlined in this Section for a unit price contract also apply in any lump sum contract.

8. Claims for Extra Cost

- (a) If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the Locality, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.
- (b) Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.
- (c) Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall be reported at once to the Locality and work shall not proceed except at the Contractor's risk, until written instructions have been received by him from the Locality.
- (d) If, on the basis of the available evidence, the Locality determines that an adjustment of the Contract Price and/or time is justifiable, a change order shall be executed.

9. Termination, Delays, and Liquidated Damages

- (a) Right of the Locality to Terminate Contract.
- (b) In the event that any of the provisions of this contract are violated by the Contractor, or by any of his subcontractors, the Locality may serve written notice upon the Contractor and the Surety of its intention to terminate the contract. The notices shall contain the reasons for such intention to terminate the contract, and unless such violation or delay shall cease and satisfactory arrangement of correction be made within ten days, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the Locality shall immediately serve notice thereof upon the Surety and the Contractor. The Surety shall have the right to take over and perform the contract. Provided, however, that if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such Surety of notice of termination, the Locality may take over the work and complete the project by bid/contract or by force account at the expense of the Contractor and his Surety shall be liable to the Locality for any excess cost incurred. In such event the Locality may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.
- (c) Liquidated Damages for Delays.
- (d) If the work is not completed within the time stipulated in the applicable bid for Lump Sum or Unit Price Contract provided, the Contractor shall pay to the Locality as fixed, agreed, and liquidated damages (it being impossible to determine the actual damages occasioned by the delay) the amount of **\$400.00** for each calendar day of delay, until the work is completed. The Contractor and his sureties shall be liable to the Locality for the amount thereof.

(e) Excusable Delays.

- 1) The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due to:
- 2) Any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, national defense, or any other national emergency;
- 3) Any acts of the Locality;
- 4) Causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God or of the public enemy, acts of another Contractor in the performance of some other contract with the Locality, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and weather of unusual severity such as hurricanes, tornadoes, cyclones and other extreme weather conditions.
- 5) Provided, however, that the Contractor promptly notifies the Locality within ten (10) days in writing of the cause of the delay. Upon receipt of such notification, the Locality shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract, the delay is properly excusable, the Locality shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

10. Assignment or Novation

The Contractor shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the Locality; provided, however, that assignments to banks or other financial institutions may be made without the consent of the Locality. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, or equipment.

11. Disputes

- (a) All disputes arising under this Contract or its interpretation except those disputes covered by FEDERAL LABOR STANDARDS PROVISIONS whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10) days of commencement of the dispute, be presented by the Contractor to the Locality for decision. Any claim not presented within the time limit specified in this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt of the Locality.
- (b) The Contractor shall submit in detail his claim and his proof thereof.
- (c) If the Contractor does not agree with any decision of the Locality, he shall in no case allow the dispute to delay the work but shall notify the Locality promptly that he is proceeding with the work under protest.

12. Technical Specifications and Drawings

Anything mentioned in the Technical Specifications and not shown on the Drawings or vice versa, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Locality, without whose decision, said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

13. Shop Drawings

- (a) All required shop drawings, machinery details, layout drawings, etc. shall be submitted to the Engineer in **5** copies for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The Contractor may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said shop drawings, etc. until they are approved and no claim, by the Contractor, for extension of the contract time shall be granted by reason of his failure in this respect.
- (b) Any drawings submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment of contract price and/or time, otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.
- (c) If a shop drawing is in accordance with the contract or involves only a minor adjustment in the interest of the Locality not involving a change in contract price or time; the engineer may approve the drawing. The approval shall not relieve the Contractor from his responsibility for adherence to the contract or for any error in the drawing.

14. Requests for Supplementary Information

It shall be the responsibility of the Contractor to make timely requests of the Locality for any additional information not already in his possession which should be furnished by the Locality under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted from time to time as the need approaches, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Each request shall be in writing, and list the various items and the latest date by which each will be required by the Contractor. The first list shall be submitted within two weeks after Contract award and shall be as complete as possible at that time. The Contractor shall, if requested, furnish promptly any assistance and information the Engineer may require in responding to these requests of the Contractor. The Contractor shall be fully responsible for any delay in his work or to others arising from his failure to comply fully with the provision of this section.

15. Materials and Workmanship

- (a) Unless otherwise specifically provided for in the technical specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the technical specifications as "equal to" any particular standard, the Engineer shall decide the question of equality.
- (b) The Contractor shall furnish to the Locality for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full

information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval full information concerning all other materials or articles which he proposes to incorporate.

- (c) Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.
- (d) Materials specified by reference to the number or symbol of a specific standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids, except as limited to type, class or grade, or modified in the technical specifications shall have full force and effect as though printed therein.
- (e) The Locality may require the Contractor to dismiss from the work such employee or employees as the Locality or the Engineer may deem incompetent, or careless, or insubordinate.

16. Samples, Certificates and Tests

- (a) The Contractor shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the contract documents or required by the Engineer, promptly after award of the contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.
- (b) Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Engineer in making a prompt decision regarding the acceptability of the sample. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.
- (c) Approval of any materials shall be general only and shall not constitute a waiver of the Locality's right to demand full compliance with Contract requirements. After actual deliveries, the Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Engineer will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.
- (d) Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
 - 1) The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the Engineer;
 - 2) The Contractor shall assume all costs of re-testing materials which fail to meet contract requirements;
 - 3) The Contractor shall assume all costs of testing materials offered in substitution for those found deficient;
 - 4) The Locality will pay all other expenses.

17. Permits and Codes

- (a) The Contractor shall give all notices required by and comply with all applicable laws, ordinances, and codes of the Local Government. All construction work and/or utility installations shall comply with all applicable ordinances, and codes including all written waivers. Before installing any work, the Contractor shall examine the drawings and technical specifications for compliance with applicable ordinances and codes and shall immediately report any discrepancy to the Locality. Where the requirements of the drawings and technical specifications fail to comply with such applicable ordinances or codes, the Locality will adjust the Contract by Change Order to conform to such ordinances or codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price or stipulated unit prices.
- (b) Should the Contractor fail to observe the foregoing provisions and proceed with the construction and/or install any utility at variance with any applicable ordinance or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the drawings and technical specifications), the Contractor shall remove such work without cost to the Locality.
- (c) The Contractor shall at his own expense, secure and pay for all permits for street pavement, sidewalks, shed, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.
- (d) The Contractor shall comply with applicable local laws and ordinances governing the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements contained in this Contract.
- (e) The Contractor will be required to make arrangements for and pay the water, electrical power, or any other utilities required during construction.
- (f) During construction of this project, the Contractor shall use every means possible to control the amount of dust created by construction. Prior to the close of a day's work, the Contractor, if directed by the Locality, shall moisten the bank and surrounding area to prevent a dusty condition.

18. Care of Work

- (a) The Contractor shall be responsible for all damages to person or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.
- (b) The Contractor shall provide sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.
- (c) In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the Locality is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the Locality.
- (d) The Contractor shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.

- (e) The Contractor shall shore up, brace, underpin, secure, and protect as maybe necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the improvements included in this Contract. The Contractor shall be responsible for the giving of any and all required notices to any adjoining or adjacent property owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the Locality from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Locality may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

19. Accident Prevention

- (a) No laborer or mechanic employed in the performance of this Contract shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety as determined under construction safety and health standards promulgated by the Secretary of Labor.
- (b) The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work.
- (c) The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Locality with reports concerning these matters.
- (d) The Contractor shall indemnify and save harmless the Locality from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this contract.
- (e) The Contractor shall provide trench safety for all excavations more than five feet deep prior to excavation. All OSHA Standards for trench safety must be adhered to by the Contractor.
- (f) The contractor shall at all times conduct his work in such a manner as to insure the least possible inconvenience to vehicular and pedestrian traffic. At the close of the work each day, all streets where possible in the opinion of the Locality, shall be opened to the public in order that persons living in the area may have access to their homes or businesses by the use of the streets. Barricades, warning signs, and necessary lighting shall be provided to the satisfaction of the Locality at the expense of the Contractor.

20. Sanitary Facilities

The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

21. Use of Premises

- (a) The Contractor shall confine his equipment, storage of materials, and construction operations to the contract limits as shown on the drawings and as prescribed by ordinances or permits, or as may be desired

by the Locality, and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.

- (b) The Contractor shall comply with all reasonable instructions of the Locality and all existing state and local regulations regarding signs, advertising, traffic, fires, explosives, danger signals, and barricades.

22. Removal of Debris, Cleaning, Etc.

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for work, and put the whole site of the work and public rights of way in a neat and clean condition.

23. Inspection

- (a) All materials and workmanship shall be subject to inspection, examination, or test by the Locality and Engineer at any and all times during manufacture or construction and at any and all places where such manufacture or construction occurs. The Locality shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge. If the Contractor fails to proceed at once with the correction of rejected workmanship or defective material, the Locality may by contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any Monies which may be due the Contractor, without prejudice to any other rights or remedies of the Locality.
- (b) The Contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. All tests by the Locality will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the technical specifications.
- (c) The Contractor shall notify the Locality sufficiently in advance of back filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Locality, the Contractor shall uncover for inspection and recover such facilities at his own expense, when so requested by the Locality.
- (d) Should it be considered necessary or advisable by the Locality at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or his subcontractors, the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- (e) Inspection of materials and appurtenances to be incorporated in the improvements included in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the technical specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.

- (f) Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the Locality or its agents shall relieve the Contractor or his sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

24. Review by Locality

The Locality and its authorized representatives and agents shall have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however that all instructions and approval with respect to the work will be given to the Contractor only by the Locality through its authorized representatives or agents.

25. Final Inspection

When the Improvements included in this Contract are substantially completed, the Contractor shall notify the Locality in writing that the work will be ready for final inspection on a definite date which shall be stated in the notice. The Locality will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable.

26. Deduction for Uncorrected Work

If the Locality deems it not expedient to require the Contractor to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the Contractor and the Locality and subject to settlement, in case of dispute, as herein provided.

27. Insurance

The Contractor shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Locality.

- (a) **Compensation Insurance:** The Contractor shall procure and shall maintain during the life of this contract Worker's Compensation Insurance as required by the State of Texas for all of his employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for all of the employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Worker's Compensation Insurance.

- (b) **Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance:** The Contractor shall procure and shall maintain during the life of this contract Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the following amounts:

- (1.) Comprehensive General Liability: Comprehensive General Liability (including Premises/Operations; Independent CONTRACTORS; Products and Completed Operations; Broad Form Property Damage; Blanket Contractual):

A. **Bodily Injury and Property Damage:**

General Aggregate Limits: \$1,000,000

30. Compliance with Air and Water Acts

- (a) In compliance with the Clean Air Act, as amended, 41 U.S.C. Sec. 7401 et. seq., and the regulations of the Environmental Protection Agency with respect thereto, the Contractor agrees that:
 - 1) Any facility to be utilized in the performance of this contract or any subcontract shall not be a facility listed on the EPA List of Violating Facilities pursuant to 40 CFR 15.20.
 - 2) He will comply with all requirements of Section 114 of the Clean Air Act, as amended.
 - 3) Materials utilized in the project shall be free of any hazardous materials, except as may be specifically provided for in the specifications.
- (b) If the Contractor encounters existing material on sites owned or controlled by the Locality or in material sources that are suspected by visual observation or smell to contain hazardous materials, the Contractor shall immediately notify the Engineer and the Locality. The Locality will be responsible for testing for and removal or disposition of hazardous materials on sites owned or controlled by the Locality. The Locality may suspend the work, wholly or in part during the testing, removal or disposition of hazardous materials on sites owned or controlled by the Locality.

31. Equal Employment Opportunity

- (a) The Contractor will not discriminate against any employee or the applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the owner.
- (b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- (c) The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this contract so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.
- (d) The Contractor shall take affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions.
- (e) Contractors are encouraged to participate in voluntary associations which assist in fulfilling their affirmative action obligations.
- (f) The Contractor is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority.
- (g) The Contractor shall not use the affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

- (h) The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts.
- (i) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents.

32. Affirmative Action for Handicapped Workers

The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, promotion, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

33. Section 109 of the Housing and Community Development Act of 1974

No person in the United States shall on the ground of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

34. The Provision of Local Training, Employment, and Business Opportunities

- (a) To the greatest extent feasible opportunities for training and employment be given lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.
- (b) The Contractor will include this clause in every subcontract for work in connection with the project.

35. Non Segregated Facilities

The Contractor certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments, or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise.

36. Job Offices

- (a) The Contractor and his subcontractors may maintain such office and storage facilities on the site as are necessary for the proper conduct of the work. These shall be located so as to cause no interference to any work to be performed on the site. The Locality shall be consulted with regard to locations.
- (b) Upon completion of the improvements, or as directed by the Locality, the Contractors shall remove all such temporary structures and facilities from the site, and leave the site of the work in the condition required by the Contract.

37. Partial Use of Site Improvements

The Locality may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the technical specifications and if in its opinion, each such section is reasonably safe, fit, and convenient for the use and accommodation for which it was intended, provided:

- (a) The use of such sections of the Improvements shall in no way impede the completion of the remainder of the work by the Contractor.
- (b) The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.
- (c) The period of guarantee stipulated in the Section 132 hereof shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

38. Contract Documents and Drawings

The Local Public Agency will furnish the Contractor without charge (3) copies of the Contract Documents, including Technical Specifications and Drawings. Additional copies requested by the Contractor will be furnished at cost.

39. Contract Period

The work to be performed under this contract shall commence within the time stipulated by the Locality in the Notice to Proceed, and shall be fully completed within **120 calendar days** thereafter.

40. Liquidated Damages

Since the actual damages for any delay in completion of the work under this contract are impossible to determine, the Contractor and his Sureties shall be liable for and shall pay to the Locality the sum of **Four-hundred Dollars (\$400.00)** as fixed, agreed and liquidated damages for each calendar day of delay from the above stipulated time for completion.

ATTACHMENT NO. 1 TO GENERAL CONDITIONS

WORKERS' COMPENSATION INSURANCE COVERAGE

A. 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 persons or entities performing 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 services 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.

- B. 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 employees of the CONTRACTOR providing services on the project for the duration of the project.
- C. The CONTRACTOR must provide a certificate of coverage to the Owner prior to being awarded the contract.
- D. 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.
- E. The CONTRACTOR shall obtain from each person providing services on a project, and provide to the governmental entity:
 - (1) 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

- (2) no later than seven 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.

- F. The CONTRACTOR shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

- G. The CONTRACTOR shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the CONTRACTOR knew or should have known, of any changes that materially affects the provision of coverage of any person providing services on the project.

- H. The CONTRACTOR shall post on each project site a notice, in the text, form and manner prescribed by the Texas Worker's 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.

**NOTICE
REQUIRED WORKER'S COMPENSATION COVERAGE**

“The law requires that each person working on this site or providing services related to this construction project must be covered by worker's compensation insurance. This includes persons providing, hauling, or delivering equipment or materials, or providing labor or transportation or other service related to the project, regardless of the identify of their employer or status as an employee.”

“Call the Texas Worker's Compensation Commission at (512) 440-3789 to receive information on the legal requirements for coverage, to verify whether your employer has provided the required coverage, or to report an employer's failure to provide coverage.”

- I. The CONTRACTOR shall contractually require each person with whom it contracts to provide services on a project, to:
 - 1. 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;

 - 2. 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:

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3. 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;
 4. obtain from each other person with whom it contracts, and provide to the CONTRACTOR:
 - a. a certificate of coverage, prior to the other person beginning work on the project; and
 - b. a new certificate of coverage shown 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;
 5. retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
 6. notify the governmental entity in writing by certified mail or personal delivery, within 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
 7. contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.
- J. 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 worker's compensation coverage for the duration of the project, that the coverage agreements 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.
- K. 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 CONTRACTOR void if the CONTRACTOR does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

ATTACHMENT NO. 2 TO GENERAL CONDITIONS

**AGREEMENT FOR FINAL PAYMENT
AND CONTRACTOR'S SWORN RELEASE**

In order to insure that the rights, obligations and responsibilities of all parties to the original contract document are fully protected, which contract document was signed and executed on the day of _____, 20__ by _____, referred to therein as CONTRACTOR and hereinafter referred to as CONTRACTOR, and the OWNER on the _____ day of _____, 20____, and further in consideration for the final payment of all sums due and claimed by the CONTRACTOR against the OWNER, the CONTRACTOR makes the following representations to the OWNER, either individually if a proprietorship, jointly by all partners if a partnership, or if a corporation, by action of the president and secretary of said corporation, as duly authorized by appropriate action of the stockholders and/or board of directors of said corporation, their signatures hereon constituting a representation under oath by said individuals that they have the power and authority to execute this Agreement for and on behalf of the said corporation:

I.

The CONTRACTOR has received _____ (number) payments pursuant to _____ (number) of CONTRACTOR Payment Estimates, copies of which are attached hereto and marked Exhibit "A", presented to the OWNER and paid during the progress of the job referred to in the Contract between the parties; and in this regard, the undersigned CONTRACTOR represents to the OWNER that it does not claim nor intend to claim at any future date, any additional sums of money of any nature whatsoever under and by virtue of the payment estimates previously submitted to the Professional for approval, or any other sums of money of any nature whatsoever for materials furnished and used in the job or for work done, and hereby releases and discharges the OWNER

from any liabilities of any nature whatsoever, for any claims of any nature made by the CONTRACTOR at some future date, or by its successors or assigns.

II.

The undersigned CONTRACTOR further represents to the OWNER that the Final Payment Estimate, reflecting all associated Change Orders, if any, submitted by the CONTRACTOR to the OWNER, whether or not modified, corrected or changed in some way by deletions or other modifications by the Professional, the CONTRACTOR or the OWNER, a copy of which is attached hereto and marked Exhibit "B", is true, correct and accurate; and it is further agreed and stipulated by the undersigned CONTRACTOR that upon the receipt of final payment in the amount as set out on the Final Payment Estimate, the CONTRACTOR, by execution of this instrument of release, does, therefore, release and forever discharge the OWNER of and from all manner of debts, demands, obligations, suits, liabilities and causes of action of any nature whatsoever under and by virtue of the terms and provisions of the Contract hereinbefore referred to, and any change or modification thereof, or in any manner growing out of or arising from or by virtue of the work, labor and services performed by the CONTRACTOR.

III.

CONTRACTOR, in addition to the provisions set out in the contract document, agrees to indemnify and hold the OWNER harmless from any and all causes of action, claims, demands or suits made by any person or other entity against the OWNER, by reason of the work performed by such CONTRACTOR, and agrees to defend or to cause the same to be defended at the CONTRACTOR's sole expense and obligation, whenever such actions may be brought, and further to pay all costs incurred by the OWNER in the defense thereof, including administrative costs and attorney's fees, and further to pay any judgments or settlements which may be entered into or agreed

to against or for the benefit of the OWNER. It is, however, specifically agreed that the OWNER shall not enter into any settlement agreements without the acquiescence and agreement of the CONTRACTOR.

IV.

The CONTRACTOR, acting by and through the person or persons whose names are subscribed hereto, does solemnly swear and affirm that all bills and claims have been paid to all materialmen, suppliers, laborers, subcontractors, or other entities performing services or supplying materials, and that the OWNER shall not be subject to any bills, claims, demands, litigation or suits in connection therewith.

V.

It is further specifically understood and agreed that this Agreement for Final Payment and Contractor's Sworn Release shall constitute a part of the original Contract of the parties heretofore previously referred to, and it is also specifically understood and agreed that this Agreement shall not act as a modification, waiver or renunciation by the OWNER of any of its rights or remedies as set out in the contract itself, but this Agreement for Final Payment and Contractor's Sworn Release shall constitute a supplement thereto for the additional protection of the OWNER.

VI.

This Agreement for Final Payment and Contractor's Sworn Release shall be considered to be continuing and binding upon the parties hereto and shall not terminate upon receipt and acceptance by the CONTRACTOR of final payment, but shall be deemed continuing so long as any actions, claims or other demands contemplated herein against the OWNER, may lawfully be brought under applicable statutes of limitations, and shall in addition be deemed to be continuing for such

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additional period of time as shall be necessary to compensate and repay to the OWNER, all costs or damages incurred by it by reason of such claims.

SIGNED and EXECUTED this, the ____ day of _____, 20__.

Signature

Print Name: _____

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[If CONTRACTOR is a proprietorship, OWNER must sign; if a partnership, each partner must sign; if a corporation, the following language should be used.]

SIGNED and EXECUTED this, the _____ day of _____, 20____, by
_____, a Texas corporation, under authority
granted to the undersigned by said corporation as contained in the Charter, By-Laws or Minutes of a
meeting of said corporation regularly called and held.

CONTRACTOR

By: _____
President

ATTEST:

Corporate Secretary
(Corporate Seal)

[This form is for use by either a proprietorship or a partnership. In the event CONTRACTOR is a partnership or a joint proprietorship, additional signature lines should be added for each individual.]

AFFIDAVIT

STATE OF TEXAS

COUNTY OF GALVESTON

BEFORE ME, the undersigned authority, on this day personally appeared the person or persons whose name(s) are subscribed to the above and foregoing Agreement for Final Payment and Contractor's Sworn Release, who each, after being by me duly sworn, on their oaths deposed and said:

I(We) am(are) the person(s) who signed and executed the above and foregoing Agreement for Final Payment and Contractor's Sworn Release, and I(we) have read the facts and statements as therein set out and the representations as made therein, and I(we) state that the above and foregoing are true and correct.

CONTRACTOR - Affiant

SWORN TO AND SUBSCRIBED TO before me this, the _____ day of _____, 20__.

Notary Public, State of Texas

My Commission Expires: _____

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[This form is for use in the event CONTRACTOR is a corporation.]

AFFIDAVIT

STATE OF TEXAS

COUNTY OF GALVESTON

BEFORE ME, the undersigned authority, on this day personally appeared the persons who signed and executed the above and foregoing Agreement for Final Payment and Contractor's Sworn Release, whose names are set out above, who each, after being by me duly sworn, on their oaths deposed and said:

We each are the persons whose names are subscribed above, and hold respectively the offices in the corporation as set out above, and each state under oath that we have the authority to execute this Agreement for Final Payment and Contractor's Sworn Release for and on behalf of said corporation, pursuant to authority granted to us in the Charter of said corporation, the By-Laws of said corporation and/or the Minutes of said corporation; and the facts, statements and representations as set out in the instrument to which this Affidavit is attached, are true and correct.

SWORN TO AND SUBSCRIBED TO before me this, the ____ day of _____, 20__.

Notary Public, State of Texas

My Commission Expires: _____

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STATE OF _____

COUNTY OF _____

**SUBCONTRACTOR/MATERIALMAN'S
FULL AND FINAL
RELEASE AND WAIVER OF CLAIMS AND LIENS**

For consideration in hand paid, _____, (Company) does hereby certify and acknowledge that Company has been fully paid for all work and labor done by it, and for materials supplied by it, to date on that certain project described as follows:

Contractor:

Project Description:

Obligee:

Amount:

Company does hereby waive all rights, claims and liens which it may have, or be entitled including statutory and constitutional liens on such project for such work and labor done and material supplied by it to date, or arising out of such transactions.

Company hereby releases in full all claims and liens it has heretofore filed on such property for such work including labor and material.

Executed this _____ day of _____, 20____.

By: _____

STATE OF _____

COUNTY OF _____

BEFORE ME, the undersigned, a Notary Public in and for said County, _____ on this day personally appeared _____ Known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said _____, a corporation, and that he executed the same as the act of such corporation for the purposes and consideration therein expressed and in the capacity therein stated.

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

Notary Public

**CONSENT OF
SURETY COMPANY
TO FINAL PAYMENT**

**Conforms with the American Institute
of Architects, AIA Document G707**

Owner
Architect
Contractor
Surety
Other

PROJECT:
(Name, address)

TO (Owner)

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(here insert name and address of Surety Company)

on bond of (here insert name and address of Contractor)

, SURETY COMPANY

CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve
the Surety Company of any of its obligations to (here insert name and address of Owner)

, OWNER,

as set forth in the said Surety Company's bond.

IN WITNESS, WHEREOF,
the Surety Company has hereunto set its hand this _____ day of _____

Surety Company

Attest:
(Seal):

Signature of Authorized Representative

Title

NOTE: This form is to be used as a companion document to AIA DOCUMENT G706, CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS,
Current Edition

**ATTACHMENT 3
WAGE RATES**

General Decision Number: TX150094 08/21/2015 TX94

Superseded General Decision Number: TX20140094

State: Texas

Construction Type: Heavy

County: Galveston County in Texas.

HEAVY CONSTRUCTION PROJECTS Including Water and Sewer Lines
(Does Not Include Flood Control)

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is 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 \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	08/21/2015

* SFTX0669-001 04/01/2015

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	\$ 27.43	17.12

SUTX2005-021 08/05/2005

HEAVY Including Water and Sewer Lines (Excluding Flood Control)

	Rates	Fringes
Carpenter.....	\$ 14.38	
Cement mason/concrete finisher.....	\$ 11.37	1.13
Electrician.....	\$ 18.40	1.34
FORM BUILDER/FORM SETTER.....	\$ 13.35	1.17
IRONWORKER, REINFORCING.....	\$ 11.29	
Laborers:		
Common.....	\$ 10.70	
Landscape.....	\$ 7.35	
Mason Tender Cement.....	\$ 9.96	
Pipelayer.....	\$ 10.07	
PIPEFITTER.....	\$ 17.00	0.04

Power equipment operators:

Excavator.....	\$ 16.74	
Backhoe.....	\$ 13.25	
Bulldozer.....	\$ 14.00	
Crane.....	\$ 14.91	0.58
Front End Loader.....	\$ 11.75	0.92
Grader.....	\$ 12.20	1.48
Tractor.....	\$ 12.38	1.51

TRUCK DRIVER.....	\$ 12.28	0.98

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

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all

rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part

of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been

communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who

is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be

awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

CONTRACTOR'S LOCAL OPPORTUNITY PLAN

_____ agrees to implement the following specific affirmative action steps directed at increasing the utilization of lower income residents and businesses within the (City/County) of **Dickinson, Galveston County, Texas**

- A. To ascertain from the Locality's CDBG program official the exact boundaries of the project area and where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.
- B. To attempt to recruit from within the city the necessary number of lower income residents through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within and servicing the project area such as Service Employment and Redevelopment (SER), Opportunities Industrialization Center (OIC), Urban League, Concentrated Employment Program, Hometown Plan, or the U.S. Employment Service.
- C. To maintain a list of all lower income residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and if a vacancy exists.
- D. To insert this plan in all bid documents and to require all bidders on subcontracts to submit an affirmative action plan including utilization goals and the specific steps planned to accomplish these goals.
- E. To insure that subcontracts (greater than \$10,000), which are typically let on a negotiated rather than a bid basis in areas other than the covered project area, are also let on a negotiated basis, whenever feasible, in a covered project area.
- F. To formally contact unions, subcontractors, and trade associations to secure their cooperation in this effort.
- G. To insure that all appropriate project area business concerns are notified of pending sub-contractual opportunities.
- H. To maintain records, including copies of correspondence, memoranda, etc., which document that all of the above affirmative action steps have been taken.
- I. To appoint or recruit an executive official of the company or agency as Equal Opportunity Officer to coordinate the implementation of this plan.
- J. To maintain records concerning the amount and number of contracts, subcontracts, and purchases which contribute to objectives.
- K. To maintain records of all projected work force needs for all phases of the project by occupation, trade, skill level, and number of positions and to update these projections based on the extent to which hiring meets these Local Opportunity objectives.

As officers and representatives of _____, we the undersigned have read and fully agree to this Plan, and become a party to the full implementation of the program and its provisions.

Signature

Title

Date

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

PROPOSED CONTRACTS BREAKDOWN

Type of Contracts	No. of Contracts	Approx. Total Dollar Amount	Estimated No. to local Business	Estimated \$ Amount Local Business

ESTIMATED PROJECT WORKFORCE BREAKDOWN

Work Classification	Total Estimated Positions	No. of Positions Currently Filled	No. of Positions not Filled	No. of Positions to fill with L/M Residents
Totals				

STATEMENT OF BIDDER'S QUALIFICATIONS

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

Name of Bidder: _____ Date Organized: _____

Address: _____ Date Incorporated _____

Number of Years in contracting business under present name _____:

CONTRACTS ON HAND:

Contract	Amount \$	Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

Type of work performed by your company: _____

Have you ever failed to complete any work awarded to you? _____

Have you ever defaulted on a contract? _____

List the projects most recently completed by your firm (include project of similar importance):

Project	Amount \$	Mo/Yr Completed
_____	_____	_____
_____	_____	_____
_____	_____	_____

Major equipment available for this contract: _____

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

Credit available: \$ _____ Bank reference: _____

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

Executed this _____ day of _____, 20____.

By:(signature) _____ Title: _____

(print name) _____

CONTRACTOR CERTIFICATIONS

U.S. Department of Housing and Urban Development	
CERTIFICATION OF BIDDER REGARDING CIVIL RIGHTS LAWS AND REGULATIONS	
INSTRUCTIONS	
CERTIFICATION OF BIDDER REGARDING Executive Order 11246 and Federal Laws Requiring Federal Contractor to adopt and abide by equal employment opportunity and affirmative action in their hiring, firing, and promotion practices. This includes practices related to race, color, gender, religion, national origin, disability, and veterans' rights.	
NAME AND ADDRESS OF BIDDER (include ZIP Code)	
CERTIFICATION BY BIDDER	
Bidder has participated in a previous contract or subcontract subject to Civil Rights Laws and Regulations.	
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p>The undersigned hereby certifies that:</p> <ul style="list-style-type: none"> <input type="checkbox"/> The <u>Provision of Local Training, Employment, and Business Opportunities</u> clause (Section 3 provision) is included in the Contract. A written Section 3 plan (Local Opportunity Plan) was prepared and submitted as part of the bid proceedings (if bid equals or exceeds \$100,000). <input type="checkbox"/> The <u>Non Segregated Facilities</u> clause (Section 109 provision) is included in the Contract. No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964. <input type="checkbox"/> The <u>Equal Employment Opportunity</u> clause is included in the Contract (if bid equals or exceeds \$10,000). <input type="checkbox"/> The <u>Affirmative Action for Handicapped Workers</u> clause is included in the contract. 	
Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?	
<input type="checkbox"/> Yes	<input type="checkbox"/> No
NAME AND TITLE OF SIGNER (Please type)	
SIGNATURE	DATE

SECTION 504 CERTIFICATION

Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
 CONTRACTOR'S CERTIFICATION

CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

TO (appropriate recipient)	DATE
C/O	PROJECT NUMBER (if any) HDR 15-020
	PROJECT NAME 2013-2014 CDBG Sanitary Sewer Improvement

1. The undersigned, having executed a contract with Galveston County W.C. & I. D. #1 for the construction of the above-identified project, acknowledges that:

- (a) The Labor Standards provisions are included in the aforesaid contract,
- (b) Correction of any infractions of the aforesaid conditions, including infractions by any of his subcontractors and any lower tier subcontractors, is his responsibility.

2. He certifies that:

- (a) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended.
- (b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

3. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.

4. He certifies that:

- (a) The legal name and the business address of the undersigned are:

(b) The undersigned is:

(1) A SINGLE PROPRIETORSHIP	(3) A CORPORATION ORGANIZED IN THE STATE OF
(2) A PARTNERSHIP	(4) OTHER ORGANIZATION (Describe)

(c) The name, title and address of the owner, partners or officers of the undersigned are:

NAME	TITLE	ADDRESS

*Galveston County WCID #1
2013-2014 CDBG Sanitary Sewer Improvement*

(d) The names and addresses of all other persons having a substantial interest in the undersigned, and the nature of the interest are:

NAME	ADDRESS	NATURE OF INTEREST

(e) The names, addresses and trade classifications of all other building construction contractors in which the undersigned has a substantial interest are:

NAME	ADDRESS	TRADE CLASSIFICATION

Date _____

(Contractor)

By _____

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

State of Texas

County of Galveston

_____, being first duly sworn, deposes and says that:

- (1) He is _____ of _____ the Bidder that has submitted the attached Bid;
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with another Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix an overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Galveston County, (Local Public Agency) or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) _____

Title

Subscribed and sworn to me this _____ day of _____.

By: _____

Notary Public

My commission expires _____

SPECIAL CONDITIONS

SPECIAL CONDITIONS

1. Basic TECHNICAL SPECIFICATION items are items which follow described general requirements. When necessary, SPECIAL CONDITIONS are inserted to describe additional requirements applicable to this Contract. SPECIAL CONDITIONS are to be used in conjunction with basic TECHNICAL SPECIFICATION items. In the event of conflict between requirements as set forth the SPECIAL CONDITIONS and the basic TECHNICAL SPECIFICATION items, the requirements as set forth in the SPECIAL CONDITIONS shall govern.
2. It is the intent of the Contractor that the aggregate amount of unit prices times unit work actually installed shall cover all work required by the Contract Documents, in place, complete and ready to use.
3. Prices in the Contract Documents include all compensation for full completion of all work items in place, and include providing all labor, materials, tools, equipment, services, supplies, incidentals, and all necessary operations.
4. No costs in connection with work required by the Contract Documents for proper and successful completion of the Contract will be paid outside of or in addition to the items and unit prices named in the Bid Proposal.
5. Work not specifically set forth in the Bid Proposal as pay items shall be considered subsidiary obligations of Contractor and costs shall be included in the item bid prices named in the unit Bid Proposal.
6. Permits. Contractor is responsible to obtain all necessary permits to accomplish the Work described within these documents.

It is the Contractor's responsibility to coordinate with the Owner in order to determine all requirements and to meet such requirements.

7. Time of Completion. The work shall commence promptly after written notice to commence work shall have been given by Engineer and to be completed within **150 calendar days** after the date of written notice to commence work.
8. Delayed Completion. Failure of the Contractor to complete the work within the contract time, including any extensions granted shall entitle the Owner to deduct from the money due to the Contractor an amount equal to **\$400.00** for each calendar day of delay in completion of the work, not as a penalty, but as liquidated damages and added expense for supervision.
9. Warranty - Neither the final payment nor certificate nor any provision in this Contract shall relieve the Contractor of responsibility for faulty materials or workmanship, and he shall remedy any defects due thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of final acceptance. The final acceptance is when the final walk through of the project has occurred and the punch list items identified from the final walk through have been completed by the Contractor. The Contractor shall notify the Owner in writing upon completion of the punch list items.

Certificate of acceptance will be issued upon verification by the Engineer of the completion of punch list items from “final walk through” and a submittal of the close-out documents by the Contractor. The Warranty period will commence from the date of final acceptance. The Contractor is made aware that the warranty period will start from the date of final acceptance of the entire project regardless of completion of the individual areas.

10. Taxes and Insurance. In addition to the general obligations and responsibilities for insurance and protection set out in the General Conditions of Agreement of these Specifications, the Contractor shall comply with the following provisions:
 - A. The Contractor acknowledges that he has qualified and will make all payments under the terms of the Unemployment Compensation Law of the State in which the work is performed.
 - B. The Contractor, and all subcontractors employed on the work, shall carry insurance of minimum limits as stated in the General Conditions of Agreement.
 - C. The Contractor, before starting work for the Owner, must furnish to the Owner Certificates of Insurance or other acceptable evidences from a reputable insurance company or companies (such companies to be acceptable to the Owner) licensed to write insurance in the State of Texas, showing that the Contractor is covered by the insurance as stated in the General Conditions of Agreement.
 - D. The certificates of insurance furnished to the Owner shall contain a provision that coverage under such policies shall not be canceled or materially changed until at least 30 days prior written notice have been given to the Owner.
 - E. In the event the policy or policies are not renewed, 30 days prior written notice shall be given to the Owner.
 - F. All accidents or injuries to Contractor’s employees working on the job site must be immediately reported to the Engineer (Professional).
 - G. The certificates to the above insurance policies shall be filed with the Owner within ten (10) days after notification of award of contract.
 - H. The Contractor shall also comply with all Federal, State, and Local laws and ordinances relating to Social Security, Unemployment Insurance, Pensions, etc., and shall pay all taxes, levies or assessments for which he may be liable.
11. Guarantees - Guarantee work, including equipment installed, to be free from defects due to faulty workmanship or materials for period of one year from date of issue of Certificate of Acceptance. Upon notice from Owner, repair defects in all construction which develop during specified period at no cost to Owner. Neither final acceptance nor final payment nor any provision in Contract Documents relieves Contractor of above guarantee. Notice of observed defects will be given with reasonable promptness. Failure to repair or replace defect upon notice entitles Owner to repair or replace same and recover reasonable cost thereof from Contractor and/or his Surety.

12. Wage Rates and Subcontractors. The current wage rates as shown on the attached sheets (Attachment 3 to General Conditions) shall apply. It's mandatory that the Contractor and any subcontractor under him pay not less than the said specified rates to all laborers, workmen and mechanics employed by him in the execution of this contract, as specified in the Tex. Rev. Civ. Stat. Ann. art. 5159a.

Contractor shall use due diligence in securing local subcontractors, vendors, and labor/craftsmen in performance of this agreement. Contractor shall submit to the Owner documentation of efforts in this regard prior to award of Contract.

Contractor and all subcontractors shall pay the following rates as a minimum for this Contract (See Attached Wage Rates).

The Contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all laborers, workmen and mechanics employed by him, in connection with this contract, and showing also the actual per diem wages paid to each of such workers, which record shall be open at all reasonable hours to the inspection of the Owner, its officers and agents.

The Contractor shall pay, as a penalty, sixty dollars (\$60.00) to the Owner for each calendar day, or portion thereof, for each laborer, workman or mechanic, who is paid less than the stipulated rate for any work done under this Contract.

The Contractor shall submit to the Owner documentation of compliance with the above items, on a periodic as requested basis.

13. Progress Schedule - Within 15 days after execution of Contract and prior to Pre-Construction Conference, whichever is earlier, submit, in acceptable form, anticipated progress schedule covering work to be performed. Schedule shall be updated periodically to reflect changes and must be submitted monthly with the pay estimate.
14. Upon completion of each facility, the Contractor shall furnish Owner with two sets of direct prints, marked with red pencil, to show as-built dimensions and locations of all work constructed. As a minimum, the final drawings shall include the following:
1. Horizontal and vertical locations of work.
 2. Changes in equipment and dimensions due to substitutions.
 3. "Nameplate" data on all installed equipment.
 4. Deletions, additions, and changes to scope of work.
 5. Any other changes made.

Record drawings are to be submitted with Contractor's Notice of Completion and are a condition of the Contractor's Notice of Completion.

15. Preservation of Trees and Shrubs. Trees and shrubs within the right-of-way shall not be removed or disturbed unless stated otherwise on the plans. Unless indicated in the Bid Proposal, any work required to provide tree protection, maintenance and evaluation will be

considered incidental to the various pay items and no separate payment for this work will be made. Where tree roots must be cut, follow the repair method described in the "Technical Specifications". The contractor must utilize the services of a professional Arborist when such work is required.

16. Any areas of grass which are disturbed or dug up during the construction shall be replaced with St. Augustine sod or grass which matches the grass removed or as stated on plans.
17. When construction occurs in City right-of-ways, alleys and easements on residential yard areas, care shall be taken to minimize construction damage to yard areas. Contractor shall return all areas to a condition equal or better than prior to construction.
18. Subsurface Exploration - It is not represented that PLANS show all existing storm sewer, sanitary sewer, water, gas, telephone, petroleum or petroleum related pipelines and electrical facilities and other underground structures. It is the Contractor's responsibility to determine the depth, location and their existence which may conflict with the proposed construction by referring to available records, consulting appropriate municipal departments and utility owners and by making necessary exploration and excavations. All investigative work will be done and all repairs required after completion of investigative work shall be performed by the Contractor at no additional cost to the project.

Whenever existing utilities, not indicated on PLANS, present obstructions to grade and alignment of pipe, immediately notify Professional and Owner, who without delay, will determine whenever existing utilities are to be relocated, or grade and alignment of proposed pipe changed. When necessary to move services, poles, guy wires, pipelines, or other obstructions, the Contractor shall contact and coordinate and make arrangements with owners of said utilities. Owner will not be liable for damages on account of delays due to changes or adjustments made by owners of privately owned utilities and faulty workmanship by owners of privately owned utilities which hinder progress of work regardless of work authorized by Owner or other entities.

It is the Contractor's responsibility to install the proposed water line and maintain proper clearances with all utilities and meet the regulatory requirements. Any damage to existing sprinklers or sanitary sewer service lines shall be repaired to Owner's satisfaction at no additional cost to the project.

19. In the event a utility (shown or not shown on plan drawings) including but not limited to (gas, electric, telephone, cable, petroleum or petroleum related pipelines) is exposed due to excavation and is in conflict, the appropriate company shall be contacted by the Contractor. The Contractor shall make a concerted effort to the Professional's satisfaction to identify the utility (if unknown) and avoid any conflict with the utility. The Contractor shall provide all the necessary documentation for the efforts extended by the contractor in locating the utility. The documentation shall be either telephone conversation memo's, letters, meetings on site and other coordination efforts utilized to identify the utility or pipeline. The Professional will review all the documentation provided by the Contractor. In the event of a conflict with the utility and the Professional concurs that the Contractor had made a concerted effort to avoid the conflict and in spite of his effort, the conflict cannot be avoided without the utility being relocated, the Owner will assist in coordinating the relocation efforts of the utility with

the pertinent company. (The Contractor is still responsible for coordinating efforts with the utility or the pipeline company). The Contractor, during the period the utility is being relocated, will move his crew(s) to other areas at his own expense. The Contractor will not be due any compensation for delays or downtime resulting from the coordination and relocation efforts performed by the Contractor or the utility owner due to the utility conflict. The Contractor may request additional time if the relocation effort substantially hinders his construction effort. No additional payment will be made. If the Contractor chooses to assist the utility or pipeline company in the performance of their work, he shall be doing that at his own risk. The Owner will not be responsible for costs incurred by the Contractor from providing such assistance to the utility or pipeline companies.

20. The Contractor is made aware and shall make provisions in his unit price bid to allow for changes in alignment (vertical and horizontal) of the proposed utility (storm, water, sanitary sewer or force main) and roadway during construction to avoid conflicts, conditions encountered in the field, and to expedite construction. The Owner will not be responsible for any claims for downtime costs resulting from such conflicts. If the change in alignment results in increased quantities of the pertinent item, the Contractor shall be paid at the established bid unit price in the Contract. Any coordination or verification of existing utilities (including but not limited to gas, electric, water, sewer, petrochemical pipeline) resulting from the realignment shall not be paid for separately and shall be incidental to project costs. In the event the Contractor desires additional time due to the conflict, the Contractor shall submit documentation supporting such request to the Owner as per the project specifications. The Owner will evaluate such request on a case by case basis and make appropriate decisions.
21. Utility Services for Construction - Owner will provide water necessary for construction at no additional cost to Contractor. Contractor shall obtain a fire hydrant water meter from the Owner and shall monitor all water usage as metered. The Contractor may be required to draw water at specific locations as directed by the Owner. Contractor shall not use resident's water. It is expressly understood and agreed that the Owner assumes no responsibility for any loss resulting to the Contractor from any loss of pressure or failure of the water system; however, in the event of failure that can be attributed to the Owner, the Owner does agree to make repairs and restore service as expeditiously as possible.
22. Interruption of Utility Services - Operate no valve or other control on existing systems. Exercise care in performing work so as not to interrupt service. Locate and uncover existing utilities ahead of heavy excavation equipment. At house connections, either lift trenching machine over lines or cut and reconnect with minimum interruption of service. In the event there is a need for interruption of water service, the Contractor shall contact the Owner in writing so that the City forces can operate the appropriate valves. The Contractor shall provide a minimum of 72 hours notice to property owners whose service will be interrupted.
23. Resident and Property Owner Notification. Once the work begins it shall be constructed and completed in the shortest time possible to minimize inconvenience to property owners. Contractor shall assure that all affected property owners are notified between 72 hours and 2 weeks before work begins on their street/alley/easement. The Contractor shall provide property owners the minimum following information; work to be performed, starting and

ending dates, and name and number of City official to be contacted for questions. Written notices shall be approved by Engineer prior to distribution.

24. Driveway Disturbance. Residents and property owners shall be notified, by the Contractor, between 72 hours and 2 weeks in advance of disturbance of driveways. Notice to property owners shall follow the procedure as stated in the previous item. Driveways that are open cut shall be reconstructed as soon as possible to minimize inconvenience to the property owners. The materials used for the replacement of the driveways shall be as shown on the plans and in all cases shall be equal to or better than the existing material. In the event an excavation at a driveway must be left open over night, the excavation shall be covered and temporary access to the property shall be provided. Anchored steel sheeting, bridges, temporary driveway or other substantial structure shall be used to provide temporary access to the property.

25. Traffic During Construction. When construction begins on a street, the Contractor shall maintain traffic on the streets at all times. Contractor shall also make necessary provisions to allow ambulance, police, fire and other emergency vehicles access to the street.

During construction, the Contractor shall allow resident traffic access to the street with proper guidance, direction, flagmen and traffic control and only at such times that damage will not occur to the new construction or to the vehicles.

26. Closing Streets to Traffic. The Contractor shall maintain traffic on the project streets throughout construction. In the event a Contractor must close a street to all traffic, he shall obtain prior permission from the Public Works Department and he shall provide a minimum of 72 hours notice in writing to the following: the Professional, Owner's Public Works Department, Fire Department, and Police Department.

27. Warning Signs and Barricades. When any street or any section of a street is closed, the Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags and lights at the end of each street and at all intersections along the street within the limits of the work. All expenses incurred for the above requirements shall be borne by the Contractor. All warning signs and barricades shall be in conformance with the Texas Manual of Uniform Traffic Control Devices latest edition.

28. Work to protect items to remain by installation of temporary construction, including posting of warning signs, placement of protective fencing, barriers, barricades and covers, and restoration of damaged items to remain, will be considered incidental to the various pay items and no separate payment for this work will be made.

29. Excavated Material and Storage of Equipment and Materials. No equipment, material or excavated material shall be stored or deposited on streets, lawns, driveways, sidewalks, gardening or shrubbery.

30. Work necessary to haul materials from original positions to points of disposition, including excavation of earth materials and utilization in construction or other disposition, will be considered incidental to the various pay items and no separate payment for this work will be made.

31. Construction materials storage facility site shall comply with applicable Owner requirements and meet the following minimum requirements:
- A. Provide storage facility of neat and reasonable uniform appearance, structurally adequate for required purpose.
 - B. Maintain during entire construction period.
 - C. Prior to start of work, install enclosure fence with locked entrance gate.
 - D. Provide an all weather surface with adequate drainage to City facilities. Do not drain onto adjacent property.
 - E. Clean mud and debris from City streets on a daily basis or more often as required. Construction operations may be temporarily suspended if the storage facility is not properly maintained.
32. Barricading Excavation Areas. All excavation areas shall be barricaded at all times to prevent motorists from inadvertently driving into bore pits, open cuts, and trenches. All excavation must also be cordoned off with 4-foot high orange polyethylene fence with mesh size 2.5" by 0.80", Tenax Beacon or approved equal, installed as per manufacturer's recommendations and acceptable to the Owner. The fence shall be supported with enough intermediate support to avoid excessive sagging. Adequate barricades with flashing yellow lights shall also be provided to protect pedestrian traffic and vehicular traffic.

No excavations shall be left open overnight.

All excavations which cannot be back filled overnight for the installation of manholes, storm and sanitary sewers, and utilities shall be covered with anchored steel sheeting, in paved areas, and 3/4" plywood, wood planking or some other material approved by the City in non-paved areas. The steel sheeting shall be of sufficient thickness to support H-20 loading, truck or lane that produces maximum stress. The excavation area must be well protected with traffic barricades equipped with flashing yellow lights.

It is the Contractor's responsibility to insure the safety of the public, himself, his employees and all other persons. Provisions listed here are minimum measures and in no way relieves the Contractor of his responsibility or changes or alters other requirements within these contract documents.

The Contractor is hereby made aware that the work is being conducted in an area consisting of a high amount of pedestrian and vehicular traffic. The possibility of vandalism to his barricades, sheeting, tape, other protective devices and equipment does exist. The Contractor is responsible for maintaining all traffic barricades, sheeting, tape and other protective devices during construction hours and non-construction hours such as weekends, holidays, nights and inclement weather periods. Upon notification of the need for maintenance of the barricaded areas, either by the Contractor's own personnel, the City or its representatives, the Contractor shall promptly take the required corrective measures.

33. Replacement of Damage. If any damage is done to existing asphalt or concrete roads or appurtenances, by equipment, tires, metal tracks or other construction practices, damage shall be saw cut, removed and replaced with materials equal to or superior to the existing material. Damage shall include but not limited to scrapes and tread marks.
34. Damage to pavement, curbs, driveways, sidewalks or any other structure caused by the Contractor during construction shall be repaired at the Contractor's expense.
35. Construction Sequence. It is important to the Owner that this project be accomplished in the most expedient manner possible.

The Contractor shall schedule his work such that each section will be substantially complete prior to moving his construction operation to another section. More than one section can be under construction at one time, only if each section has continuous, active, and uninterrupted construction operation.

The nature of this project is such that there are different sections along the project alignment where construction may occur. The Contractor shall not leave one construction section to begin work on another site unless:

- The work on the section, in the Owner's opinion, is complete to the point where the Contractor can move to the next section.
- The Contractor will maintain an active on-going construction effort on each section to a completion point which the Owner feels is adequate; and the Owner concurs that an active on-going construction effort is being maintained.
- The Contractor has adequate forces to work multiple sections to the Owner's satisfaction; and the Owner concurs with the Contractor that adequate forces are available.
- The Contractor has obtained concurrence from the Owner that work can begin on another section.

It is the Owner's desire not to have multiple partially completed sections on which minimal work is being performed. It is the Owner's desire not to have multiple sections on which cleanup is remaining to be performed.

It is the Owner's desire that each section be completed to the point where the installation is complete, testing is complete, cleanup is complete and grass or appropriate surface material has been installed prior to the Contractor moving to another section. If the Contractor desires to work multiple sections along the project alignment at any one time, then he shall provide adequate manpower on each section to maintain a continuous, active, on-going work effort on each section and obtain prior approval from Owner.

36. Other Contracts - Other construction may be underway concurrently in this area. Afford utility companies and other Contractors reasonable opportunity for introduction and storage

of their materials and execution of their work. All work under this Contract must be properly connected and coordinated with that constructed by others. The Owner is not responsible or liable for any claims resulting from delays by other Contractors or utility companies in the area regardless of the entity authorizing such work and any faulty workmanship resulting from such work performed.

37. Alternate Designs - If alternate design features are proposed for convenience of Contractor, submit design calculations and detail drawings covering proposed changes and related modifications of Contract PLANS to Professional for review. Make drawings same size as Contract PLANS and of comparable quality. Make payment of charges resulting from modifications, including engineering charges for checking such designs.
38. Cleanup. Remove from site of work, and from public and private property, temporary structures, rubbish and waste materials including excess excavated materials. Dispose of surplus earth as directed or as specified. Complete cleanup not greater than 800 feet behind operation. The operation will be suspended temporarily if complete cleanup is further behind than 800 feet. Contractor is to be aware that the cleanup procedure will be strictly enforced by the Owner. There will be no extra pay for complying with said item.

Complete cleanup of a site shall be mandatory before the Contractor can begin work on another site. Multiple sites can be worked on simultaneously; however, complete cleanup must be conducted before a work crew leaves one site to work on another site.

39. Some manholes or structures may have been paved over or otherwise covered up, may not exist, may not be correctly shown in the plans, or may be shown as a cleanout or vice versa. The cost to field locate and open the manhole or the structure shall be incidental to the work specified.

The Contractor shall verify all the above prior to construction. If requested by the Contractor, the Owner will make a concerted effort to provide any available layout maps of the existing utilities, but the Owner does not guarantee the accuracy of such information. The information provided will in no way relieve the Contractor of his responsibility of verification prior to construction.

40. Incidental Construction Items. All items called out on the construction drawings or within the specifications which are not itemized in the bid proposal section of these documents shall be considered incidental to the cost of the project.
41. Any increased width of pavement, driveway, curb reconstruction or sidewalk repairs from that shown on the plans required due to over excavation, undermining (due to improper shoring) or for Contractor convenience shall be incidental to the cost of the pipe.
42. All testing equipment shall be calibrated at maximum twelve month intervals and after any repairs or adjustments by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants. The Contractor shall provide a written certification to the Engineer on the calibration.

43. Repairs to curbs, driveways, roadways and sidewalks shall be constructed with materials consistent with the existing and adjacent material and according to the detail shown in the plans as a minimum. All curbs, sidewalks, roadways and driveways to be removed and replaced shall be saw cut (a straight, even, clean cut) at the point of removal so that an even joint results between existing pavement and new pavement. Jointing material shall be placed between the new and existing material.
44. Drainage During Construction - Drainage is of utmost importance to this project. Work necessary to provide proper drainage during construction, including maintaining sections, existing ditches, channels, culverts, and storm sewers and including temporary construction and maintenance of ditches and drainage systems, and pumping, will be considered incidental to the various pay items and no separate payment for this work will be made. Where new curb is installed, Contractor shall backfill and regrade behind curb as necessary to maintain positive drainage from non-paved areas over top of curb. Regrading of existing ditches and swales shall be considered incidental.

The Contractor is responsible for ensuring adequate drainage is maintained at each intersection as the drainage is converted from the existing system to the proposed system. This may require temporary systems, connection or pumping depending on the Contractor's construction activities. No separate payment will be made for such efforts and the cost for performing the work shall be included in the related work item.

45. The Contractor is responsible for the verification of all key design elevations prior to commencing construction. Yard swales and pipe drains disturbed during construction shall be repaired or replaced with positive drainage towards the street or other existing drainage structure or swale at no additional cost to the Owner. The Contractor shall perform all transitions to existing pavements and driveways so that positive drainage is maintained and ponding is prevented. Any temporary storm sewer pipe installation necessary to maintain drainage shall be installed by the Contractor at no additional cost to the project. Transitions shall be performed so that a smooth driving surface is maintained. Contractor shall transition driveways so that vehicles will not "bottom out".
46. The cost for pavement, driveway or sidewalk removal, repair and temporary pavement or any other surface restoration necessary for service connections for water lines shall be incidental to the cost of the service connection.
47. Tack Coat - During the time period from April 15th to October 16th, of each year, the asphaltic material used for tack coat shall be either SS-1, anionic slow setting emulsion or CSS-1, cationic slow setting emulsion. During the remainder of the year, the asphaltic material shall be either RC-250 or RC-2, rapid curing cutback asphalt.
48. The Contractor shall carry out his operations in strict accordance with all applicable Occupational Safety and Health Administration (OSHA) standards. Special attention is drawn to those safety requirements involving work on all elevated platforms and entry into a confined space. It shall be the Contractor's responsibility to familiarize himself with OSHA standards and regulations pertaining to all aspects of the work. All work shall be done in accordance with OSHA, Safety and Health Regulations of the United States Government for

Construction, State of Texas laws and regulations, Galveston County regulations and City ordinances.

49. The Contractor shall replace or repair pavement, sidewalks, driveways, culverts, inlets, curbs, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed to a condition equivalent to or better than existing condition. In the event sod is removed or disturbed it will be replaced to a healthy green condition, regardless of the condition of the existing sod.
50. The Contractor will have a representative available on the project site 24 hours/day during the duration of the bypass pumping. No separate payment shall be made for bypass pumping efforts and the cost expended must be included in the unit price for related items. The Contractor is responsible for maintaining additional standby pumps for bypass pumping in the event of failure of any pumps utilized during bypass pumping.
51. Due to the location of work (predominantly in a residential area), the Contractor must utilize quiet pumps with appropriate sound barriers for well pointing and bypass pumping. The noise generated by this equipment must be kept to a minimum. In the event the Contractor cannot keep the noise levels to a minimum, he shall utilize electric powered pumps at no additional cost to the project. No payment shall be made for additional sound barriers, switching from a gasoline powered pumps to electric pumps.
52. Contractor shall be aware that groundwater is present in the construction sites. Seepage into excavation may occur. This seepage should be collected in sumps and pumped out. This type of de-watering is considered incidental to the cost of the improvement.

If seepage cannot be handled by sumping, then mechanical dewatering techniques such as well pointing shall be used. The Contractor shall be paid for well pointing as per the unit price bid.

Piezometers - Since ground water conditions can change depending on current conditions, the Contractor shall install piezometers at areas where dewatering is considered and groundwater level and seepage conditions should be checked prior to construction. The installation of the piezometers to monitor ground water prior to construction shall be paid for at the unit price bid for piezometers. The Contractor shall utilize the services of a geotechnical firm to install the piezometers and report on the groundwater conditions. The installation of piezometers in advance of the excavation can give the Contractor advance notice for the need to well point and will therefore aid the Contractor in his scheduling efforts. If it is determined that well pointing is required, then the cost of the piezometer will be incidental to the well pointing.

53. Soils stratigraphy and groundwater conditions encountered during excavations may vary from those observed in the geotechnical investigation report provided in this specification. The Contractor should collect additional subsurface information as he deems necessary to determine the conditions of the site. If conditions significantly differ from those presented in the geotechnical report attached to these specifications, the Contractor shall notify the Owner and Professional immediately.

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- 54. The Contractor shall monitor all excavations and retaining structures on a continuous basis by experienced personnel who can make evaluations as to the appropriateness of the retention system used.
- 55. In the event it is necessary to remove and replace a sidewalk which terminates at a street radius, a wheel chair ramp shall be constructed as per ADA specifications.
- 56. The Contractor shall comply with the new Texas Worker’s Compensation Commission Rule, 28 TAC§110.110 relating to Reporting Requirements for Building or Construction Projects for Governmental Entities.
- 57. Dewatering - Contractor shall maintain dewatering after the cement stabilized sand bedding and backfill has been installed so that a good set on the cement has been obtained. Do not remove well points immediately after placement of cement stabilized sand. The dewatering shall remain a minimum of 48 hours after placement of the cement stabilized sand bedding and backfill. The Contractor shall obtain site representative concurrence prior to the removal of dewatering.
- 58. Trench Safety - Contractor shall be aware that conditions may exist whereby solid sheeting and shoring may be more appropriate than trench boxes.

The Contractor shall provide an excavation safety system as approved by OSHA 29 CFR Part 1926 (latest revision) indicating the use of sheeting, shoring, bracing, under pinning, etc., to be utilized where conditions warrant such system. This system shall be provided in addition to other excavation systems the Contractor selects as per section 01526 “Trench Safety System”.

- 59. All claims for extension of time shall be made in writing to the Owner no more than ten days after the occurrence of the delay or after the cause of the delay has become apparent; otherwise they shall be waived. In the case of the continuing cause of delay, only one claim is necessary. Any request for an extension of time shall be accompanied by a revised construction schedule which, if approved by the Owner, shall become the Contractor’s construction schedule.

When the Contract is on a calendar day basis, no extension of time shall be allowed for adverse weather conditions reasonably anticipatable from historical weather data, and such weather conditions shall not be deemed a casualty beyond the Contractor’s control. The Contractor may be granted an extension of time because of unusual inclement weather which is beyond the normal weather recorded. Listed as follows is the mean number of days in which there occurred 0.01 inch or more of precipitation for Galveston County:

January	10	February	8	March	8	April	6
May	6	June	7	July	9	August	9
September	9	October	7	November	8	December	10

Rain days per month in amounts exceeding the number of days shown above may be credited as a “Rain Day” if a claim is made in accordance with the Contract Documents. A “Rain

Day” is any day in which a rain event occurs at the site and is sufficient to prevent the Contractor from performing work critical to maintaining the project schedule.

60. Dust Control - The Contractor shall take necessary measures to control dust on the site and minimize blowing dust. The Contractor shall water the site as necessary and when requested by the Owner to control blowing dust. The site shall be watered to the Owner’s satisfaction.
61. Where reference within these documents and plans is made to the Professional, such Professional shall be Registered or Licensed in the State of Texas. Where reference within these documents and plans is made to the Owner such Owner shall be the Galveston County Water Control and Improvement District #1.
62. Certified flagmen may be used on the project. However, there may be situations that would warrant uniformed officers for traffic control. The Contractor is responsible for identifying such situations and utilizing uniformed officers for such situations. The Contractor is responsible for maintaining safe traffic control at the job site at all times. The Contractor must utilize uniformed officers for traffic control, in TxDOT right of way, school vicinity, major thoroughfares and other areas designated by the Owner at no additional cost to the project. Uniformed peace officers shall be off-duty Dickinson, Texas peace officers as a first priority and Galveston County peace officer as a second option. In the event, neither Dickinson, Texas or Galveston County peace officers are available then the Contractor shall provide documentation and justification for the use of other peace officers. The Owner reserves the right to request the Contractor to utilize uniformed officers at any location throughout the project.

A certified flagman must be formally trained in traffic control procedures. Certified flagmen must wear bright-colored vest and be equipped with appropriate flagging and communication devices while on the work site. They must also have in their possession while on duty a proof of training identification issued by a certified institute.

63. The Contractor shall be aware that utilities and pipelines (including but not limited to telephone, gas, petrochemical or petroleum product lines, cable, and electric) are present in the easements and in the right-of-way. The possibility of encountering these lines during excavation is very high. The Contractor shall coordinate with all the pertinent utility companies and schedule his work in such a manner that delays and interruptions of service do not occur. The Contractor will provide adequate protection to the utilities and pipelines as required or directed by the pertinent utility company’s and include costs in the related bid items to work around the pertinent utilities and to complete the work.
64. The Contractor shall provide a minimum of 72 hours notice in writing to the Owner and the Engineer and the project’s on-site representative of any testing. The Contractor shall document the test results and provide a copy to the Owner and the Engineer. All testing procedures shall conform to the specifications and standards of the Owner. The Contractor shall keep in daily contact with the on-site representative through completion of the project and shall have a superintendent on the job site who can communicate in English with the on-site representative at all times.

65. The Contractor is responsible for locating the existing water lines, including valves prior to construction. The Contractor shall provide 72 hours notice in writing to the Owner for assistance in operating the valves in the system. The Contractor shall be aware there are water lines with no existing valves necessary for their isolation. The Contractor is responsible for making the tie-ins (wet connections) under pressure in those areas. The Contractor shall be paid at the bid unit price for wet connection. No additional payment shall be made for replacing or reconnecting water lines that are broken within the work area.
66. The Contractor shall remove and replace fence sections as necessary to accomplish the construction at no additional cost to the Project. In the event of damage to fences or other improvements, structures, plants, landscaping, etc. due to Contractor's performance of work, the Contractor will replace them with equal or better product, to Owner's satisfaction, all at no additional cost to the Project.
67. The Contractor shall accomplish the construction by hand excavation while working in close proximity to utilities, structures, landscaping, trees, shrubs, swimming pools, etc. and whenever necessary or as directed by the project representative. Any additional costs associated with utilizing hand excavation shall not be paid for separately and shall be included in the unit price bid for the related item.
68. The Contractor shall be aware that the work may be performed in areas that are in close proximity to structures (power poles, buildings, pipelines, and other structures). The Contractor shall take all precautions necessary to protect such structures from damage and insure safety to his personnel during construction. Any damages resulting from the Contractor's operations to such structures shall be repaired at no additional cost to the project.

In the event the Contractor determined certain structures conflict with the proposed improvements, the Contractor shall provide a written notice to the City documenting the location of such structure. The City will coordinate with the pertinent Owner and try to expedite the relocation efforts. However, the City does not guarantee the time of relocation efforts.
69. The Contractor is responsible for addressing all complaints from citizens and commercial property owners caused due to the performance of his work. The Contractor shall take appropriate measures to address all complaints from the citizen and commercial property owner's to their satisfaction in a timely manner. The Contractor shall submit to the Engineer a letter from the citizen and commercial property owner acknowledging the complaints have been addressed and any repair work necessary work has been completed by the Contractor.
70. The Contractor shall have a supervisor present on the site at all times when on-site activities relating to the Work are occurring, except for periods of absence approved by the Engineer or the Owner when: (i) the supervisor's absence from the site is caused by compelling or emergency circumstances, and (ii) the Contractor makes suitable provisions for substitute supervision. The Contractor shall notify the Owner and the Engineer as soon as the need for an absence is known. Approvals of absences will not be unreasonably withheld.

If the Engineer and the Owner jointly notify the Contractor that the current supervisor should be replaced for good cause, the Contractor will replace the supervisor as soon as practicable, and in any event within ten days (or such other time period as may be approved by the Engineer and Owner). For this purpose, “good cause” means: (i) the supervisor is not causing the Work to be performed in accordance with the Contract Documents, (ii) the supervisor is not communicating effectively with the Owner, the Engineer or other persons affected by the Work, or (iii) the supervisor is failing to prevent (or remedy) needless dislocation, damage or inconvenience related to the work.

71. The Contractor is made aware of rainfall events that may impact the construction efforts regardless of where the rainfall occurs, whether upstream or downstream of the project. The Contractor’s construction operation shall not impede the drainage flow and shall maintain drainage at all times. The Contractor is responsible for the installation and removal of temporary pipes, pumps and/or structures or any other means as necessary to maintain drainage during construction operations. The Contractor shall submit a proposed plan to maintain drainage for approval by the Engineer prior to commencing work in the area. The Contractor shall take all necessary measures to provide a safe condition during the construction operations to protect his workers, machinery and property. No separate payment shall be made for maintaining drainage or removing water during the duration of construction.

Additionally, construction will not be allowed within the project area until such time when storm flows cease and further rainfall is not anticipated in the short term forecast. No separate payment will be made for down-time associated with construction delays resulting from rain events.

72. The locations and details of the sanitary sewer lines requiring rehabilitation (regardless of rehabilitation method) shown on the plan drawings are approximate and shall be field verified. The Contractor is responsible for cleaning and televising the entire line segment (from manhole to manhole) prior to the proposed rehabilitation effort and providing the video tape and log for review by the Engineer to identify any other repairs necessary prior to performing rehabilitation and to confirm the method of rehabilitation. The Contractor is also responsible for performing the post rehabilitation T.V. inspection and cleaning of the entire line segment regardless of the method of rehabilitation. The cleaning and television inspection (pre and post rehabilitation) shall be incidental to the cost of the proposed full length rehabilitation.
73. The Owner has the right to add or delete line sections based on the pipe condition as determined from the television inspection video review and/or to meet budgetary requirements and at no additional increase to the unit price bid. The Contractor is hereby made aware that the method or extent of rehabilitation on each line segment may change after the pre-rehabilitation cleaning and television inspection is performed. The Owner and Engineer will review the video to determine any modifications to the rehabilitation which may be necessary. In the event the extent or method of rehabilitation changes, the Contractor will be paid at the unit price bid in the contract for the selected method of rehabilitation. In the event rehabilitation is not authorized on the lines, payment for cleaning and survey television inspection shall be made at the established bid unit prices in the contract. The Contractor is made aware that there is a potential for the bid quantities to increase or decrease based on the results of the evaluation of pre-television videotapes. The Contractor shall be

aware of such potential and shall perform the work at the established bid unit price in the Contract. No re-negotiation of bid prices will be made for over runs or under runs of quantities. The Contractor shall allow a minimum of three working days for each line section (manhole to manhole) from the time the video of the televised line is submitted to the Engineer to the anticipated start of rehabilitation to allow adequate time for review and modifications.

74. If a line section designated for rehabilitation is determined by the Engineer not to require rehabilitation upon review or the pre-television inspection video, payment shall be made only for the cleaning and television inspection of the line segment. This shall be made based on the unit price for the applicable bid item.
75. The Contractor shall obtain Owner's representative concurrence on any method of repairs prior to performing the rehabilitation to facilitate completion of television inspection work (i.e., obstruction removal prior to pipe bursting, etc.). The Contractor shall notify the Owner's representative in writing and provide documentation on the manhole numbers, location and the need for such repair.
76. Order of Priority - The Contractor shall address the sanitary sewer line sections requiring rehabilitation in an order of priority as described below.
 - Pre-Cleaning and television inspection work
 - Rehabilitation of sanitary sewer and associated work
 - Manhole Rehabilitation
 - Post-Cleaning and television inspection work

The Owner reserves the right to direct the Contractor to work on line sections in a specific order within the priority groupings at no additional cost to the Owner. The Owner also reserves the right to change the order of priority at no additional cost to the Owner. The Contractor shall coordinate with the Owner as to the order of lines to be addressed throughout the project.

77. The Contractor shall be aware and agrees that adequate time has been included in the Contract time for review of the pre and post television inspection videotapes by the Engineer.
78. The Contractor shall be aware that utilities and utility service lines (including but not limited to telephone, gas, cable, and electric) are present in the easements or right-of-way. The potential of encountering such lines during excavation is very high. The Contractor shall coordinate with all the pertinent utility companies and schedule his work in such manner that delays do not occur. The Contractor will provide adequate protection as necessary to the utility company's satisfaction and include costs in the related bid items to work around the pertinent utilities and to complete the work. The Contractor shall employ the following sequence prior to commencing work areas where utilities are present:
 - Locate existing utility service line in the backyard prior to performing any excavation. The Contractor shall utilize the appropriate detection equipment in locating such utilities.

- Locate existing sanitary sewer service in the backyard prior to performing any excavation.
- If the utility line is in close proximity to the sanitary sewer service line, the Contractor shall reroute the sanitary sewer service line away from the utility service. The Contractor is responsible for determining the proximity limits and whether the sewer service needs to be rerouted. The Contractor shall coordinate with the Owner and HDR|C&M representative for concurrence prior to performing the work.
- Utilize wooden boards or a bridge to transport/move equipment across the electrical service line and avoid damage and/or disruption. The Contractor shall explore other routes to access the sewer service prior to crossing over the electrical service.
- Any damage or disruption to the utility service due to Contractor performance of work shall be replaced at no additional cost to the Project.

79. Operation of Pumping Stations - In the event the Contractor desires that City pumping stations (lift stations) be controlled in a manner to assist the sewer system cleaning, television inspection and subsequent rehabilitation, the Contractor shall request such control from the Owner ninety-six (96) hours prior to the need for such control. The Contractor shall coordinate with the Owner as to the time required for such control and as to the availability of City personnel to perform such control. The City will only provide such control if City personnel are available for the time that is requested.

Only City personnel will operate and control City pumping stations. The Contractor is made aware that some of the pumping stations may not be in operation due to on-going maintenance efforts or for performing repairs. The duration of such efforts are not known at this time. The City will attempt to schedule maintenance efforts at a different time so as to not conflict with the Contractor's rehabilitation operations. However, the City does not guarantee the Contractor of such efforts. The Contractor shall be prepared to work in other areas or perform other work during such periods of time. No additional payment shall be made for any delays or downtime associated with such maintenance or repair efforts.

80. The Contractor is responsible for locating and disconnecting all the services from the main line in the field by excavation prior to commencing rehabilitation on the sanitary sewer. The Contractor shall submit documentation to the Engineer identifying services that cannot be reconnected by excavation at their existing location due to above ground features or obstructions. The Contractor shall make provisions in his unit price bid to reroute such services. The Contractor shall be aware that rehabilitation will not be authorized until the above tasks are completed and approved by the Engineer. All the service lines shall be replaced by open cut or auger to the right-of-way line (short side and long side) and a cleanout installed at the right-of-way prior to their tie-ins.
81. The Contractor is made aware that review of the post television inspection videotapes by the Engineer or the Owner does not relieve the Contractor of the responsibility of reconnecting all services affected by the rehabilitation. In the event the Contractor fails to reconnect a

service and the service back-up results in damage to the resident's property, the Contractor is responsible for all damages resulting from the service not reconnected. The Contractor is responsible for replacing all the damages at no additional cost to the project. The service shall be reconnected by the Contractor in less than 24 hours upon notice by the Owner. Payment for service reconnection shall be made at the established bid unit price in the original contract regardless of date of occurrence i.e., within or beyond the warranty period.

82. As part of the Contract Closeout, prior to release of the contract retainage, the Contractor shall provide the following:
1. Agreement of final Payment and CONTRACTOR'S Sworn Release
 2. Subcontractor/Materialman's full and Final Release and Waiver of Claims and Liens
 3. Consent of Surety to Final Payment (either AIA Document G707 or Surety Standard Form)
 4. One Year Maintenance Bond
 5. One set of Record Drawings (including service reconnection locations)
83. Negotiation or changes to unit prices due to material/labor price increases will not be allowed for duration of this project. The bid unit prices of the successful bidder for the project shall govern regardless of the magnitude of price decrease or increase in material costs during the project duration.

ATTORNEY'S REVIEW CERTIFICATION

I, the undersigned, _____, the duly authorized and acting legal representative of the _____, do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and am of the opinion that each of the agreements may be duly executed by the proper parties, acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties; and that the agreements shall constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Attorney's signature: _____ Date: _____

Print Attorney's Name: _____

TECHNICAL
SPECIFICATIONS

SECTION 01015

CONTRACTOR'S USE OF PREMISES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes general use of the site including properties inside and outside of rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

1.02 RIGHTS-OF-WAY

- A. Confine access and operations and storage areas to rights-of-way provided by Owner as stipulated in General Conditions of Agreement; trespassing on abutting lands or other lands in the area is not allowed.
- B. Contractor may make arrangements, at Contractor's cost, for temporary use of private properties, in which case Contractor and Contractor's surety shall indemnify and hold harmless the Owner against claims or demands arising from such use of properties outside of rights-of-way.
- C. Restrict total length which materials may be distributed along the route of the construction at any one time to 1,000 linear feet unless otherwise approved by Engineer.

1.03 PROPERTIES OUTSIDE OF RIGHTS-OF-WAY

- A. Altering the condition of properties adjacent to and along rights-of-way will not be permitted unless authorized by the Engineer.
- B. Ways, means, methods, techniques, sequences, or procedures which will result in damage to properties or improvements in the vicinity outside of rights-of-way will not be permitted.
- C. Any damage to properties outside of rights-of-ways shall be repaired or replaced to the satisfaction of the Engineer and at no cost to the Owner.

1.04 USE OF SITE

- A. Obtain approvals of governing authorities prior to impeding or closing public roads or streets. Do not close more than two consecutive intersections at one time.
- B. Notify Engineer a minimum of 72 hours prior to closing a street or a street crossing. Permits for street closures are required in advance and are the responsibility of the Contractor.
- C. Maintain access for emergency vehicles including access to fire hydrants.

- D. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.
- E. Locate and protect private lawn sprinkler systems which may exist on rights-of-ways within the site. Repair or replace damaged systems to condition equal to or better than that existing at start of Work.
- F. Perform daily clean up of dirt outside the construction zone, and debris, scrap materials, and other disposable items. Keep streets, driveways, and sidewalks clean of dirt, debris and scrap materials. Do not leave buildings, roads, streets or other construction areas unclean overnight.

1.05 NOTIFICATION TO ADJACENT OCCUPANTS

- A. Notify individual occupants in areas to be affected by the Work of the proposed construction and time schedule. Notification shall be not less than 72 hours or more than 2 weeks prior to work being performed within 200 feet of the homes or businesses.
- B. Include in notification names and telephone numbers of two company representatives for resident contact, who will be available on 24-hour call. Include precautions which will be taken to protect private property and identify potential access or utility inconvenience or disruption.
- C. Submit proposed notification to Engineer for approval. Consideration shall be given to the ethnicity of the neighborhood where English is not the dominant language. Notice shall be in an understandable language.

1.06 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS

- A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of the Work.
- B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment or exceptionally large or heavy trucks or equipment.
- C. Construct and maintain access roads and parking areas as specified in Section 01500 - Temporary Facilities and Controls.

1.07 EXCAVATION IN STREETS AND DRIVEWAYS

- A. Avoid hindering or needlessly inconveniencing public travel on a street or any intersecting alley or street for more than two blocks at any one time, except by permission of the Engineer.
- B. Obtain the Engineer's approval when the nature of the Work requires closing of an entire street. Permits required for street closure are the Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners.

- C. Remove surplus materials and debris and open each block for public use as work in that block is complete.
- D. Acceptance of any portion of the Work will not be based on return of street to public use.
- E. Avoid obstructing driveways or entrances to private property.
- F. Provide temporary crossing or complete the excavation and backfill in one continuous operation to minimize the duration of obstruction when excavation is required across drives or entrances.
- G. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices latest edition.

1.08 TRAFFIC CONTROL

- A. Comply with traffic regulation as specified in Section 01570 - Traffic Control and Regulation.

1.09 SURFACE RESTORATION

- A. Restore site to condition existing before construction to satisfaction of the Owner and Engineer.
- B. Repair paved area per the requirements of the specifications.
- C. Repair turf areas which become damaged, level with bank run sand conforming to Section 02227 - Excavation and Backfill for Utilities, or topsoil conforming to Section 02920 - Topsoil, as approved by the Engineer and resod in accordance with Section 02935 - Sodding. Water and level newly sodded areas with adjoining turf using steel wheel rollers appropriate for sodding. Do not use spot sodding or sprigging.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.02 AUTHORITY

- A. Measurement methods delineated in Specification sections are intended to complement the criteria of this section. In the event of conflict, the requirements of the Specification section shall govern.
- B. Measurements and quantities submitted by the Contractor will be verified by the Engineer.
- C. Contractor shall provide necessary equipment, workers, and survey personnel as required by Engineer to verify quantities.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantity and measurement estimates stated in the Agreement are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by Engineer shall determine payment as stated in the General Conditions.
- B. If the actual Work requires greater or lesser quantities than those quantities indicated in the Bid Form, provide the required quantities at the unit prices contracted, except as otherwise stated in the General Conditions.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement by Weight: Reinforcing steel, rolled or formed steel or other metal shapes will be measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies will be measured by CRSI or AISC Manual of Steel Construction or scale weights.

- B. Measurement by Volume:

Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.

Excavation and Embankment Materials: Measured by cubic dimension using the average end area method.

- C. Measurement by Area: Measured by square dimension using mean length and width or radius.
- D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- E. Stipulated Price Measurement: By unit designated in the agreement.
- F. Other: Items measured by weight, volume, area, or lineal means or combination, as appropriate, as a completed item or unit of the Work.

1.05 PAYMENT

- A. Payment Includes: Full compensation for all required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of the Work; and Contractor's overhead and profit.
- B. Total compensation for required Unit Price Work shall be included in Unit Price bid in Bid schedule. Claims for payment as Unit Price Work, but not specifically covered in the list of unit prices contained in Bid Schedule, will not be accepted.
- C. Interim payments for stored materials will be made only for materials to be incorporated under items covered in unit prices, unless disallowed in Supplementary Conditions. Such materials must be stored on the job site or at a location approved by the Engineer. No payment will be made for street construction, backfill or landscape materials on hand.
- D. Progress payments will be based on the Engineer's observations and evaluations of quantities incorporated in the Work multiplied by the unit price.
- E. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities determined by Engineer multiplied by the unit price for Work which is incorporated in or made necessary by the Work.

1.06 NONCONFORMANCE ASSESSMENT

- A. Remove and replace the Work, or portions of the Work, not conforming to the Contract Documents.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:

The nonconforming Work will remain as is, but the unit price will be adjusted to a lower price at the discretion of Engineer.

The nonconforming Work will be modified as authorized by the Engineer, and the unit price will be adjusted to a lower price at the discretion of Engineer, if the modified work is deemed to be less suitable than originally specified.

- C. Specification sections may modify these options or may identify a specific formula or percentage price reduction.
- D. The authority of Engineer to assess the nonconforming work and identify payment adjustment is final.

1.07 NONPAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:

Products wasted or disposed of in a manner that is not acceptable to Engineer.

Products determined as nonconforming before or after placement.

Products not completely unloaded from transporting vehicle.

Products placed beyond the lines and levels of the required Work.

Products remaining on hand after completion of the Work, unless specified otherwise.

Loading, hauling, and disposing of rejected products.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

PART 4 UNIT PRICES

4.01 PIPE BURSTING

- A. As per Section 02768.
- B. This item shall be paid for per linear foot of pipe successfully rehabilitated by pipe bursting method as indicated in the bid proposal, complete in place.
- C. The depth range shall be as indicated in the bid proposal. This depth will be measured from the top of the ground at the manhole to the flowline of the pipe rehabilitated. In the event one side of the ground at the manhole is lower than the other side of the trench, then the measurement will be taken from the lowest side. The depth measurement will be to the closest foot when measuring in tenths of a foot, i.e. if the depth measurements are 10.4-feet, then the depth measurements are within the 0 to 10-foot range. If the depth measurement is 10.5 feet, then the depth measurement is within the 11 to 15-foot range.

- D. The unit price bid for rehabilitating the sewer main shall be full compensation for all materials, labor, equipment and incidentals required to install the replacement pipe within the sewer main. Payment for the rehabilitated pipe shall also include the cost of sealing the replacement pipe in the manholes, reworking the manhole inverts and benches. Payment shall be for actual linear footage for rehabilitated pipe installed in the field and shall be measured between the center lines of the manholes. Payment for pipe bursting shall be based on the depth of the deeper flow line of the rehabilitated segment at the manhole and as indicated in the bid proposal. In the event of a drop manhole, the depth of the main designated for rehabilitation prior to the drop shall be used to determine payment for the line.
- E. Incidental items include pre and post cleaning and television inspection, insertion and receiving pits, bypass pumping, excavation and backfill (including hand excavation), all pavement removal and repair, cement stabilized sand bedding and cement stabilized sand backfill where backfill is under pavements (includes streets, alleys, driveways, and sidewalks), sealing pipe at manhole, preparation and forming of benches, surface and site restoration and all testing. Fiberglass manhole repair kits shall be utilized as per manufacturer's recommendation at all pipe entry points into a fiberglass manhole at no additional cost to the project. The Contractor is responsible for taking adequate precautions to protect the integrity of such manholes.
- F. All costs for testing the replacement pipe and the service reconnections shall be considered incidental to the cost of rehabilitating the sewer. The Contractor shall be responsible for making adequate and suitable arrangements for any bypass pumping that may become necessary to prevent any backflow into houses or buildings, or onto the streets between the time the replacement pipe is installed and the service reconnections have been made, tested, and approved by the Owner. The Contractor shall install bypass pumping as per the appropriate specification section.
- G. Areas within an existing lined manhole excavated around pipe entry points to facilitate pipe bursting shall be patched utilizing liner, equal to existing liner, as per the manufacturer's recommendation at no additional cost to the project. It is not necessary that the entire manhole be re-lined unless stated otherwise on the plan drawings or if directed by the Owner representative.
- H. No additional payment shall be made for excavation required to pipe burst past existing pipe encased in cement stabilized sand and/or concrete.
- I. Payment for service connections restored by excavation and reconnecting with approved fittings shall be made in accordance with Section 02762. Two or more service laterals from several houses coming at one point to the sewer (replacement pipe) through stacks, wyes and/or tests, shall be considered as one service connection. However, the Engineer may move/relocate such service connections so as not to exceed more than two houses per each new connection pipe.

- J. No payment shall be made for work considered incidental or complimentary to a pay item already in bid item. The Contractor shall clarify, for his own benefit, all work required for any item, incidental or otherwise, prior to bidding.
- K. The Contractor will submit all post color TV inspection in DVD format to the Engineer for acceptance prior to payment.
- L. Pay estimates for progress payments will be made as measured above according to the following schedule:
 - 1. An estimate for 80 percent payment will be authorized when the sanitary sewer line is pipe bursted and tested.
 - 2. An estimate for 100 percent payment will be authorized when post television inspection videotape is submitted and restoration work (includes pavement replacement) is complete.

4.02 SERVICE RECONNECTIONS (BY EXCAVATION)

- A. As per Section 02762.
- B. This bid item shall be paid for by each service reconnection performed on lines rehabilitated by pipe bursting or cured in place liner method of rehabilitation.
- C. Service Connections (by excavation) shall be measured and paid for by each service connection fully and completely reconnected (4" and 6"). This shall include all excavation and backfill (including hand excavation), bedding, cement stabilized sand encasement, Inserta Tee fittings, connections, couplings, adaptors, connectors, pipe, installation of clean out at the right of way or easement line (short side and long side), stacks, removal and disposal of concrete or cement stabilized encasement, removal and disposal of existing service line and appurtenances, pavement removal and replacement (includes streets, alleys, driveways, and sidewalks), surface repair, testing, bypass pumping, dewatering, removal and replacement of existing service line and site restoration. No separate payment shall be made for augering or pipe bursting service lines under roadways. One or more connections discharging into a common point shall be considered as one house/building connection. The Contractor shall not be allowed to increase the number of service reconnections. This item also includes, as incidental to the work, field locating all live service connections from the ground in portions of sanitary sewer that cannot be located with the television camera or where the camera was submerged.
- D. This item shall include each stack installed on the sanitary sewer fully and completely reconnected to the existing sanitary sewer regardless of depth.

The work shall be performed as per the detail shown on plans and shall include all excavation, cement stabilized sand embedment, and backfill, adapter couplings reconnection, Inserta-Tees, to existing sanitary sewer or manhole associated fittings and bends, dewatering as necessary to accomplish the construction.

- E. In the event the service cannot be reconnected by excavation at the existing location due to above ground features or obstructions, the Contractor shall obtain Owner's concurrence and reroute and reconnect the service line to a location away from the existing location. The additional length of service line above and beyond 4-feet shall be paid per the bid item for "additional length of service line".
- F. All service lines shall extend from the main to the right-of-way line (short side and long side), and the bid price for the service re-connection shall include the stack and 4-feet of service line (measured horizontally from the main).
- G. The additional length of service line to complete the connection to the right-of-way line (short side and long side) beyond the 4-foot length shall be paid for per linear foot. This shall be full compensation whether the additional footage is installed by open cut or auger. All cement stabilized sand bedding and backfill and surface restoration and pavement removal and replacement shall be incidental.
- H. Well pointing where approved by the Engineer shall be paid as per appropriate bid item.
- I. Pre and post rehabilitation cleaning and television of the main lines to show services have been newly reconnected or installed shall be incidental to the cost of rehabilitation.
- J. Where two connections discharge into a common point, Contractor shall replace existing service line with 6-inch service line or install a 4-inch service line for each connection. One or more connections discharging into a common point are considered one service connection. The Contractor shall not add service reconnections without approval of the Engineer. The Engineer may require reconnections to be moved or relocated to avoid having more than two houses per reconnection.
- K. In the event a service line cleanout exists at the right-of-way line or easement line, the Contractor shall remove and replace the clean out and tie in at no cost to the project.
- L. Pay estimates for progress payments will be made as measured above according to the following schedule:
 - 1. An estimate for 80 percent payment will be authorized when the reconnection is completely installed and backfilled.
 - 2. An estimate for 100 percent payment will be authorized when the cleanout is installed on the right-of-way or easement line, restoration work is complete, and the reconnection has been tested as specified in Section 02732.

4.03 ADDITIONAL LENGTH OF SERVICE LINE

- A. As per Section 02762.

- B. This bid item shall be paid per linear foot of service line (4-inch or 6-inch) necessary to complete the connection from the 4-feet of service line (measured horizontally from center line of main) included in the Service Reconnection bid item to the right-of-way line.
- C. This shall be full compensation whether the additional footage is installed by open-cut or by auger.
- D. Includes all bedding, backfill, cement stabilized sand backfill, pavement restoration (includes streets, alleys, sidewalks, and driveways), connection to existing service, and surface restoration as incidentals.
- E. In the event, a service line discharges into a manhole and the manhole is designated for replacement, the service line shall be replaced to the right-of-way or easement line. Payment for performing the work shall be made as per the bid item "Additional Length of Service Line", regardless of depth and size. Connections to manholes, appurtenances and all items outlined in Item 'D' shall apply.
- F. In the event the service line discharges into a manhole and manhole is not designated for replacement, the service line shall be replaced to the right-of-way or easement line. Payment for performing the work shall be made as per the bid item "Service Reconnection" (by excavation). Additional length of service line necessary to tie-in to the right-of-way shall be made as per appropriate bid item. All the items included in the said bid item shall apply.

4.04 INSTALL END-OF-LINE CLEANOUT

- A. Measurement for clean outs installed at the end of existing sewer main shall be paid for each clean out installed on existing main as indicated in the bid proposal. This shall be full compensation for providing labor, materials, tools, equipment, bypass pumping, incidentals and necessary operations.
- B. This item shall include excavation, installation, clean out, piping, fittings, connection to sewer main (all types), concrete box with lid, bypass pumping, disposal of debris, cement stabilized sand, bedding and backfill, compacted backfill, and work to adjust final grade and fit into adjacent construction.
- C. This item will be utilized at locations where the sanitary sewer main terminates at a shallow depth. The exact location of the end-of-line clean out to be installed on existing sewer main shall be determined in the field by the Owner. The Contractor shall obtain Owner's concurrence on the final location prior to construction. In the event the Owner desires to install a precast manhole on the existing sanitary sewer main in the field, the Contractor shall install such manhole at the established bid unit prices in the contract.

4.05 INSTALL SANITARY SEWER MANHOLE (PRE-CAST) ON EXISTING MAIN

- A. Measurement for manholes installed on existing main shall be paid for each manhole installed as indicated in the bid proposal. This shall be full compensation for providing labor, materials, tools, equipment, bypass pumping, incidentals and necessary operations. If indicated in the bid proposal, application of epoxy wall liner to the proposed manhole shall be included in the bid item cost.
- B. Work includes excavation, installation, concrete foundation, manhole construction, grouting or gasketing joints, adjusting rings, cast iron frame and cover, concrete invert construction, connection of all lines, stubbing, all drops, bypass pumping, removal and disposal of existing manhole, and all debris, cement stabilized sand bedding and backfill, compacted backfill, and work to adjust final grade and fit into adjacent construction.
- C. In the event a service line discharges into the manhole and the manhole is designated for replacement, the Contractor shall replace and reconnect the service line from the manhole to the right-of-way (including long side and short side). Payment for the linear feet of service line replaced to the right-of-way (including short side or long side) shall be made as per "Additional length of service line" bid item and not as a service reconnection (by excavation). No separate payment shall be made for connecting the service line to the manhole.
- D. Removal and replacement of pavement to facilitate the work shall be made as per pertinent bid item.
- E. This item shall also apply in the event a manhole is designated to be constructed on an existing sanitary sewer. All the items stated above shall apply.
- F. The exact location of the manholes to be installed on existing sewer shall be determined in the field by the Owner. The Contractor shall obtain Owner's concurrence on the final location prior to construction. In the event the Owner desires to install additional manholes on the existing sanitary sewers in the field, the Contractor shall install such manholes at the established bid unit prices in the contract.

4.06 CLEANING AND SURVEY TELEVISION INSPECTION OF SANITARY SEWER

- A. As per Section 02733.
- B. This bid item shall only be paid under the following circumstances:
 - 1. When a sanitary sewer line designated for rehabilitation is cleaned and televised as a pre-rehabilitation television inspection task which is incidental to the rehabilitation and through subsequent review of the inspection tapes, it is determined that no rehabilitation of any type is required on that line section.

2. When the Owner designates survey cleaning and television inspection of a line which, after subsequent review by the Engineer and the Owner, does not result in any type of rehabilitation. In the event, a line designated for cleaning and survey television inspection is recommended for rehabilitation (full length or point repair), the cleaning and survey television inspection and the post cleaning and television inspection shall be incidental to the method of rehabilitation performed.
- C. This item will be paid for per linear feet of cleaning and survey television inspection as indicated in the bid proposal. Payment shall only be made for those lines that have been cleaned and televised and have not been recommended for rehabilitation. Payment will only be made on footage of sewer line actually televised regardless of the cleaning efforts expended on the line. Payment will not be made for reverse setups, footage of pipe not adequately televised for whatever reason, including blockages, sags, high water, protruding taps, blurred lens, mechanical malfunctions or abandonment of television inspection effort.
- D. Cleaning for ACleaning and Survey Television Inspection of Sanitary Sewer@ shall be suitable to properly television inspect the sewer line. No payment will be made for any additional cleaning the Contractor may perform in anticipation of rehabilitation. Such additional cleaning will be solely at the Contractors risk.
- E. Incidental items shall be all items necessary to complete the task including bypass pumping, legal disposal of debris, repairing damages as a result of the cleaning and television inspection operations, flow control, preparation of logs, tapes and supporting data.
- F. No additional payment will be made if cleaning requires different methods to adequately clean the line. No additional payment or adjustment to payment will be made if the quantity or quality of debris, dirt, silt, sand or other material varies, changes, increases or decreases from line section to line section or within a single line section. No additional payment will be made for retrieval of equipment within the line. No separate payment shall be made for T.V. inspection with floating camera.
- G. No separate payment shall be made in the event the Contractor has to clean the sanitary sewer using mechanical equipment. The Contractor has to obtain Engineer=s approval prior to performing such efforts.
- H. The Cost for any bypass pumping/dewatering required to complete the television inspection shall be considered incidental to the project.
- I. The Contractor is responsible for repairing any damaged areas as a result of cleaning and television inspection to the satisfaction of the Engineer.
- J. Poor and unacceptable quality tapes (hazy and unclear pictures) or for portions of sanitary sewer not televised will not be accepted.

- K. No separate payment shall be made for T.V. inspection with floating camera. Note: The Contractor will not be allowed to float the camera unless permitted by the Engineer.

4.07 TRENCH SAFETY SYSTEM

- A. As per Section 01526.
- B. Trench safety system shall be measured by the linear foot along the centerline of pipe trench greater than 5-feet in depth including manholes and other line structures, where trench safety measures were actually implemented.
- C. Payment will be paid by the bid unit price.
- D. This shall be full compensation for all work required to comply with the State of Texas Trench Safety Act.
- E. For depths less than 5-feet the Contractor shall implement all necessary measures to obtain and maintain safe trench conditions. Non payment for trenches at depths less than 5-feet in no way relieves the Contractor of his obligation to maintain a safe trench system.

SUPPLEMENTAL ITEMS

4.08 OBSTRUCTION REMOVAL (BY EXCAVATION)

- A. As per Section 02769.
- B. This bid item is intended to apply to obstruction removal where excavation is necessary to remove the obstruction.
- C. This item shall also apply for the removal of sags in existing sanitary sewer as identified from the pre-television inspection videotape and as directed by the Engineer.
- D. This item will also apply in areas where a void exists around existing pipe and the pipe is missing.
- E. Obstruction removal by excavation will be paid per bid item. Depth is measured from the ground level to the flow line of the sanitary sewer main at the point of the obstruction removal. Payment for an obstruction removal shall be made when the Contractor has cleared the obstruction from the sewer main as directed by the Engineer. The unit price for obstruction removal (by excavation) shall include a minimum length six (6) feet regardless of pipe size and depths. The price shall include excavation, bedding and backfill (including cement stabilized sand backfill), and surface restoration. Pavement removal and replacement (includes streets,

driveways, and sidewalks) shall be paid separately. In the event the section of pipe removed is greater than the minimum length (6-feet), payment for additional footage of pipe shall be paid for as per the bid item "Extra Length Obstruction Removal" per linear foot for all pipe sizes, and depths.

- F. Any cleaning of sanitary sewer due to broken pipe, roots, dirt, and loose deposits, etc. will be incidental to obstruction removal. If any TV inspection is involved, it will be incidental.
- G. Removal and legal disposal of hard deposits, concrete, debris, pipes or any other material in the manhole or that is within outside wall of the manhole wall will be incidental to the rehabilitation of sanitary sewer pipes and manholes.
- H. Any bypass pumping necessary for obstruction removal shall be considered incidental.

4.09 EXTRA LENGTH FOR OBSTRUCTION REMOVAL (BY EXCAVATION)

- A. As per Section 02769.
- B. This bid item is for that footage of pipe which may have to be removed and replaced which is greater than the minimum length of pipe removed and replaced by obstruction removal (excavation).
- C. The extra footage (which is greater than the minimum length, i.e., six (6) feet) shall be paid for as "extra length for obstruction removal (excavation)" by linear feet regardless of pipe size and depth as indicated in the bid proposal.
- E. This item includes all items which are included in the obstruction removal (excavation) bid item.
- C. When extra length for obstruction removal (by excavation) occurs under pavement (includes streets, driveways, and sidewalks), cement stabilized sand bedding and backfill shall be incidental. Payment removal and replacement (includes streets, driveways, and sidewalks) shall be paid separately.

4.10 ABANDON AND GROUT FILL EXISTING STUBOUT

- A. Measurement for grout fill and abandonment of existing stubout for sanitary sewers is on a cubic yard basis for each diameter of sewer being abandoned. Measurement will be along the centerline of the sewer force main.
- B. Payment will be full compensation for all material, equipment, and labor required for complete abandonment grouting, including air venting, testing, temporary and permanent plugs, PVC pipes and all incidentals. Payment for provision of plugs on lines not designated for grout fill and abandonment shall be incidental to the project. Payment for any excavation access pits to aid in grouting shall be incidental to the project.

- C. Acceptability of grout material is based on achieving an average strength within the range of 75 to 150 psi as defined in Specification Section 02051. Grout that is out of range after placement may be accepted with a price adjustment of 1.0 percent price deduction for each psi average compressive strength below 75 psi and 0.5 percent price deduction for each psi average compressive strength above 150 psi, as applicable to the material volume represented by the test series. Grout material placements having excessive shrinkage shall be remedied by Contractor according to Specification Section 02051, without additional compensation.
- D. The Contractor shall obtain Engineer's concurrence prior to abandoning stubout. The level of cleaning effort if necessary on the stubout designated for abandonment shall meet the Grouting Material's Manufacturers requirements. The Contractor shall meet the Grouting Manufacturers requirements and obtain his concurrence prior to the abandonment efforts. The Contractor shall have the Grouting Manufacturer's representative available on site during the entire duration of abandonment operations to ensure that the abandonment efforts are being performed to the manufacturer's requirements.
- E. The Contractor is made aware of utilities that are in close proximity to the sanitary sewer designated for abandonment. The Contractor shall take all necessary precautions to maintain the integrity of the utilities as part of his abandonment efforts.

4.11 PAVEMENT REPAIR

- A. Removal and Replacement of Existing Pavement or Roadway
 - 1. This bid item is intended to apply to the removal and replacement of pavement or roadway types as identified in the bid proposal. These types may include:
 - a. Concrete Pavement
 - b. Asphalt Pavement
 - 2. In the event a pavement to be removed and replaced is concrete pavement with asphalt overlay, the cost of replacing the asphalt to match existing shall be incidental to the cost of the concrete removal and replacement bid item.
 - 3. This bid item is to be measured and paid for per square yard. However, measurement and payment will only be made to the limits of removal and replacement as called for in the specifications and listed below. Additional pavement beyond those limits which is removed and replaced shall be incidental.
 - 4. Limits of Measurement and Payment for Pavement Removal and Replacement for all types of pavements or roadways:
 - a. Area of the theoretical trench plus an area 12-inches wide around all limits of the theoretical trench limits; with the minimum trench width being 3-feet.
 - b. The length of the trench by which the theoretical trench area can be calculated is:
 - 1. Where pipe ends at new manhole: 4-feet beyond the center of the manhole, all depths.
 - 2. At point repairs:

- a. 1-foot beyond the minimum length of replacement pipe for 0-10-feet deep.
 - b. 2-feet beyond the minimum length of replacement pipe for 10-feet to 15-feet deep.
 - c. 3-feet beyond the minimum length of replacement for greater than 15-feet deep.
(Note: The minimum length of replacement pipe is provided in Section 02763.)
 - c. If concrete is removed and replaced which has asphalt overlay, the limits stated herein shall apply to the concrete pavement. The existing asphalt should be removed and replaced a minimum of 6-inch beyond the limits of concrete. No additional payment will be made for this additional asphalt.
 - d. Payment will not be made for removed and replaced pavement outside the above stated limits.
5. This bid item includes all work to sawcut, full depth removal and disposal of the existing pavement or roadway material, and replace the pavement section to the existing thickness or thicker and replace the pavement section to equal or better than the existing pavement section.
Pavement sections thicknesses shall match existing pavement thickness and in no case will be less than the following thicknesses:
- a. Concrete: 7-inch reinforced concrete - doveled into existing concrete, compacted subgrade.
 - b. Asphalt Overlay on top of concrete - 1-inch
 - c. Asphalt Pavement = 1½-inch asphaltic concrete, 12-inch crushed stone and compacted subgrade.
6. Removal and Replacement of Existing Pavement or Roadway will only be considered for payment when pavement is removed and replaced over main sewer lines where the following occurs:
- a. Point repair on main
 - b. Removal and replacement of main, manhole, or manhole ring and cover
 - c. Sanitary sewer main installed by open cut
 - d. Obstruction removal (by excavation) on the main.
7. Payment for Removal and Replacement of pavements or roadways will not be made on:
(Removal and replacement of pavement is incidental to these items):
- a. Service reconnections (by excavation).
 - b. Additional length of service lines.
 - c. Service reconnections (by excavation on replacement pipe).
 - d. Pits for sliplining and pipe bursting.
 - e. Entry and receiving pits for augering.
 - f. Service reconnections and pipe associated with point repair.
 - g. Abandonment of service connections.
 - h. Areas removed and replaced as a result of a corrective repair due to faulty construction such as a faulty service connection by remote or retrieval of cleaning and T.V. equipment.
8. Contractor shall refer to the appropriate specifications for other items which may affect measurement and payment.

9. This item shall be payment for all work necessary to satisfactorily complete the removal and replacement complete in place.

END OF SECTION

SECTION 01035

CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for processing Change Orders, including:
 - 1. Assignment of a responsible individual for approval and communication of changes in the Work;
 - 2. Documentation of change in Contract Price and Contract Time;
 - 3. Change procedures, using proposals and construction contract modifications, work change directive, stipulated price change order, unit price change order, time and materials change order;
 - 4. Execution of Change Orders;
 - 5. Correlation of Contractor submittals.

1.02 REFERENCES

- A. Rental Rate Blue Book for Construction Equipment (Data Quest Blue Book). Rental Rate is defined as the full unadjusted base rental rate for the appropriate item of construction equipment.

1.03 RESPONSIBLE INDIVIDUAL

- A. Contractor shall provide a letter indicating the name and address of the individual authorized to execute change documents, and who shall also be responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. The information shall be provided at the Preconstruction Conference.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Contractor shall maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Contractor shall document each proposal for a change in cost or time with sufficient data to allow evaluation of the proposal.
- C. Proposals shall include, as a minimum, the following information as applicable:

1. Quantities of items in the original Bid Proposal with additions, reductions, deletions, and substitutions.
 2. Quantities and cost of items in original Schedule of Values with additions, reductions, deletions, and substitutions.
 3. When Work items were not included in the Bid Proposal, Contractor shall provide unit prices for the new items, with supporting information as required by the Engineer.
 4. Justification for any change in Contract Time.
 5. Additional data upon request.
- D. For changes in the Work performed on a time-and-material basis, the following additional information may be required:
1. Quantities and description of products and equipment.
 2. Taxes, insurance and bonds.
 3. Overhead and profit.
 4. Dates and times work was performed, and by whom.
 5. Time records and certified copies of applicable payrolls.
 6. Invoices and receipts for products, rented equipment, and subcontracts, similarly documented.
- E. Rented equipment will be paid to the Contractor by actual invoice cost for the duration of time required to complete the extra work. If the extra work comprises only a portion of the rental invoice where the equipment would otherwise be on the site, the Contractor shall compute the hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and one week equals 40 hours.) Operating costs shall not exceed the estimated operating costs given for the item of equipment in the Blue Book.
- F. For changes in the work performed on a time-and-materials basis using Contractor-owned equipment, compute rates with the Blue Book as follows:
1. Multiply the appropriate Rental Rate by an adjustment factor of 70 percent plus the full rate shown for operating costs. The Rental Rate utilized shall be the lowest cost combination of hourly, daily, weekly or monthly rates. Use 150 percent of the Rental Rate for double shifts (one extra shift per day) and 200 percent of the Rental Rate for more than two shifts per day. No other rate adjustments shall apply.

2. Standby rates shall be 50 percent of the appropriate Rental Rate shown in the Blue Book. Operating costs will not be allowed.

1.05 CHANGE PROCEDURES

- A. Changes to Contract Price or Contract Time can only be made by issuance of a Change Order. Issuance of a Work Change Directive or written acceptance by the Engineer of changes will be formalized into Change Orders. All changes will be in accordance with the requirements of the General Conditions.
- B. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.
- C. Contractor may request clarification of Drawings, Specifications or Contract Documents or other information. Response by the Engineer to a Request for Information does not authorize the Contractor to perform tasks outside the scope of the Work. All changes must be authorized as described in this section.

1.06 PROPOSALS AND CONTRACT MODIFICATIONS

- A. The Engineer may issue a Request for Proposal, which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications. The Engineer may also request a proposal in the response to a Request for Information. Contractor will prepare and submit its Proposal within 7 days or as specified in the request.
- B. The Contractor may propose an unsolicited change by submitting a Proposal to the Engineer describing the proposed change and its full effect on the Work, with a statement describing the reason for the change and the effect on the Contract Price and Contract Time including full documentation.

1.07 WORK CHANGE DIRECTIVE

- A. Engineer may issue a signed Work Change Directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work and will designate a method of determining any change in Contract Price or Contract Time.
- C. Contractor shall proceed promptly to execute the changes in the Work in accordance with the Work Change Directive.

1.08 STIPULATED PRICE CHANGE ORDER

- A. A stipulated price Change Order will be based on an accepted Proposal including the Contractor's lump sum price quotation.

1.09 UNIT PRICE CHANGE ORDER

- A. Where Unit Prices for the affected items of Work are included in the Bid Proposal, the unit price Change Order will be based on unit prices as originally bid, subject to provisions of the General Conditions.
- B. Where unit prices of Work are not pre-determined in the Bid Proposal, Work Change Directive or accepted Proposal will specify the unit prices to be used.

1.10 TIME-AND-MATERIAL CHANGE ORDER

- A. Contractor shall provide an itemized account and supporting data after completion of change, within time limits indicated for claims in the General Conditions.
- B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the General Conditions.
- C. Contractor shall maintain detailed records of work done on time-and-material basis as specified in paragraph 1.04, Documentation of Change in Contract Price and Contract Time.
- D. Contractor shall provide full information required for evaluation of changes, and shall substantiate costs for changes in the Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

- A. Engineer will issue Change Orders, Work Change Directives, or accepted Proposals for signatures of parties as described in the General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

- A. For Stipulated Price Contracts, Contractor shall promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.
- B. For Unit Price Contracts, the next monthly estimate of work after acceptance of a Change Order will be revised to include any new items not previously included and the appropriate unit rates.
- C. Contractor shall promptly revise progress schedules to reflect any change in Contract Time, and shall revise schedules to adjust time for other items of work affected by the change, and resubmit for review.
- D. Contractor shall promptly enter changes to the on-site and record copies of the Drawings, Specifications or Contract Documents as required in Section 01720 - Project Record Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01040

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes general coordination including preconstruction conference, site mobilization conference, and progress meetings.

1.02 RELATED DOCUMENTS

- A. Coordination is required throughout the documents. Refer to all of the Contract Documents and coordinate as necessary.

1.03 ENGINEER AND REPRESENTATIVES

- A. The Engineer may act directly or through designated representatives as defined in the General Conditions and as identified by name at the preconstruction conference.

1.04 CONTRACTOR COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Specifications sections to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and clean up of Work for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
- C. Coordinate access to site for correction of nonconforming Work to minimize disruption of Owner's activities where Owner is in partial occupancy.

1.05 PRECONSTRUCTION CONFERENCE

- A. Engineer will schedule a preconstruction conference.
- B. Attendance Required: Engineer's representatives, Owner's representatives, Consultants, TWDB representative, Contractor, and major Subcontractors.
- C. Agenda:
 - 1. Distribution of Contract Documents
 - 2. Designation of personnel representing the parties in Contract, and the Consultant.
 - 3. Review of insurance

4. Discussion of formats proposed by the Contractor for schedule of values, and construction schedule
5. Procedures and processing of shop drawings and other submittals, substitutions, pay estimates or applications for payment, Requests for Information, Request for Proposal, Change Orders, and Contract closeout
6. Scheduling of the Work and coordination with other contractors
7. Review of Subcontractors and Suppliers
8. Appropriate agenda items listed for Site Mobilization Conference, paragraph 1.06 C, when preconstruction conference and site mobilization conference are combined
9. Procedures for testing
10. Procedures for maintaining record documents
11. Owner's requirements
12. Construction Schedule
13. Storm Water Pollution Prevention Plan
14. Submittals and TPDES Requirements

1.06 SITE MOBILIZATION CONFERENCE

- A. When required by the Contract Documents, Engineer will schedule a conference at the Project site prior to Contractor occupancy.
- B. Attendance Required: Engineer's representatives, Owner's representatives, Consultants, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 1. Use of premises by Owner and Contractor
 2. Safety and first aid procedures
 3. Construction controls provided by Owner
 4. Temporary utilities
 5. Survey and layout
 6. Security and housekeeping procedures

1.07 PROGRESS MEETINGS

- A. Project meetings shall be held at Project field office or other location as designated by the Engineer. Meeting shall be held at monthly intervals, or more frequent intervals if directed by Engineer.
- B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Engineer's representatives, Owner's representatives, and Consultants as appropriate to agenda topics for each meeting.
- C. Engineer or his representative will make arrangements for meetings, and recording minutes.
- D. Engineer or his representative will prepare the agenda and preside at meetings.
- E. Contractor shall provide required information and be prepared to discuss each agenda item.
- F. Agenda:
 - 1. Review minutes of previous meetings
 - 2. Review of Work progress schedule submittal, and pay estimates, payroll and compliance submittals
 - 3. Field observations, problems, and decisions
 - 4. Identification of problems which impede planned progress
 - 5. Review of submittals schedule and status of submittals
 - 6. Review of Request for Information and Request for Proposal status
 - 7. Change order status
 - 8. Review of off-site fabrication and delivery schedules
 - 9. Maintenance of progress schedule
 - 10. Corrective measures to regain projected schedules
 - 11. Planned progress during succeeding work period
 - 12. Coordination of projected progress
 - 13. Maintenance of quality and work standards
 - 14. Effect of proposed changes on progress schedule and coordination

15. Other items relating to Work

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting, patching and fitting of Work to existing facilities, or to accommodate installation or connection of Work with existing facilities, or to uncover work for access, inspection or testing.

1.02 UNIT PRICE

- A. No separate payment for work under this section. Include the costs for performing the work in the unit price for related work.

1.03 CUTTING AND PATCHING

- A. Perform activities to avoid interference with facility operations and the Work of others in accordance with the General Conditions of the Contract.
- B. Execute cutting and patching, including excavation, backfill and fitting to:
 - 1. Remove and replace defective Work or Work not conforming to the Drawings and Specifications.
 - 2. Take samples of installed Work as required for testing.
 - 3. Remove construction required to provide for specified alteration or addition to existing work.
 - 4. Uncover Work to provide for inspection or reinspection of covered Work by the Engineer or regulatory agencies having jurisdiction.
 - 5. Connect any Work that was not accomplished in the proper sequence to completed Work.
 - 6. Remove or relocate existing utilities and pipes which obstruct Work to which connections must be made.
 - 7. Make connections or alterations to existing or new facilities.
 - 8. Provide openings, channels, chases and flues, if any, and do cutting, patching and finishing.
- C. Restore existing work to a state equal to or better than that prior to cutting and patching. Restore new Work to standards of these Specifications.
- D. Support, anchor, attach, match, trim and seal materials to the Work of others. Unless otherwise specified, furnish and install sleeves, inserts, hangers, required for the execution of the Work.

- E. Provide shoring, bracing and support as required to maintain structural integrity and protect adjacent Work from damage during cutting and patching. Before cutting beams or other structural members, anchors, lintels or other supports, request written instructions from the Engineer. Follow such instructions, as applicable.

1.04 SUBMITTALS

- A. Submit written notice to the Engineer requesting consent to proceed prior to cutting which may affect structural integrity or design function, Owner operations, or work of another contractor.
- B. Include the following in submittal:
 - 1. Identification of project.
 - 2. Description of affected Work.
 - 3. Necessity for cutting.
 - 4. Effect on other work and on structural integrity.
 - 5. Include description of proposed Work:
 - a. Scope of cutting and patching.
 - b. Contractor, subcontractor or trade to execute Work.
 - c. Products proposed to be used.
 - d. Extent of refinishing.
 - e. Schedule of operations.
 - 6. Alternatives to cutting and patching, if any.
- C. Should conditions of Work or schedule indicate change of materials or methods, submit a written recommendation to the Engineer including:
 - 1. Conditions indicating change.
 - 2. Recommendations for alternative materials or methods.
 - 3. Submittals as required for substitutions.
- D. Submit written notice to the Engineer designating time Work will be uncovered for observation. Do not begin cutting or patching operations until authorized by the Engineer.

1.05 CONNECTIONS TO EXISTING FACILITIES

- A. Perform construction necessary to complete connections and tie-ins to existing facilities. Keep all existing facilities in continuous operation unless otherwise specifically permitted in these Specifications or approved by the Engineer.
- B. Coordinate with the Engineer, interruption of service requiring connection into existing facilities. Bypassing of wastewater or sludge to waterways is not permitted. Provide temporary pumping facilities to handle wastewater if necessary. Use temporary bulkheads (e.g., inflatable plugs) to minimize disruption. Provide temporary power supply and piping to facilitate construction where necessary.

- C. Submit a detailed schedule of proposed connections, including shut-downs and tie-ins. Include in the submittal the proposed time and date as well as the anticipated duration of the Work. Submit the detailed schedule coordinated with the construction schedule.
 - 1. Provide specific time and date information to the Engineer 48 hours in advance of proposed Work.

- D. Procedures and Operations:
 - 1. The Contractor shall operate existing pumps, valves and gates required for sequencing procedures as directed by the Engineer. Do not operate any valve, gate or other item of equipment without the knowledge of the Engineer.
 - 2. Insofar as possible, equipment shall be tested and in operating condition before final tie-ins are made to connect equipment to the existing facility.
 - 3. Carefully coordinate Work and schedules. Provide written notice to the Engineer at least 48 hours before shut-downs or by-passes are required.

PART 2 P R O D U C T S - N O T U S E D.

PART 3 E X E C U T I O N - N O T U S E D.

END OF SECTION

SECTION 01050

FIELD SURVEYING

PART 1 GENERAL

1.01 QUALITY CONTROL

- A. Conform to State of Texas laws for surveys requiring licensed surveyors. Employ a land surveyor acceptable to Engineer, if required.

1.02 SUBMITTALS

- A. Submit to Engineer the name, address, and telephone number of Surveyor before starting survey work.
- B. Submit documentation verifying accuracy of survey work on request.
- C. Submit information under provisions of Section 01300 - Submittals.

1.03 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Submit Record Documents under provisions of Section 01720 - Project Record Documents.

1.04 EXAMINATION

- A. Verify locations of survey control points prior to starting Work. Contractor shall utilize bench mark as basis for field verification of all temporary benchmark elevation prior to commencement of work. Contractor shall provide letter to Engineer once he is in agreement with all provided temporary benchmark elevations.
- B. Notify Engineer immediately of any discrepancies discovered.

1.05 SURVEY REFERENCE POINTS

- A. Control datum for survey is that established by Owner-provided survey and indicated on Drawings.
- B. Locate and protect survey control points, including property corners, prior to starting site work; preserve permanent reference points during construction.
- C. Notify Engineer 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.

- D. Report promptly to Engineer the loss or destruction of any reference point.
- E. Contractor shall reimburse Owner for cost of reestablishment of permanent reference points and temporary benchmarks disturbed by Contractor's operations.

1.06 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
- C. Establish elevations, lines and levels to provide quantities required for measurement and payment and to provide appropriate controls for the Work. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading; fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
- D. Verify periodically layouts by same means.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes general quality assurance as related to Reference Standards and a list of references.

1.02 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on the date as stated in the General Conditions.
- C. Request clarification from Engineer before proceeding should specified reference standards conflict with Contract Documents.

1.03 SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W Washington, DC 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
AGC	Associated General Contractors of America 333 John Carlyle Street Alexandria, VA 22314
AI	Asphalt Institute Research Park Drive P.O. Box 14052 Lexington, KY 40512
AITC	American Institute of Timber Construction 7012 S. Revere Parkway, Suite 140 Englewood, CO 80112

AISC	American Institute of Steel Construction One East Wacker Dr. Chicago, IL 60601
AISI	American Iron and Steel Institute 1101 17 th Street NW, Suite 1300 Washington, DC 20036
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016
ANSI	American National Standards Institute 1819 L Street NW, Sixth Floor Washington, DC 20036
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005
AREA	American Railway Engineering Association 8201 Corporate Drive, Suite 1125 Landover, Maryland 20785
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428
AWPA	American Wood-Preservers' Association P.O. Box 5690 Granbury, TX 76049
AWS	American Welding Society 550 NW 42 nd Avenue Miami, FL 33126
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CLFMI	Chain Link Fence Manufactures Institute 9891 Broken Land Parkway, Suite 300 Columbia, MD 21046

CRD	U.S.A. Corps. Of Engineers
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173-4758
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FS	Federal Standardization Documents General Services Administration, Specifications Unit (WFSIS) 7 th and D Streets, S.W. Washington, DC 20406
ICEA	Insulated Cable Engineer Association P.O. Box 440 S. Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane, P.O. Box 1331 Piscataway, NJ 08855-1331
MIL	Military Specifications General Services Administration, Specifications Unit (WFSIS) 7 th and D Streets, S.W. Washington, DC 20406
NACE	National Association of Corrosion Engineers 1440 South Creek Drive Houston, TX 77084-4906
NEMA	National Electrical Manufacturers' Association 1300 North 17 th Street, Suite 1847 Rosslyn, VA 22209
NFPA	National Fire Protection Association 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02269-9101
OSHA	Occupational Safety Health Administration U.S. Department of Labor, Office of Public Affairs Room N3647 Washington, DC 20210

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083
PCI	Prestressed Concrete Institute 209 W. Jackson Blvd. Chicago, IL 60606
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021
SSPC	Society for Protective Coatings (Steel Structures Painting Council) 40 24 th Street, Sixth Floor Pittsburgh, PA 15222
TAC	Texas Administrative Code Texas Water Resources Conservation Commission P.O. Box 13087 Library MC-196 Austin, TX 78711-3087
TCEQ	Texas Commission on Environmental Quality P.O. Box 13087 Austin, TX 78711-3087
TxDOT	Texas Department of Transportation 125 E. 11 th Street Austin, TX 78701-2483
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234

PART 2 P R O D U C T S - NOT USED

PART 3 E X E C U T I O N - NOT USED

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures for:
 - 1. Schedule of Values
 - 2. Construction Schedules
 - 3. Shop Drawings, Product Data, and Samples
 - 4. Operations and Maintenance Data
 - 5. Manufacturer's Certificates
 - 6. Construction Photographs
 - 7. Project Record Documents
 - 8. Design Mixes
 - 9. Video Tapes or DVD's

1.02 SUBMITTAL PROCEDURES

- A. Scheduling and Handling
 - 1. Schedule submittals well in advance of the need for the material or equipment for construction. Allow time to make delivery of material or equipment after submittal is approved.
 - 2. Develop a submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. The Engineer will review and return submittals to the Contractor as expeditiously as possible but the amount of time required for review will vary depending on the complexity and quantity of data submitted. In no case will a submittal schedule be acceptable which allows less than 30 days for initial review by the Engineer. This time for review shall in no way be justification for delays or additional compensation to the Contractor.
 - 3. The Engineer's review of submittals covers only general conformity to the Drawings, Specifications and dimensions which affect the layout. The Contractor is responsible for quantity determination. No quantities will be ver-

ified by the Engineer. The Contractor is responsible for any errors, omissions or deviations from the Contract requirements; review of submittals in no way relieves the Contractor from his obligation to furnish required items according to the Drawings and Specifications.

4. Submit 6 copies of documents unless otherwise specified in the following paragraphs or in the Specifications.
5. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
6. The Contractor shall assume the risk for material or equipment which is fabricated or delivered prior to approval. No material or equipment shall be incorporated into the Work or included in periodic progress payments until approval has been obtained in the specified manner.

B. Transmittal Form and Numbering

1. Transmit each submittal to the Engineer with a transmittal form.
2. Sequentially number each transmittal form beginning with the number 1. Resubmittals shall use the original number with an alphabetic suffix (i.e., 2A for first resubmittal of Submittal 2 or 15C for third resubmittal of Submittal 15). Each submittal shall only contain one type of work, material, or equipment. Mixed submittals will not be accepted.
3. Identify variations from requirements of Contract Documents and identify product or system limitations.
4. For submittal numbering of video tapes or DVD's, coordinate with the Engineer.

C. Contractor's Certification

1. Each submittal shall contain a statement or stamp signed by the Contractor, certifying that the items have been reviewed in detail and are correct and in accordance with Contract Documents, except as noted by any requested variance.

1.03 SCHEDULE OF VALUES

- A. Submit a Schedule of Values at least 10 days prior to the first Application for Payment. A Schedule of Values shall be provided for each of the items indicated as Lump Sum (LS) in the Bid Proposal for which the Contractor requests to receive progress payments.
- B. Schedule of Values shall be typewritten on 8-1/2" x 11", plain bond, white paper. Use the Table of Contents of this Project Manual as a format for listing costs of Work by Section.

- C. Round off figures for each listed item to the nearest \$100.00 except for the value of one item, if necessary, to make the total price for all items listed in the Schedule of Values equal to the applicable lump sum amount in the Bid Proposal.
- D. For Unit Price Contracts, items should include a proportional share of Contractor's overhead and profit, such that the total of all items listed in the Schedule of Values equals the Contract amount. For Stipulated Price Contracts, mobilization, bonds, and insurance may be listed as separate items in the Schedule of Values.
- E. For lump sum equipment items where submittal of operations and maintenance data and testing are required, include a separate item for equipment operation and maintenance data submittal valued at 5 percent of the lump sum amount and a separate item for testing and adjusting valued at 5 percent of the lump sum amount.
- F. Revise the Schedule of Values and resubmit for items affected by Contract Modifications, Change Orders, and Work Change Directives. Submit revised Schedule of Values 10 days prior to the first Application for Payment after the changes are approved by the Engineer.

1.04 CONSTRUCTION SCHEDULES

- A. Submit Construction Schedules for the Work in accordance with the requirements of this Section. The Construction Schedule Submittal shall be a bar chart, either computer generated, or prepared manually and a narrative report.
- B. During the Pre-construction Meeting, as noted in Section 01040 - Coordination and Meetings, the Contractor shall provide a sample of the format to be used for the Construction Schedule Submittal. The format is subject to approval by the Engineer. Review of the submittal will be provided within 7 days of the submittal of the sample.
- C. Within 7 days of the receipt of approval of the Contractor's format, or 14 days of the Notice to Proceed, whichever is later, the Contractor shall submit a proposed Construction Schedule for review. The Construction Schedule Submittal shall meet the following requirements:
 - 1. The schedule shall usually include a total of at least 20 but not more than 50 activities. Fewer activities may be accepted, if approved by the Engineer.
 - 2. For projects with work at different physical locations, each location should be indicated separately within the schedule.
 - 3. For projects with multiple crafts or significant subcontractor components, these elements should be indicated separately within the schedule.
 - 4. For projects with multiple types of tasks within the scope, these types of work should be indicated separately within the schedule.

5. For projects with significant major equipment items or materials worth over 30 percent of the Total Contract Price, the schedule shall indicate dates when these items are to be purchased, when they are to be delivered, and when installed.
 6. For projects where operating plants are involved, each period of work which will require the shut down of any process or operation shall be identified in the Schedule and must be agreed to by the Engineer prior to starting work in the area.
 7. A tabulation of the estimated monthly billings for the work shall be prepared and submitted by the Contractor with the first schedule submittal. This information is not required in the monthly updates, unless significant changes in Work require resubmittal of the schedule for review. The total for each month and a cumulative total will be indicated. These monthly forecasts are only for planning purposes of the Engineer. Monthly payments for actual work completed will be made by the Engineer in accordance with the General Conditions of Agreement.
- D. The Contractor must receive approval of the Engineer for the Schedule and billing estimate prior to the first monthly Application for Payment. No payment will be made until these are accepted.
- E. Upon written request from the Engineer, the Contractor shall revise and submit for approval all or any part of the Construction Schedule to reflect changed conditions in the Work or deviations made from the original plan and schedule.
- F. The Contractor's Construction Schedule shall thereafter be updated with the Actual Start and Actual Finish Dates, Percent Complete, and Remaining Duration of each Activity and submitted monthly. The date to be used in updating the monthly Construction Schedule shall be the same Date as is used in the monthly Application for Payment. This monthly update of the schedule shall be required before the monthly Application for Payment will be processed for payment.
- G. The narrative Schedule Report shall include a description of changes made to the Construction Schedule; Activities Added to the Schedule; Activities Deleted from the Schedule; any other changes made to the Schedule other than the addition of Actual Start Dates and Actual Finish Dates and Remaining Durations.

1.05 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. Shop Drawings
1. Submit shop drawings for review as required by the Specifications.
 2. Contractor's Certification, as described in paragraph 1.02C, shall be placed on each drawing.
 3. The drawings shall accurately and distinctly present the following:
 - a. Field and erection dimensions clearly identified as such

- b. Arrangement and section views
 - c. Relation to adjacent materials or structure including complete information for making connections between work under this Contract and work under other contracts
 - d. Kinds of materials and finishes
 - e. Parts list and descriptions
 - f. Assembly drawings of equipment components and accessories showing their respective positions and relationships to the complete equipment package
 - g. Where necessary for clarity, identify details by reference to drawing sheet and detail numbers, schedule or room numbers as shown on the Contract Drawings.
4. Drawings shall be to scale, and shall be a true representation of the specific equipment or item to be furnished.
- B. Product Data**
1. Submit product data for review as required in Specification sections.
 2. Contractor's Certification, as described in paragraph 1.02C, shall be placed on each data item submitted.
 3. Mark each copy to identify applicable products, models, options to be used in this Project. Supplement manufacturers' standard data to provide information unique to this Project, where required by the Specifications.
 4. For products specified only by reference standard, give manufacturers, trade name, model or catalog designation and applicable reference standard.
 5. For products proposed as alternates to "approved" products, as described in Section 01630 - Product Options and Substitutions, provide all information required to demonstrate the proposed products meet the level of quality and performance criteria of the "approved product".
- C. Samples**
1. Submit samples for review as required by the Specifications.
 2. Contractor's Certification, as described in paragraph 1.02C, shall be placed on each sample or a firmly attached sheet of paper.
 3. Submit the number of samples specified in Specifications; one of which will be retained by the Engineer.

4. Reviewed samples which may be used in the Work are identified in Specifications.

1.06 OPERATIONS AND MAINTENANCE DATA

- A. When specified in Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, operation, adjusting, finishing, and maintenance.
- B. Contractor's Certification, as described in paragraph 1.02C, shall be placed on front page of each document.
- C. Identify conflicts between manufacturers' instructions and Contract Documents.

1.07 MANUFACTURER'S CERTIFICATES

- A. When specified in Specification sections, submit manufacturers' certificate of compliance for review by Engineer.
- B. Contractor's Certification, as described in paragraph 1.02C, shall be placed on front page of the certificate.
- C. Submit supporting reference data, affidavits, and certifications as appropriate.
- D. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.08 CONSTRUCTION PHOTOGRAPHS

- A. Submit photographs in accordance with Section 01380.

1.09 PROJECT RECORD DOCUMENTS

- A. Submit Project Record Documents in accordance with section 01720-Project Records Documents.

1.10 DESIGN MIXES

- A. When specified in Specifications, submit design mixes for review.
- B. Contractor's Certification as described in paragraph 1.02C, shall be placed on front page of each design mix.
- C. Mark each design mix to identify proportions, gradations, and additives for each class and type of design mix submitted. Include applicable test results on samples for each mix.
- D. Maintain a copy of approved design mixes at mixing plant.

PART 2 P R O D U C T S - N O T U S E D

PART 3 E X E C U T I O N - N O T U S E D

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Photographic requirements for construction photographs and submittals

1.02 UNIT PRICES

- A. No separate payment will be made for work under this section. Include the cost in the unit price of related work.

1.03 SUBMITTALS

- A. Refer to Section 01300 for submittal requirements.
- B. Prints: Prepare 2 prints of each view and submit 1 print directly to the Engineer within 7 days of taking photographs. One print shall be retained by the Contractor and made available at all times for reference.
- C. Digital Photos: With each submittal include digital photograph on CD-ROM with same information.

PART 2 PRODUCTS

2.01 PRECONSTRUCTION PHOTOGRAPHS

- A. Prior to the commencement of any construction, take 35mm color photographs of the entire route of the project. If photographs taken digitally, photographs shall be 2 megapixel quality.
- B. Photographs: Two prints; color, matte finish; 3 x 5-inch size, mounted on 8-1/2 x 11-inch soft card stock, with left edge binding margin for three hole punch, or in plastic pockets in three-ring notebook.
- C. The photographs shall show:
 - 1. Date photographs were taken
 - 2. Location of the photograph, house number and street name.

This information may be shown on a chalkboard in the photograph or by a label on the mountings.

- D. Photographs should show the condition of the following:
1. Esplanades and boulevards
 2. Yards (near side and far side of street)
 3. Housewalk, sidewalk and driveway.
 4. Curb
 5. Area between walk and curb
 6. Particular features (yard light, shrubs, fences, trees, etc.)
 7. Trees, shrubs and grass

2.02 POST CONSTRUCTION PHOTOGRAPHS

- A. On completion of construction, provide photographs of any public or private property which has been repaired or restored and any damage which is the subject of complaints.
- B. Submit in same quantity and format as the preconstruction photographs.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

1.0 GENERAL

1.1 CONDITIONS

- A. Testing, inspection, and control of materials required by these specifications shall be performed by a commercial testing laboratory meeting the specified requirements.
- B. Owner will select and pay for services of commercial testing laboratory to perform density tests for field control and to perform the various laboratory testing services necessary for field control of the work as specified in respective specification sections, except Contractor shall pay for services of commercial testing laboratory approved by Owner to perform the following:
 - 1. Pipe diameter deflection tests on all flexible and semi-rigid sanitary sewer collection system pipe installation.
 - 2. Testing of systems or partially completed systems, such as testing of water and sewer systems, water supply and drainage systems, air systems, electrical systems and grounding systems.
 - 3. Laboratory services required to establish mix design proposed for use for Portland cement concrete, asphaltic concrete mixtures, and other material mixes requiring control by testing laboratory.
 - 4. Analysis of aggregates, fixing gradations, and the preparation and testing of design cylinders, beams, or specimens, and other services required to establish design or redesign of material mixes requiring control by testing laboratory when required because of change in source of materials or other conditions not caused by Owner.
 - 5. Tests required to establish optimum moisture of earth and base materials and to determine required compactive effort to meet density requirements (Contractor shall pay for all proctor curves to establish optimum moisture and Owner shall pay for all density tests).
 - 6. Cores to test for thickness of paving.
 - 7. Testing and inspection performed for the Contractor's convenience.
 - 8. Retesting and repetitions of laboratory services when initial tests indicate work does not comply with requirements of Contract Documents.
- C. Specified testing frequencies are recommended standards, and may be increased or decreased by the Owner or Engineer as deemed necessary for quality control of materials and the work.
- D. Reports and commentaries by testing laboratory shall in no way relieve Contractor of his obligation to perform work in full compliance with standards and provisions of the Contract Documents.

- E. The Contractor shall not be relieved of his obligation to perform work in full compliance with the standards and provisions of the Contract Documents by reason of the Owner's performance in testing or refraining from testing the work.
- F. Owner reserves right to take samples and specimens, and conduct tests on material and work provided by Contractor to assure quality control.

1.2 REQUIREMENTS OF LABORATORY

- A. Meet basic requirements of ASTM E329.
- B. Testing Equipment: Calibrated at maximum twelve month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
- C. Testing laboratory is only required to have testing facilities for work included in this project.
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection.
- E. Submit memorandum of remedies of any deficiencies reported by inspection.

1.3 LABORATORY DUTIES AND LIMITATIONS OF AUTHORITY

- A. Cooperate with Engineer, Owner and Contractor.
 - 1. Unless directed by Owner or Engineer, types and frequencies of tests as specified in specifications sections for field quality control shall not be exceeded.
 - 2. Owner may not accept charges for tests in excess of types and frequencies specified in specifications sections unless authorized by Engineer or Owner.
 - 3. Charges for tests to be paid for by Owner shall be submitted promptly to Engineer to allow adequate time for his review before time for payment by Owner.
 - 4. Unless otherwise directed or stipulated, samples, specimens, and field test locations shall be selected under the control of the Engineer.
- B. Provide qualified personnel promptly on notice.
- C. Perform required inspections, sampling, and testing of materials and methods of construction, including making and curing concrete test specimens.
- D. Ascertain Contractor's compliance with specifically named standards of the Contract Documents.

- E. Comply with specified testing and sampling standards, or recognized authoritative testing and sampling standards when none are specifically named in the Specifications.
- F. Promptly notify Engineer, Owner and Contractor of irregularities or deficiencies of work which are observed during performance of services.
- G. Promptly distribute copies of reports of inspections and tests:
 - 1. Owner: One copy.
 - 2. Engineer: One copy.
 - 3. Contractor: Two copies.
- H. Perform additional services as required by Owner.
- I. Laboratory is not authorized to:
 - 1. Revoke, alter, enlarge on, or waive requirements of Contract Documents.
 - 2. Approve or accept any portion of work.
 - 3. Perform any duties of Contractor.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. Before starting to use proposed design mix and mix materials in construction, arrange for testing of design mixes and mix materials for Portland cement concrete, asphaltic concrete, and other material mixes requiring control by testing laboratory.
- B. Cooperate with laboratory personnel, provide access to work, and to construction and fabrication operations.
- C. Provide samples of materials to be tested in required quantities.
- D. Provide adequate on-site storage area for testing laboratory.
- E. Furnish copies of mill test reports for the materials being used on the job when requested by Engineer.
 - 1. Mill certificates will be acceptable when it is definite that certified mill test sheets apply to the material being supplied.
- F. Furnish casual labor to provide access to work to be tested, to obtain and handle samples at site, and to facilitate inspections and tests.
- G. Notify laboratory and Engineer 48 hrs. minimum in advance of operations requiring control by testing laboratory, to allow for assignment of personnel and scheduling of tests.

- H. Arrange with laboratory and pay for:
 - 1. Retesting required for failed tests.
 - 2. Retesting for nonconforming Work.
 - 3. Additional sampling and tests requested by Contractor beyond specified requirements.
 - 4. Insufficient notification of cancellation of tests for work scheduled but not performed.

1.5 SPECIFIC TESTS, INSPECTIONS AND METHODS REQUIRED

- A. Certification of Products: As required by respective specification sections.
- B. Test, Adjust and Balance of Equipment: As required by respective specification sections.
- C. Sampling and Laboratory Tests: As required by respective specification sections.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary facilities and the necessary controls for the project including utilities, telephone, sanitary facilities, field office, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, disposal of trash, debris, and excavated material, pest and rodent control, water runoff and erosion control.

1.02 UNIT PRICES

- A. No separate payment for work under this section. Include the costs for performing the work in project costs.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. The facilities and controls specified in this section are considered minimum for the Project. The Contractor may provide additional facilities and controls for the proper execution of the Work and to meet Contractor's responsibilities for protection of persons and property.
- B. Comply with applicable requirements specified in other sections of the Specifications.
 - 1. Maintain and operate temporary facilities and systems to assure continuous service.
 - 2. Modify and extend systems as Work progress requires.
 - 3. Completely remove temporary materials and equipment when their use is no longer required.
 - 4. Restore existing facilities used for temporary services to specified or to original condition.

1.04 TEMPORARY UTILITIES

- A. Obtaining Temporary Service.
 - 1. Make arrangements with utility service companies for temporary services.
 - 2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.

3. Be responsible for utility service costs until the Work is substantially complete. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.
- B. Water
1. Provide water required for and in connection with Work to be performed and for specified tests of piping, equipment, devices, or for other use as required for proper completion of the Work.
 2. For water to be drawn from public fire hydrants, obtain special permit or license from the proper officials. A deposit based on rates established by latest ordinance will be required. Install backflow preventer on fire hydrant supply.
 3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel.
- C. Electricity and Lighting.
1. Provide electric power service as required for the Work, including testing of Work. Provide power for lighting, operation of the Contractor's equipment, or for any other use by Contractor.
 2. Electric power service includes temporary power service or generator to maintain plant operations during any scheduled shutdown.
 3. Minimum lighting level shall be 5 foot-candles for open areas; 10-foot-candles for stairs and shops.
- D. Temporary Heat and Ventilation
1. Provide temporary heat as necessary for protection or completion of the Work.
 2. Provide temporary heat and ventilation to assure safe working conditions; maintain enclosed areas at a minimum of 50°F.
- E. Telephone
1. Provide emergency telephone service at the Contractor's field office, or by mobile telephone, for use by Contractor personnel and others performing work or furnishing services at the site.
- F. Sanitary Facilities
1. Provide and maintain sanitary facilities for persons on the job site; comply with the regulations of State and local departments of health.

2. Enforce the use of sanitary facilities by construction personnel at the job site. Such facilities shall be enclosed. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause a nuisance or health problem; have sewage and waste hauled off-site and properly disposed in accordance with local regulations.
3. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

1.05 FIELD OFFICE

- A. The Contractor will not be required to provide a field office for the project.

1.06 STORAGE OF MATERIALS

- A. Provide adequately ventilated, watertight storage facilities with floor above ground level for materials and equipment susceptible to weather damage.
- B. Storage of materials not susceptible to weather damage may be on blocks off the ground.
- C. Store materials in a neat and orderly manner. Place materials and equipment to permit easy access for identification, inspection and inventory.

1.07 SAFETY REQUIREMENTS

- A. Submit and follow a safety program. Include in the safety program documented response to trench safety requirements as specified in Section 01526 - Trench Safety System.
- B. Conduct operations in strict accord with applicable Federal, State and local safety codes and statutes and with good construction practice. The Contractor is fully responsible and obligated to establish and maintain procedures for safety of all work, personnel and equipment involved in the Project.
- C. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under the Williams-Steiger Occupational Safety and Health Act of 1970, and to any other legislation enacted for safety and health of Contractor employees. Such safety and health standards apply to subcontractors and their employees as well as to the Contractor and its employees.
- D. Observance of and compliance with the regulations shall be solely and without qualification the responsibility of the Contractor without reliance or superintendence of or direction by the Engineer or the Engineer's representative. Immediately advise the Engineer of investigation or inspection by Federal Safety and Health inspectors of the Contractor or subcontractor's work or place of work on the job site under this Contract,

and after such investigation or inspection, advise the Engineer of the results. Submit one copy of accident reports to Engineer within 10 days of occurrence.

- E. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test such devices frequently to assure their functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidences of contamination, immediate take appropriate steps to seal off entry of contaminated liquids to the Work area.
- F. Safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment and safety equipment, in the specifications and shown on the Drawings are obligations of the Contractor.
- G. Maintain required coordination with the local Police and Fire Departments during the entire period covered by the Contract.
- H. Include project safety analysis in safety plan. Itemize major tasks and potential safe hazards. Plan to eliminate hazards or protect workers and public from each hazard.

1.08 FIRST AID EQUIPMENT

- A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.
- B. Have at least one person thoroughly trained in first aid procedures present on the site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

1.09 FIRE PROTECTION

- A. Fire Protection Standards.
 - 1. Conform to specified fire protection and prevention requirements as well as those which may be established by Federal, State, or local governmental agencies.
 - 2. Comply with all applicable provisions of NFPA Standard No. 241, Safeguarding Building Construction and Demolition Operations.
 - 3. Provide portable fire extinguishers, rated not less than 2A or 5B in accordance with NFPA Standard No. 10, Portable Fire Extinguishers, for each temporary building, and for every 3000 square feet of floor area of facilities under construction.
 - 4. Locate portable fire extinguishers within 50 feet maximum from any point in the Project area.
- B. Fire Prevention and Safety Measures.

1. Prohibit smoking in hazardous areas. Post suitable warning signs in areas which are continuously or intermittently hazardous.
2. Use metal safety containers for storage and handling of flammable and combustible liquids.
3. Do not store flammable or combustible liquids in or near stairways or exits.
4. Maintain clear exits from all points within a structure.

1.10 SECURITY MEASURES

- A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Contractor's duty to protect property includes Owner's property.
- B. If existing fencing or barriers are breached or removed for purposes of construction. Provide and maintain temporary security fencing equal to existing.

1.11 PROTECTION OF PUBLIC UTILITIES

- A. Prevent damage to existing public utilities during construction. These utilities are shown on the Drawings at their approximate locations, but all lines may not be shown. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), all underground utilities before excavating in area. All investigative work will be done and all repairs required after investigation will be accomplished by Contractor. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of these utilities at least 48 hours notice before commencing Work in area, for locating utilities during construction and allow adequate time for making adjustments or relocation of the utilities when they conflict with proposed Work. Any temporary relocation of utilities if necessary to accommodate construction will not be paid for separately. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service lines are not shown on Drawings. Anticipate that such service lines exist and repair them if damaged due to any construction activity. No separate payment will be made for this repair work.
- B. Prior to abandonment of utility, make appropriate arrangements with owner of utility to terminate service, remove meters, transformers, and poles as may be required by site conditions.
- C. When excavating near pipelines and prior to start of excavation, request a representative of pipeline company to come to construction site(s) to meet representatives of Contractor and Engineer to discuss actual procedures that will be used. Request pipeline company's representative to probe and locate the pipelines in at least three locations: one at each side of proposed excavation and one at centerline of proposed utility. Representative of pipeline company and Engineer must be present to observe activities of Contractor at all times when excavation is being conducted within 15 feet of pipeline company's pipeline.

1.12 PROTECTION OF THE WORK AND PROPERTY

A. Preventive Actions.

1. Take precautions, provide programs, and take actions necessary to protect the Work and public and private property from damage.
2. Take action to prevent damage, injury or loss, including, but not limited to, the following:
 - a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with progress of the Work or the Work of any other contractor, any utility service company, or the Owner's operations.
 - b. Provide suitable storage for materials which are subject to damage by exposure to weather, theft, breakage, or otherwise.
 - c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
 - d. Frequently clean up refuse, rubbish, scrap materials, and debris caused by construction operations, keeping the Project site safe and orderly.
 - e. Provide safe barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways, and other hazardous areas.
3. Obtain written consent from proper parties before entering or occupying with workers, tools, materials or equipment, privately-owned land except on easements provided for construction.
4. Assume full responsibility for the preservation of public and private property on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of the Work by the Contractor, it shall be restored by the Contractor to a condition equal to or better than that existing before the damage was done.

B. Barricades and Warning Signals.

1. Where work is performed on or adjacent to any roadway, right-of-way, or public place; furnish and erect barricades, fences, lights, warning signs, and danger signals; provide watchmen; and take other precautionary measures for the protection of persons or property and protection of the Work. Barricades shall be painted to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade. Erect sufficient barricades to keep vehicles from being driven and pedestrians from walking on or into Work under construction.

Furnish watchmen in sufficient numbers to protect the Work. Responsibility of maintenance of barricades, signs, lights and for providing watchmen shall continue until the Project is accepted by the City. Conform to Section 01570 - Traffic Control and Regulation.

C. Tree and Plant Protection. Conform to requirements of Section 01535 - Tree and Plant Protection.

D. Protection of Existing Structures

1. Underground Structures:

a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels, and other existing subsurface installations located within or adjacent to the limits of the Work.

b. Known underground structures, including water, sewer, electric, and telephone services are shown on the Drawings in accordance with the best information available, but is not guaranteed to be correct or complete.

c. Explore ahead of trenching and excavation work and uncover obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption of utility services. Restore to original condition damages to underground structure at no additional cost to the Owner.

d. Necessary changes in location of the Work may be made by the Engineer to avoid unanticipated underground structures.

e. If permanent relocation of an underground structure or other subsurface installations is required and not otherwise provided for in the Contract Documents, the Engineer will direct Contractor in writing to perform the Work, which shall be paid for under the provisions for changes in the Contract Price as described in the General Conditions.

2. Surface Structures:

a. Surface structures are defined as existing buildings, structures and other constructed installations above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities that are visible above the ground surface.

3. Protection of Underground and Surface Structures:

- a. Support in place and protect from direct or indirect injury to underground and surface structures located within or adjacent to the limits of the Work. Install such supports carefully and as required by the party owning or controlling such structure. Before installing structure supports, Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the owner of the structure.
 - b. Avoid moving or in any way changing the property of public utilities or private service corporations without prior written consent of a responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within the limits of this project for the purpose of maintaining their properties, or of making such changes or repairs to their property that may be considered necessary by performance of this Contract.
 - c. Notify the owners and/or operators of utilities and pipelines of the nature of construction operations to be performed and the date or dates on which those operations will be performed. When construction operations are required in the immediate vicinity of existing structures, pipelines, or utilities, give a minimum of 5 working days advance notice. Probe and flag the location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reach and uncover the utility.
 - d. Assume risks attending the presence or proximity of underground and surface structures within or adjacent to the limits to the Work including but not limited to damage and expense for direct or indirect injury caused by the Work to any structure. Immediately repair damage caused, to the satisfaction of the owner of the damaged structure.
- E. Employ a structural engineer to ensure protection measures are adequate for the safety and integrity of structures and facilities.
- F. Protection of Installed Products.
- 1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
 - 2. Control traffic to prevent damage to equipment, materials, and surfaces.

1.13 ROADS AND PARKING

- A. Prevent interference with traffic and Owner operations on existing roads.

- B. Designate temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Engineer.
- C. Minimize use by construction traffic of existing streets and driveways.
- D. Do not allow heavy vehicles or construction equipment in existing parking areas.

1.14 ENVIRONMENTAL CONTROLS

- A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at the construction site and adjacent areas.
- B. Comply with statutes, regulations, and ordinances which relate to the proposed Work for the prevention of environmental pollution and preservation of natural resources, including but not limited to the National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.
- C. Recognize and adhere to the environmental requirements of the Project. Disturbed areas shall be strictly limited to boundaries established by the Contract Documents. Particularly avoid pollution of "on-site" streams, sewers, wells, or other water sources. The City recognizes that the project area has considerable natural value and that construction of projects should be completed with a minimum of impact to the surrounding environment. Attention is directed to this concept. Adopt construction procedures that do not cause unnecessary excavation and filling of the terrain, indiscriminate destruction of vegetation, air or stream pollution, nor the harassment or destruction of wildlife.
- D. Burning of rubbish, debris or waste materials is not permitted.

1.15 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.
- B. Provide equipment and personnel to perform emergency measures required to contain any spillage, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in accordance with laws and regulations, and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.

2. Prevent harmful dispersal of pollutants into the environment.
 - E. Use equipment during construction that conforms to current Federal, State, and local laws and regulations.
- 1.16 PEST AND RODENT CONTROL
- A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.
 - B. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.
- 1.17 NOISE CONTROL
- A. Provide vehicles, equipment, and construction activities that minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and City Ordinances and in no case will noise levels be permitted which create a nuisance in the surrounding neighborhoods.
 - B. Conduct construction operations during daylight hours except as approved by Engineer.
- 1.18 DUST CONTROL
- A. Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of the Engineer, which will control the amount of dust generated.
- 1.19 WATER RUNOFF AND EROSION CONTROL
- A. Provide methods to control surface water, runoff, subsurface water, and water pumped from excavations and structures to prevent damage to the Work, the site, or adjoining properties.
 - B. Control fill, grading and ditching to direct water away from excavations, pits, and other construction areas; and to direct drainage to proper runoff courses so as to prevent any erosion, sedimentation or damage.
 - C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
 - D. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and in conformance with environmental requirements.
 - E. Retain existing drainage patterns external to the construction site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as needed to control conditions.

- F. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Keep to a minimum the area of bare soil exposed at one time.
 - 2. Provide temporary control measures, such as berms, dikes, and drains.
- G. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
- H. Inspect earthwork periodically to detect any evidence of the start of erosion. Apply corrective measures as required to control erosion.

PART 2 P R O D U C T S - NOT USED

PART 3 E X E C U T I O N - NOT USED

END OF SECTION

SECTION 01526

TRENCH SAFETY SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Trench safety system for the construction of trench excavations.
- B. Trench safety system for structural excavations which fall under provisions of State and Federal trench safety laws.

1.02 UNIT PRICES

- A. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. A trench is defined as a narrow excavation (in relation to its depth) 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.
- B. The trench safety system requirements apply to larger open excavations if the erection of structures or other installations limits the space between the excavation slope and the installation to dimensions equivalent to a trench as defined.
- C. Trench Safety Systems include both Protective Systems and Shoring Systems but are not limited to sloping, sheeting, trench boxes or trench shields, slide rail systems, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.
 - 1. Protective Systems: 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 an adjacent structure.
 - 2. Shoring System: A structure that supports the sides of an excavation and which is designed to prevent cave-ins, or to prevent movements of the ground affecting adjacent installations or improvements.
 - 3. Special Shoring: A shoring system meeting Special Shoring Requirements for locations identified on the Drawings.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.

- B. Submit a safety program specifically for the construction of trench excavation. Design the trench safety program to be in accordance with OSHA 29 CFR 1926.650 – 1926.652 standards governing the presence and activities of individuals working in and around trench excavations, and in accordance with any Special Shoring requirements at locations shown on the Drawings.
- C. Have construction and shop drawings for trench safety systems sealed as required by OSHA by a licensed Professional Engineer retained and paid by the Contractor.
- D. Review of the safety program by the Engineer will only be in regard to compliance with the Contract Documents and will not constitute approval by the Engineer nor relieve Contractor of obligations under State and Federal trench safety laws.

1.05 REGULATORY REQUIREMENTS

- A. Install and maintain trench safety systems in accordance with OSHA standards, 29 CFR 1926.650 - 1926.652.
- B. A reproduction of the OSHA standards included in "Subpart P - Excavations" from the Federal Register Vol. 54, No. 209 is available upon request to Contractors bidding on Owner's projects. The Owner assumes no responsibility for the accuracy of the reproduction. The Contractor is responsible for obtaining a copy of this section of the Federal Register.
- C. Legislation that has been enacted by the Texas Legislature with regard to Trench Safety Systems, is hereby incorporated, by reference, into these specifications. Refer to Chapter 756, Subchapter C, Health and Safety Code.
- D. Reference materials, if developed for a specific project, will be issued with the Bid Documents, including the following:
 - 1. Geotechnical information obtained for use in design of the trench safety system.
 - 2. Special Shoring Requirements.

1.06 INDEMNIFICATION

- A. Contractor shall indemnify and hold harmless the Owner, its employees, and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this Contract.
- B. Contractor acknowledges and agrees that this indemnity provision provides indemnity for the Owner in case the Owner is negligent either by act or omission in providing for trench safety, including, but not limited to safety program and design reviews, inspections, failures to issue stop work orders, and the hiring of the Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and maintain trench safety systems in accordance with provisions of OSHA 29 CFR 1926.650 - 1926.652.
- B. Install specially designed trench safety systems shall be installed in accordance with the Contractor's trench excavation safety program for the locations and conditions identified in the program. Install Special Shoring at the locations shown on the Drawings.
- C. Obtain verification from a competent person, as identified in the Contractor's trench excavation safety program, that trench boxes and other premanufactured systems are certified for the actual installation conditions.

3.02 INSPECTION

- A. Conduct daily inspections by Contractor or Contractor's independently retained consultant, of the trench safety systems to ensure that the installed systems and operations meet OSHA 29 CFR 1926.650 - 1926.652 and other personnel protection regulations requirements.
- B. If evidence of possible cave-ins or slides is apparent, immediately stop work in the trench and move personnel to safe locations until necessary precautions have been taken to safeguard personnel.
- C. Contractor shall maintain a permanent record of daily inspections.

3.03 REMOVAL

- A. Bed and backfill pipe to a point at least one (1) foot above top of pipe or other embedded items prior to removal of any portion of trench safety system. Bedding and backfill to be in accordance to the applicable specification items. Backfilling and removal of trench supports shall be in accordance with Contractor's Trench Excavation and Shoring Safety Plan. Removal of trench safety system to be accomplished in such a manner to cause no damage to pipe or other embedded items. Remove no braces or trench supports until all personnel have evacuated the trench.

3.04 FIELD QUALITY CONTROL

- A. Verify specific applicability of the selected or specially designed trench safety systems to each field condition encountered on the project.

END OF SECTION

SECTION 01535

TREE AND PLANT PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tree and plant protection.

1.02 PROJECT CONDITIONS

- A. Preserve and protect existing trees and plants to remain from foliage, branch, trunk, or root damage that could result from construction operations.
- B. Prevent following types of damage:
 - 1. Compaction of root zone by foot or vehicular traffic, or material storage.
 - 2. Trunk damage from equipment operations, material storage, or from nailing or bolting.
 - 3. Trunk and branch damage caused by ropes or guy wires.
 - 4. Root poisoning from spilled solvents, gasoline, paint, and other noxious materials.
 - 5. Branch damage due to improper pruning or trimming.
 - 6. Damage from lack of water due to:
 - a. Cutting or altering natural water migration patterns near root zones.
 - b. Failure to provide adequate watering.
 - 7. Damage from alteration of soil pH factor caused by depositing lime, concrete, plaster, or other base materials near roots.
 - 8. Cutting of roots larger than 1-1/2 inches in diameter.

1.03 DAMAGE ASSESSMENT

- A. When trees other than those designated for removal are destroyed or badly damaged as a result of construction operations, remove and replace with same size, species, and variety up to and including 8 inches in trunk diameter. Tree larger than 8 inches in diameter shall be replaced with an 8-inch diameter tree of the same species and variety and total contract amount will be reduced by an amount determined from the following International Shade Tree Conference formula: $0.7854 \times D^2 \times \10.00 where D is diameter in inches of tree or shrub trunk measured 12 inches above grade.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphalt paint: Emulsified asphalt or other adhesive, elastic, antiseptic coating formulated for horticultural use on cut or injured plant tissue, free from kerosene and coal creosote.
- B. Burlap: Suitable for use as tree wrapping.
- C. Fertilizer: Liquid containing 20 percent nitrogen, 10 percent phosphorus, and 5 percent potash.
- D. All necessary tree replacements shall be as approved by Engineer.

PART 3 EXECUTION

3.01 PROTECTION AND MAINTENANCE OF EXISTING TREES AND SHRUBS

- A. Except for trees and shrubs shown on Drawings to be removed, all trees and shrubs within the project area are to remain and be protected from damage.
- B. For trees to be removed, as designated on the Drawings, perform the following:
 - 1. Stake right-of-way limits and identify any tree of diameter greater than 4 inches which is to be removed. Mark trees prior to felling with an X in orange paint, clearly visible, on the trunk, and at eye level.
 - 2. After marking trees give a minimum of 48-hours notice in writing to the Engineer of intent to begin felling operations.
 - 3. Trees whose trunks are only partially in the right-of-way shall be protected and preserved as described below.
- C. For trees or shrubs to remain, perform the following:
 - 1. Trim trees and shrubs only as necessary.
 - a. Trees and shrubs requiring pruning for construction should also be pruned for balance as well as to maintain proper form and branching habit.
 - b. Cut limbs at branch collar. No stubs should remain on trees. Branch cuts should not gouge outer layer of tree structure or trunk.
 - 2. Use extreme care to prevent excessive damage to root systems.
 - a. Roots in construction areas will be cut smoothly with a trencher before excavation begins. Do not allow ripping of roots with a backhoe or other equipment.
 - b. Temporarily cover exposed roots with wet burlap to prevent roots from drying out.
 - c. Cover exposed roots with soil as soon as possible.
 - 3. Prevent damage or compaction of root zone (area below dripline) by construction activities.
 - a. Do not allow scarring of trunks or limbs by equipment or other means.
 - b. Do not store construction materials, vehicles, or excavated material under dripline of trees.

- c. Do not pour liquid materials under dripline.
4. Water and fertilize trees and shrubs that will remain to maintain their health during construction period.
 - a. Supplemental watering of landscaping during construction should be done once every 7 days in cold months and once every 4 days in hotter months.
 - b. This watering shall consist of saturating soils at least 6 to 8 inches beneath surface.
5. Water areas currently being served by private sprinkler systems while systems are temporarily taken out of service to maintain health of existing landscapes.
6. At option of the Contractor and with the Engineer's permission, trees and shrubs to remain may be temporarily transplanted and returned to original positions under supervision of professional horticulturist.

3.02 PROTECTION

A. Protection of Trees or Shrubs in Open Area:

1. Install steel drive-in fence posts in protective circle, approximately 8 feet on center, not closer than 4 feet to trunk of trees or stems of shrubs.
2. Drive steel drive-in fence posts 3 feet minimum into ground, leaving 5 feet minimum above ground.
3. Mount steel hog-wire on fence posts.
4. For trees or shrubs in paved areas, mount concrete-filled steel pipe 2-1/2 inches in diameter minimum in rubber auto tires filled with concrete (movable posts).

B. Timber Wrap Protection for Trees in Close Proximity of Moving or Mechanical Equipment and Construction Work:

1. Wrap trunk with layer of burlap.
2. Install 2 x 4's or 2 x 6's (5-foot to 6-foot lengths) vertically, spaced 3 inches to 5 inches apart around circumference of tree trunk.
3. Tie in place with 12 to 9 gage steel wire.

3.03 TREE PLANTING

- A. Apply a 6-inch ring of bank sand, immediately after planting, around perimeter of rootball where digger blades enter and exit soil.
- B. Water tree, immediately after sand is applied, to wash sand into any existing air pockets to prevent drying of roots.
- C. Apply a 4-inch layer of hardwood mulch, immediately after sand and water have been applied, over entire rootball including sand.
- D. In the absence of sufficient rainfall, follow watering schedule below:

1. Water trees immediately after tree has been planted and sand is applied.
2. Water trees once a day for three (3) consecutive days after trees have been planted and initially watered. Water trees once a week for the duration of Work.

3.04 MAINTENANCE OF NEWLY PLANTED TREES

- A. Water trees during dry periods.
- B. The Contractor guarantees that trees planted for this Project shall remain alive and healthy at least until the end of a one-year warranty period.
 1. Within four weeks of notice from Owner, Contractor shall replace, at his expense, any dead trees or any trees that in the opinion of Owner, have become unhealthy or unsightly or have lost their natural shape as a result of additional growth, improper pruning or maintenance, or weather conditions.
 2. When tree must be replaced, the guarantee period for that tree shall begin on date of replacement of tree, subject to the Owner's inspection, for no less than one year.
 3. Straighten leaning trees and bear entire cost.
 4. Dispose of trees rejected at any time by Engineer at Contractor's expense.

END OF SECTION

SECTION 01563

CONTROL OF GROUND WATER AND SURFACE WATER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering, depressurizing, draining, and maintaining trench and structure excavations and foundation beds in dry and stable condition.
- B. Protecting work against surface runoff and rising flood waters.
- C. Disposing of removed water.

1.02 METHOD OF PAYMENT

- A. Subsurface investigation and groundwater control plan preparation and monitoring shall be incidental to the project and shall include subsurface investigation to identify groundwater conditions, design, install, operate, maintain, and monitor ground water control systems.
- B. No separate payment will be made for control of ground water and surface water except for well pointing and piezometer. Include the cost to control ground water and surface water in unit price for work requiring such controls. Dewatering required to lower water table, for utility installation, construction of structures, removal or standing water, surface drainage seepage, or to protect against rising waters or floods shall be considered incidental to work.
- C. Refer to Section 01025 – Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. Ground water control includes both dewatering and depressurization of water-bearing soil layers.
 - 1. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from slopes or bottoms of excavations and disposing of removed water. The intent of dewatering is to increase stability of excavated slopes; prevent dislocation of material from slopes or bottoms of excavations; reduce lateral loads on sheeting and bracing; improve excavating and hauling characteristics of excavated material; prevent failure or heaving of the bottom of excavations; and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.

2. Depressurization includes reduction in piezometric pressure within strata not controlled by dewatering alone, as required to prevent failure or heaving of excavation bottom.
- B. Excavation drainage includes keeping excavations free of surface and seepage water.
- C. Surface drainage includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines as required to protect the Work from any source of surface water.
- D. Equipment and instrumentation for monitoring and control of the ground water control system includes piezometers and monitoring wells, and devices, such as flow meters, for observing and recording flow rates.

1.04 PERFORMANCE REQUIREMENTS

- A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems.
- B. Design a ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 01526 - Trench Safety Systems, to produce the following results:
 1. Effectively reduce the hydrostatic pressure affecting excavations.
 2. Develop a substantially dry and stable subgrade for subsequent construction operations.
 3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work.
 4. Prevent the loss of fines, seepage, boils, quick condition, or softening of the foundation strata.
 5. Maintain stability of sides and bottom of excavations.
- C. Ground water control systems may include single-stage or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types.
- D. Provide drainage of seepage water and surface water, as well as water from any other source entering the excavation. Excavation drainage may include placement of drainage materials, such as crushed stone and filter fabric, together with sump pumping.
- E. Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.
- F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.

- G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of the system to protect property as required.
- H. Provide an adequate number of piezometers installed at the proper locations and depths as required to provide meaningful observations of the conditions affecting the excavation, adjacent structures, and water wells.
- I. Provide environmental monitoring wells installed at the proper locations and depths as required to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into the work area or into the ground water control system.
- J. Decommission piezometers and monitoring wells installed during design phase studies and left for Contractors monitoring and use.

1.05 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit a Ground Water and Surface Water Control Plan for review by the Engineer prior to start of any field work. The Plan shall be signed by a Professional Engineer registered in the State of Texas. Submit a plan to include the following:
 - 1. Results of subsurface investigation and description of the extent and characteristics of water bearing layers subject to ground water control.
 - 2. Names of equipment suppliers and installation subcontractors.
 - 3. A description of proposed ground water control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria, and operation and maintenance procedures.
 - 4. A description of proposed monitoring and control system indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics.
 - 5. A description of proposed filters including types, sizes, capacities and manufacturer's application recommendations.
 - 6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.

7. Operating requirements, including piezometric control elevations for dewatering and depressurization.
 8. Excavation drainage methods including typical drainage layers, sump pump application and other necessary means.
 9. Surface water control and drainage installations.
 10. Proposed methods and locations for disposing of removed water.
- C. Submit the following records upon completed initial installation:
1. Installation and development reports for well points, eductors, and deep wells.
 2. Installation reports and baseline readings for piezometers and monitoring wells.
 3. Baseline analytical test data of water from monitoring wells.
 4. Initial flow rates.
- D. Submit the following records on a weekly basis during operations:
1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.02, Requirements for Eductor, Well Points, or Deep Wells.
 2. Maintenance records for ground water control installations, piezometers, and monitoring wells.
- E. Submit the following records at end of work. Decommissioning (abandonment) reports for monitoring wells and piezometers installed by other during the design phase and left for Contractor's monitoring and use.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Comply with requirements of agencies having jurisdiction.
- B. Comply with Texas Commission on Environmental Quality regulations and Texas Water Well Drillers Association for development, drilling, and abandonment of wells used in dewatering system.
- C. Obtain permit from EPA under the Texas Pollutant Discharge Elimination System (TPDES), for storm water discharge from construction sites. Refer to Section 01565 TPDES Permit Requirements.
- D. Obtain all necessary permits from agencies with control over the use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Because the review and permitting process may be lengthy, take early action to pursue and submit for the required approvals.

- E. Monitor ground water discharge for contamination while performing pumping in the vicinity of potentially contaminated sites.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Equipment and materials are at the option of Contractor as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review of the Engineer through submittals required in Paragraph 1.05, Submittals.
- B. Eductors, well points, or deep wells, where used, must be furnished, installed and operated by an experienced contractor regularly engaged in ground water control system design, installation, and operation.
- C. All equipment must be in good repair and operating order.
- D. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

PART 3 EXECUTION

3.01 GROUND WATER CONTROL

- A. Perform a subsurface investigation by borings as necessary to identify water bearing layers, piezometric pressures, and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary to determine the drawdown characteristics of the waterbearing layers. The results shall be presented in the Ground Water and Surface Water Control Plan (See Paragraph 1.05B.1).
- B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.
- C. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify Engineer in writing of any changes made to accommodate field conditions and changes to the Work. Provide revised drawings and calculations with such notification.
- D. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.
- E. Monitor operations to verify that the system lowers ground water piezometric levels at a rate required to maintain a dry excavation resulting in a stable subgrade for prosecution of subsequent operations.

- F. Where hydrostatic pressures in confined water bearing layers exist below excavation, depressurize those zones to eliminate risk of uplift or other instability of excavation or installed works. Allowable piezometric elevations shall be defined in the Ground Water and Surface Water Control Plan.
- G. Maintain water level below subgrade elevation. Do not allow levels to rise until foundation concrete has achieved design strength.
- H. During backfilling, dewatering may be reduced to maintain water level a minimum of 5 feet below prevailing level of backfill. However, do not allow that water level to result in uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement stabilized sand until at least 48 hour after placement.
- I. Provide a uniform diameter for each pipe drain run constructed for dewatering. Remove pipe drain when it has served its purpose. If removal of pipe is impractical, provide grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout when pipe is removed from service.
- J. Extent of construction ground water control for structures with a permanent perforated underground drainage system may be reduced, such as for units designed to withstand hydrostatic uplift pressure. Provide a means of draining the affected portion of underground system, including standby equipment. Maintain drainage system during operations and remove it when no longer required.
- K. Remove system upon completion of construction or when dewatering and control of surface or ground water is no longer required.
- L. Compact backfill to not less than 95 percent of the maximum dry density in accordance with ASTM D698.

3.02 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

- A. For aboveground piping in ground water control system, include a 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header so that discharge from each installation can be visually monitored.
- B. Install sufficient piezometers or monitoring wells to show that all trench or shaft excavations in water bearing materials are predrained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for Contractor's selected method of work.
- C. Install piezometers or monitoring wells not less than one week in advance of beginning the associated excavation.

- D. Dewatering may be omitted for portions of underdrains or other excavations, but only where auger borings and piezometers or monitoring wells show that soil is predrained by an existing system such that the criteria of the ground water control plan are satisfied.
- E. Replace installations that produce noticeable amounts of sediments after development.
- F. Provide additional ground water control installations, or change the methods, in the event that the installations according to the ground water control plan does not provide satisfactory results based on the performance criteria defined by the plan and by the specification. Submit a revised plan according to Paragraph 1.05B.

3.03 EXCAVATION DRAINAGE

- A. Contractor may use excavation drainage methods if necessary to achieve well drained conditions. The excavation drainage may consist of a layer of crushed stone and filter fabric, and sump pumping in combination with sufficient wells for ground water control to maintain stable excavation and backfill conditions.

3.04 MAINTENANCE AND OBSERVATION

- A. Conduct daily maintenance and observation of piezometers or monitoring wells while the ground water control installations or excavation drainage are operating in an area. Keep system in good condition.
- B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedule.
- C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make observations, as specified.
- D. Remove and grout piezometers inside or outside the excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by the Engineer.

3.05 MONITORING AND RECORDING

- A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Also monitor and record water level and ground water recovery. These records shall be obtained daily until steady conditions are achieved, and twice weekly thereafter.
- B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until the Work is completed or piezometers or wells

are removed, except when Engineer determines that more frequent monitoring and recording are required. Comply with Engineer's direction for increased monitoring and recording and take measures as necessary to ensure effective dewatering for intended purpose.

3.06 SURFACE WATER CONTROL

- A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. The requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.
- B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by such agencies.

END OF SECTION

SECTION 01564

WASTE MATERIAL DISPOSAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disposal of waste material and salvageable material.

1.02 UNIT PRICES

- A. No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related work.

1.03 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances.
- C. Submit a copy of written permission from property owner, along with description of property, prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SALVAGEABLE MATERIAL

- A. Excavated material: When indicated on Drawings, load, haul, and deposit excavated material at a location or locations shown on Drawings outside the limits of Project.
- B. Base, surface, and bedding material: Deliver shell, gravel, bituminous, or other base and surfacing material designated for salvage to the location designated by the Engineer.
- C. Pipe culvert: Deliver culverts designated for salvage to Owner's storage area.
- D. Other salvageable materials: Conform to requirements of individual Specification Sections.
- E. Coordinate delivery of salvageable material with Engineer.

3.02 EXCESS MATERIAL

- A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the job site and legally disposed of.
- B. Excess soil may be deposited on private property adjacent to the Project when written permission is obtained from property owner. See Paragraph 1.03 C above.
- C. Verify the flood plain status of any proposed disposal site. Do not dispose of excavated materials in an area designated as within the 100-year Flood Hazard Area.
- D. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

END OF SECTION

SECTION 01566

SOURCE CONTROLS FOR EROSION AND SEDIMENTATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of erosion and sediment control and other control-related practices which shall be utilized during construction activities.

1.02 UNIT PRICES

- A. No separate payment will be made for work performed under this Section. Include payment in unit price for related work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the engineer to allow soil testing and surveying.
- B. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Damage caused by construction traffic to erosion and sediment control systems shall be repaired immediately by the Contractor.
- C. The Contractor shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.
- D. Contractor shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the Drawings and this Specification.
- E. The Contractor shall install, maintain, and inspect erosion and sediment control measures and practices as specified in the Drawings and in this or other Specifications.

3.02 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

- A. When topsoil is specified as a component of another Specification, the Contractor shall conduct erosion control practices described in this Specification during topsoil placement operations.

1. When placing topsoil, maintain erosion and sediment control systems, such as swales, grade stabilization structures, berms, dikes, silt fences, and sediment basins.
2. Maintain grades which have been previously established on areas to receive topsoil.
3. After the areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading the topsoil, loosen the subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil.

3.03 DUST CONTROL

- A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.
- B. Control blowing dust by using one or more of the following methods:
 1. Mulches bound with chemical binders.
 2. Temporary vegetative cover.
 3. Tillage to roughen surface and bring clods to the surface.
 4. Irrigation by water sprinkling.
 5. Barriers using solid board fences, burlap fences, crate walls, bales of hay, or similar materials.
- C. Implement dust control methods immediately whenever dust can be observed blowing on the project site.

3.04 KEEPING STREETS CLEAN

- A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary to keep the streets clean, install stabilized construction exits at construction, staging, storage, and disposal areas. A vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to the stabilized construction exit, as needed. Release wash water into a drainage swale or inlet protected by erosion and sediment control measures. Construction exit and wash areas are specified in Section 01569 - Stabilized Construction Exit.
- B. In lieu of or in addition to stabilized construction exits, shovel or sweep the pavement to the extent necessary to keep the street clean. Waterhosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.

3.05 EQUIPMENT MAINTENANCE AND REPAIR

- A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate such areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.
- B. On a construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.06 WASTE COLLECTION AND DISPOSAL

- A. Contractor shall formulate and implement a plan for the collection and disposal of waste materials on the construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Methods for ultimate disposal of waste shall be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for the collection and disposal of liquid wastes and toxic or hazardous materials.
- B. Keep receptacles and waste collection areas neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they will least likely be affected by concentrated storm water runoff.

3.07 WASHING AREAS

- A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.08 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

- A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.
- B. Store toxic chemicals and materials, such as pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

3.09 DEMOLITION AREAS

- A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or toxic pollutants shall be retained on the site and shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

3.10 SANITARY FACILITIES

- A. Provide the construction sites with adequate portable toilets for workers in accordance with Section 01500 - Temporary Facilities and Controls, and applicable health regulations.

3.11 PESTICIDES

- A. Use and store pesticides during construction in accordance with manufacturers' guidelines and with local, state, and federal regulations. Avoid overuse of pesticides which could produce contaminated runoff. Take great care to prevent accidental spillage. Never wash pesticide containers in or near flowing streams or storm water conveyance systems.

END OF SECTION

SECTION 01570

TRAFFIC CONTROL AND REGULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for signs, signals, control devices, flares, lights and traffic signals, as well as construction parking control, designated haul routes and bridging of trenches and excavations.
- B. Qualifications and requirements for use of flagmen.

1.02 SUBMITTALS

- A. Make submittals in accordance with Section 01300 - Submittals

1.03 UNIT PRICES

- A. Refer to Section 01025 – Measurement and Payment for unit price.

1.04 FLAGMEN

- A. Use only flagmen who are off-duty, regularly employed, uniformed peace officers. The Contractor may also utilize certified flagmen at locations approved by the City or Engineer.
- B. Use flagmen to control, regulate and direct an even flow and movement of vehicular and pedestrian traffic, for periods of time as may be required to provide for public safety and convenience, where:
 - 1. Where multi-lane vehicular traffic must be diverted into single-lane vehicular traffic.
 - 2. Where vehicular traffic must change lanes abruptly.
 - 3. Where construction equipment either enters or crosses vehicular traffic lanes and walks.
 - 4. Where construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks.
 - 5. Where traffic regulation is needed due to rerouting of vehicular traffic around the work site.
 - 6. Where construction activities might affect public safety and convenience.

- C. The use of flagmen is for the purpose of assisting in the regulation of traffic flow and movement, and does not in any way relieve the contractor of full responsibility for taking such other steps and provide such other flagmen or personnel as the Contractor may deem necessary to protect the work and the public, and does not in any way relieve the Contractor of his responsibility for any damage for which he would otherwise be liable.

Flagmen shall be used and maintained at such points for such periods of time as may be required to provide for the public safety and convenience of travel.

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

- A. Comply with Texas State Manual on Uniform Traffic Control Devices (latest revision).
- B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

PART 3 EXECUTION

3.01 PUBLIC ROADS

- A. Abide by laws and regulations of governing authorities when using public roads. If the Contractor's work requires that public roads be temporarily impeded or closed, approvals shall be obtained from governing authorities and permits paid for before starting any work. Coordinate activities with the Engineer.
- B. Give Engineer one-week notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.
- C. Notify police department, fire department, and local schools, churches, and businesses in writing a minimum of five business days prior to beginning work.
- D. Contractor shall maintain at all times a 10-foot-wide all-weather lane adjacent to work areas which shall be kept free of construction equipment and debris and shall be for the use of emergency vehicles, or as otherwise provided in the traffic control plan.
- E. Contractor shall not obstruct the normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Engineer.
- F. Contractor shall maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Use all-weather materials approved by Engineer to maintain temporary driveway access to commercial and residential driveways. The Contractor shall also give special consideration to maintain access by constructing temporary driveway pavement for schools, apartment complex, day care facilities, hospitals, clinics, retirement and assisted living facilities.
- G. Cleanliness of Surrounding Streets:

1. Keep streets used for entering or leaving the job area free of excavated material, debris, and any foreign material resulting from construction operations in compliance with applicable ordinances.
- H. Remove existing signage and striping that conflict with construction activities or that may cause driver confusion.
- I. Provide safe access for pedestrians along major cross streets.
- J. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.
- K. Do not close more than two consecutive esplanade openings at a time without prior approval from Engineer.

3.02 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and the City's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.03 FLARES AND LIGHTS

- A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.04 HAUL ROUTES

- A. Utilize haul routes designated by authorities or shown on the Drawings for construction traffic.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.05 TRAFFIC SIGNS AND SIGNALS

- A. Construct all necessary traffic control devices including but not limited to loop detectors, traffic signal conduits, traffic signal wiring and cross walk signals as shown on the plan drawings.
- B. Install traffic control devices at approaches to the site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

- C. Relocate traffic signs and appurtenances as Work progresses to maintain effective traffic control.
- D. Unless otherwise approved by Engineer, provide driveway signs with the name of business that can be accessed from the particular cross-over. Two signs will be required for each cross-over.
- E. Replace existing traffic control devices in the project area.
- F. Engineer may direct Contractor to make adjustments to traffic control signage to eliminate driver confusion and maintain orderly traffic flow during construction at no additional cost to the City.
- G. Repair or replace signal control devices, detectors or cables where damage occurred due to Contractors construction efforts or operation of equipment related to paving repairs or removal.

3.06 BRIDGING TRENCHES AND EXCAVATIONS

- A. Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic. Provide steel plates that can be laid across construction areas and major drives of commercial businesses.
- B. Secure bridging against displacement by using adjustable cleats, angles, bolts or other devices whenever bridge is installed:
 - 1. On an existing bus route;
 - 2. When more than five percent of daily traffic is comprised of commercial or truck traffic;
 - 3. When more than two separate plates are used for the bridge; or
 - 4. When bridge is to be used for more than five consecutive days.
- C. Install bridging to operate with minimum noise.
- D. Adequately shore the trench or excavation to support bridge and traffic.
- E. Extend steel plates used for bridging a minimum of one foot beyond edges of trench or excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.
- F. Use steel plates of sufficient thickness to support H-20 loading, truck or lane, that produces maximum stress.

3.07 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of 2 feet.

3.08 MAINTENANCE OF EQUIPMENT AND MATERIAL

- A. Designate individual to be responsible for maintenance of traffic handling around construction area. This individual must be accessible at all times to immediately correct any deficiencies in equipment and materials used to handle traffic, such as missing, damaged, or obscured signs, drums, barricades, or pavement markings. Give name, address and telephone number of designated individual to the Engineer.
- B. Make daily inspections of signs, barricades, drums, lamps and temporary pavement markings to verify that these are visible, and in good working order, and in conformance with TxDOT or any other entity. When not in conformance immediately bring equipment and materials into conformance by replacement, repair, cleaning, relocation, and/or realignment.
- C. Keep all equipment and materials, especially signs and pavement markings, clean and free of dust, dirt, grime, oil, mud or debris.

END OF SECTION

SECTION 01630

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Options for making product or process selections.
- B. Procedures for proposing equivalent construction products or processes, including preapproved, and approved products or processes.

1.02 DEFINITIONS

- A. Product: Means, materials, equipment, or systems incorporated into the Project. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for re-use.
- B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Product includes Processes.

1.03 SELECTION OPTIONS

- A. Preapproved Products: Construction products of certain manufacturers or suppliers are designated in the Specifications as "preapproved." Products of other manufacturers or suppliers will not be acceptable for this Project and will not be considered under the submittal process for approving alternate products.
- B. Approved Products: Construction products or processes of certain manufacturers or suppliers designated in the Specifications followed by the words "or approved equal." Approval of alternate products or processes not listed in the Specifications may be obtained through provisions for product options and substitutions in the General Conditions, and by following the submittal procedures specified in Section 01300 - Submittals. The procedure for approval of alternate products is not applicable to preapproved products.
- C. Product Compatibility: To the maximum extent possible, provide products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available as a Contractor's option, select a product which is compatible with other products already selected, specified, or in use by the Owner.

1.04 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor's responsibility related to product options and substitutions is defined in the General Conditions.
- B. Furnish information the Engineer deems necessary to judge equivalency of the alternate product.
- C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish the equivalency between products in order to obtain information upon which the Engineer can base a decision.
- D. If the Engineer determines that an alternate product is not equal to that named in the Specifications, the Contractor shall furnish one of the specified products.

1.05 ENGINEER'S REVIEW

- A. Alternate products or processes may be used only if approved in writing by the Engineer. The Engineer's determination regarding acceptance of a proposed alternate product is final.
- B. Alternate products will be accepted if the product is judged by the Engineer to be equivalent to the specified product or to offer substantial benefit to the Owner.
- C. The Owner retains the right to accept any product or process deemed advantageous to the Owner, and similarly, to reject any product or process deemed not beneficial to the Owner.

1.06 SUBSTITUTION PROCEDURE

- A. Collect and assemble technical information applicable to the proposed product to aid in determining equivalency as related to the approved product specified.
- B. Submit a written request for a construction product to be considered as an alternate product.
- C. Submit the product information after the effective date of the Agreement and within the time period allowed for substitution submittals given in the General Conditions. After the submittal period has expired, requests for alternate products will be considered only when a specified product becomes unavailable because of conditions beyond the Contractor's control.
- D. Submit 5 copies of each request for alternate product approval. Include the following information:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Documents
 - 2. For products:

- a. Product identification, including manufacturer's name and address
 - b. Manufacturer's literature with product description, performance and test data, and reference standards
 - c. Samples, as applicable
 - d. Name and address of similar projects on which product was used and date of installation. Include the name of the Owner, Architect/Engineer, and installing contractor.
3. For construction methods:
 - a. Detailed description of proposed method
 - b. Drawings illustrating methods
 4. Itemized comparison of proposed substitution with product or method specified
 5. Data relating to changes in construction schedule
 6. Relation to separate contracts, if any
 7. Accurate cost data on proposed substitution in comparison with product or method specified.
 8. Other information requested by the Engineer.
- E. Approved alternate products will be subject to the same review process as the specified product would have been for shop drawings, product data, and samples.

PART 2 P R O D U C T S - NOT USED

PART 3 E X E C U T I O N - NOT USED

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures including final submittals such as operation and maintenance data, warranties, and spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

- A. Comply with the General Conditions of Agreement regarding Final Completion and Final Payment when Work is complete and ready for Engineer's final inspection.
- B. Provide Project Record Documents in accordance with Section 01720.
- C. Complete or correct items on punch list, with no new items added. Any new items will be addressed during warranty period.
- D. The Owner will occupy portions of the Work as specified in other Sections.
- E. Provide submittals as required by governing authorities.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean debris from drainage systems.
- C. Clean site; sweep paved areas, rake clean landscaped surfaces.
- D. Remove waste and surplus materials, rubbish, and temporary construction facilities from the site following the final test of utilities and completion of the work.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submit operations and maintenance data as noted in Section 01300 - Submittals.

1.05 WARRANTIES

- A. Provide one original of each warranty from Subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble warranties in 3-ring/D binder with durable plastic cover.
- C. Submit warranties prior to final Application for Payment.

- D. Warranties shall commence in accordance with the requirements in the General Conditions.

PART 2 P R O D U C T S - N O T U S E D

PART 3 E X E C U T I O N - N O T U S E D

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Maintenance and Submittal of Record Documents and Samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain one record copy of documents at the site in accordance with the General Conditions, paragraph 3.02.
- B. Store Record Documents and samples in field office if a field office is required by Contract Documents, or in a secure location. Provide files, racks, and secure storage for Record Documents and samples.
- C. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.
- E. Keep Record Documents and Samples available for inspection by Engineer.

1.03 RECORDING

- A. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- B. Contract Drawings and Shop Drawings: Legibly mark each item to record all actual construction, or "as built" conditions, including:
 - 1. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Elevations of underground utilities referenced to bench mark utilized for project.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by modifications.
 - 5. Details not on original contract drawings.
 - 6. References to related shop drawings and Modifications.

- C. Record information with a red pen or pencil on a set of blue line opaque drawings, provided by Engineer.

1.04 SUBMITTALS

- A. At contract closeout, deliver Project Record Documents to Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02051

ABANDONMENT OF SANITARY AND STORM SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Abandonment in place of existing sanitary sewers, storm sewers, manholes, and force mains.

1.02 UNIT PRICES

- A. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. Abandonment. Sanitary sewer abandonment consists of demolition and removal of any portion of manholes existing within the specified depth of the surface, and the abandonment in place of sewer lines and manholes as specified in this Section.
- B. Flowable Fill. Flowable fill (abandonment grout) shall be a controlled low-strength material consisting of a fluid mixture of cement, fly ash, aggregate, water and with admixtures as necessary to provide workable properties. Placement of flowable fill may be by grouting techniques in sewer pipes or other restricted areas, or as mass placement by chutes or tremie methods in unrestricted locations with open access. The long-term hardened strength shall be within a specified range.
- C. Ballast. Large aggregate either replaced with the voids subsequently filled with flowable fill injected by grouting method; or in areas with open access, placed individually and sequentially at the same time as the flowable fill placement.
- D. Backgrouting. A secondary stage pressure grouting to ensure that voids have been filled within the abandoned sewer. Back grouting will only be required at critical locations indicated on the Drawings or if there is evidence of incomplete flowable fill placements.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Flowable fill mix design report:
 - 1. Flowable fill type and production method. Describe if the fill will be mixed to final proportions and consistency in batch plant or if constituents will be added in transit mixer at the placement location.

2. Use of ballast. Provide percentage of ballast of the total placement and size limits for the ballast if fill is intended to be used with ballast.
 3. Aggregate gradation of fill. The aggregate gradation of the mix (excluding ballast) shall be used as a pilot curve for quality control during production.
 4. Fill mix constituents and proportions including materials by weight and volume, and air content but excluding ballast. Give types and amounts of admixtures including air entrainment or air generating compounds.
 5. Fill densities and viscosities, including wet density at the point of placement.
 6. Initial time of set.
 7. Bleeding and shrinkage.
 8. Compressive strength.
 9. Proposed grouting method.
 10. Bulk head design (6).
- C. Technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.
- D. Experience record for the proposed crew, showing a minimum of 1000 cubic yards of flowable fill placed using the proposed or similar equipment and methods. The company must have experience in design, placement and testing on relevant projects where fill was placed to strict quality control requirements in pipe/structure similar to or equal to with similar distances between access points at injection pressures proposed.
- E. At least 60 days prior to commencing any abandonment activities, submit a plan for abandonment, describing the proposed grouting sequence, number and location of vents, bypass pumping requirements and plugging, if any, and other information pertinent to completion of the work.

PART 2 PRODUCTS

2.01 FLOWABLE FILL

- A. Establish proposed grout mixes, methods, plans and criteria that the grouting operations shall meet. The grouting system shall have sufficient gauges, monitoring devices and tests to determine the effectiveness of the grouting operation and to ensure complete fill (100%) and that no voids exist within the pipeline or structure.
- B. Design Mix Criteria. Provide design of one or more mixes to meet the design criteria and conditions for placement so as to fill the abandoned pipe and to meet the following requirements:
- Accommodate the diameter or size of pipe/structure
 - Accommodate the void size of the surrounding soil
 - Accommodate the absence or presence of water
 - Provide the acceptable strength and durability
 - Provide load bearing capacity

- Shrinkage shall not exceed 2% volume
- Provide resistance to hydrocarbons

Present the information required by Paragraph 1.04B in the mix design report including the following:

1. Cement: ASTM C150 Type I or II. Volume and weight per cubic yard of fill. Provide minimum cement content of 100 pounds per cubic yard.
2. Fly ash: ASTM C618 Class C or F. Volume and weight per cubic yard of fill. Provide minimum Fly ash content of 200 pounds per cubic yard.
3. Potable water: Volume and weight per cubic yard of fill. Amount of water determined by mix design testing.
4. Aggregate gradation: 100 percent passing the 3/8 inch sieve and not more than 10 percent passing the #200 sieve. The mix design report shall define a pilot gradation based on the following sieve sizes 3/8-inch, Nos. 4, 8, 16, 30, 50, 100 and 200. Do not deviate from the pilot gradation by more than +/-10 percentage points for any sieve for the production material.
5. Aggregate source material: Screened or crushed aggregate, pit or bank run fine gravels or sand, or crushed concrete. If crushed concrete is used, add at least 30 percent of natural aggregate shall be added as necessary to provide workability.
6. Admixtures: Use admixtures meeting ASTM C494 and ASTM C107 as needed to improve pumpability, to control time of set, and reduce bleeding.
7. Fluidifier: Use a fluidifier meeting ASTM C397 as necessary to hold the solid constituents in suspension. Add a shrinkage compensator if necessary.
8. Performance additive: Use a flowable fill performance additive, such as Darafill or approved equal, to control the fill properties.

C. Flowable Fill Requirements

1. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for the same placement. Present at least three acceptable strength tests for the proposed mix design in the mix design report.
2. Placement characteristics: self-leveling.
3. Shrinkage characteristics: non-shrink.
4. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.
5. Minimum wet density: 90 pounds per cubic foot.

2.02 BALLAST

- A. Ballast material: natural rock or concrete pieces with a minimum size equal to at least 10 times the maximum aggregate size of the flowable fill and a maximum size of 24 inches. The maximum dimension shall not be more than 20 percent of the minimum dimension of the space to be filled.
- B. Ballast composition: free of any regulated waste material.

2.03 PLUGS FOR SEWERS AND FORCE MAINS

- A. Grout Plugs: Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.
- B. Manufactured Plug: Commercially available plug or cap specifically designed and manufactured to be used with the pipe being abandoned.
- C. Brick: Double layer brick wall with cement mortar, ASTM C270-Type S using Portland cement, and fully finished walls

PART 3 EXECUTION

3.01 PREPARATION

- A. Have fill mix design reports and other submittals required by Paragraph 1.04 accepted by the Engineer prior to start of placement. Notify the Engineer at least 24 hours in advance of grouting with flowable fill.
- B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at a pressure that will not distort or imperil any portion of the work, new or existing.
- C. Clean sewer lines and video with closed circuit television to identify connections, locate obstructions, and assess the condition of the pipe. Locate previously unidentified connections, which have not been redirected and reconnected as a part of this project, and report them to the Engineer. During placement of the fill, compensate for any irregularities in the sewer pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.
- D. Perform demolition work prior to starting fill placement. Clean placement areas of sewers and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and any other substances that may degrade performance of the fill. Do not leave sludge or other debris in place if filling more than 2 percent of the placement volume. Dispose of waste material in compliance with Section 01500 - Temporary Facilities and Controls.
- E. Remove free water prior to starting fill placement.
- F. Prior to grouting, bulkheading of the ends and appropriate venting shall be required to provide several different functions, specially to dewater the pipe permitting the grout to set.

3.02 EQUIPMENT

- A. Mix flowable fill in an automated batch plant and deliver it to the site in ready-mix trucks. Performance additives may be added at the placement site if required by mix design.

- B. Use concrete or grout pumps capable of continuous delivery at the planned placement rate. Pumping equipment shall be a size sufficient enough to inject grout at velocity and pressure relative to size, length and diameter of existing pipe or structure.
- C. The materials shall be mixed at the injection point by equipment of sufficient size and capacity to provide the desired amount of grout material for each stage in a single operation. The equipment shall be capable of mixing, foaming and pumping simultaneously the grout at densities required for the approved procedure and shall also be capable of changing density as dictated by field conditions anytime during the grouting operation. Gauges to monitor grout pressure shall be attached immediately adjacent to each injection port. The gauge shall conform to an accuracy of no more than one-half (2) percent error over the full range of the gauge. The range of the gauge shall be no more than 100 percent greater than the design grout pressure. Pressure gauges shall be instrument oil filled and attached to a saddle type diaphragm seal (gauge saver) to prevent clogging with grout. All gauges shall be certified and calibrated in accordance with ANSI B40 Grade 2A (+/- 2 %).

3.03 DEMOLITION OF ABANDONED SEWER MANHOLES, PIPELINE STRUCTURES AND FORCE MAINS PRIOR TO ABANDONMENT

- A. Remove manhole frames and covers and any castings from other existing pipeline structures. Deliver these castings to the Owner=s storage yard.
- B. Demolish and remove precast concrete adjustment rings and corner section, or brick and mortar corbel and chimney, or other pipeline structure, to a minimum depth of 4 feet below finished grade. The structure may be removed to a greater depth, but not deeper than 18 inches above the crown of the abandoned sewer.
- C. If the adjacent sewer lines are not to be filled, place temporary plugs in each line connecting to the manhole, in preparation for filling the manhole.
- D. Excavate overburden from force mains to be abandoned at the locations indicated on the Drawings, conforming to Section 02227 - Excavation and Backfill for Utilities. Cut the existing force main, if necessary, to provide an end surface perpendicular to the axis of the pipe and suitable for the plug to be installed. Remove any force main piping material remaining outside of the segment to be abandoned.

3.04 INSTALLATION

- A. Abandon sewer lines by completely filling the sewer line with flowable fill. Abandon manholes and other structures by filling with flowable fill, together with ballast as applicable, within the depth of structures left in place.
- B. Place flowable fill to fill the volume between the manholes as completely as practicable. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 feet in length. In the event the manhole to manhole length exceeds

500-feet, the Contractor shall install temporary entry points in the sanitary sewer by excavating, exposing and removing a portion of the pipe and using such points for grout filling. The costs associated with such excavation, exposing and removal of a portion of the sanitary sewer pipe to facilitate grout filling, backfill and surface restoration after completion of grouting shall be included in the unit price bid for abandonment.

- C. Have the filling operation performed by experienced crews with equipment to monitor density of the flowable fill and to control pressure.
- D. Temporarily plug sewer lines which are to remain in operation during pouring/pumping to keep the lines free of flowable fill.
- E. Pump flowable fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain the flowable fill in the lines to be abandoned. These pipes will act as injection points or vents for placement of flowable fill.
- F. Place flowable fill under pressure flow conditions into a properly vented open system until flowable fill emerges from the vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill the sewer from the downstream end, to discharge at the upstream end.
- G. Inject flowable fill through replaced ballast using grouting equipment and a series of grout pipes discharging at the bottom of the placement, allowing the fill to rise through the ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at the same time as flowable fill is placed. Do not fill with ballast more than 50 percent of the volume at any level, to prevent nesting and void formation.
- H. Remediate placement of flowable fill which does not fill voids in a sewer, in manhole or other structures, or where voids develop due to excessive shrinkage or bleeding of the fill, by using pressure grouting either from inside the sewer or from the surface at no additional cost to the project. Pressure grout shall conform to Section 02330 - Tunnel Grout.
- I. Plug each end of force mains being abandoned.
- J. Force main abandonment
 1. Clean the inside surface of force mains at least 12 inches from the ends, as necessary to achieve a firm bond and seal the grout plug or manufactured plug to the pipe surface. Similarly, clean and prepare the exterior pipe surface if a manufactured cap is to be used.
 2. When using a grout plug, place a temporary plug or bulkhead approximately 12 inches inside the pipe. Fill the pipe end completely with dry-pack grout mixture.
 3. When using a manufactured plug or cap, install the fitting as recommended by the manufacture's instructions, to form a water tight seal.
- K. Backfill to the surface, above the pipe or structures left in place, with flowable fill in restricted areas, compacted bank run sand in unrestricted areas to be paved or select fill in unrestricted areas outside of pavement. Place and compact backfill, other than flowable fill,

in compliance with Section 02227 - Excavation and Backfill for Utilities.

- L. Collect and dispose of excess flowable fill material and other debris in accordance with Section 01500 - Temporary Facilities and Controls.

3.05 FIELD QUALITY CONTROL

- A. Provide batch plant tickets for each truck delivery of flowable fill. Note on the tickets addition of admixtures at the site.
- B. Check flow characteristics and workability of the fill as the placement proceeds.
- C. Obtain at least three test cylinders for each placement area for determination of 56 day compressive strength and bleeding. The acceptance of the placement will be based on the average strength of the three tests.
- D. Record the volume of ballast together with the flowable fill placement for the same space to demonstrate that voids have been filled.

3.06 PROTECTION OF PERSONS AND PROPERTY

- A. Provide safe working conditions for employees throughout demolition and removal operations. Observe safety requirements for work below grade.
- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to the work.

END OF SECTION

SECTION 02076

REMOVE EXISTING PAVEMENTS AND STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removing concrete paving, asphaltic concrete pavement, and base courses.
- B. Removing concrete curbs, concrete curb and gutters, sidewalks and driveways.
- C. Removing pipe culverts and sewers.
- D. Removing miscellaneous structures of concrete, masonry, or combination of concrete and masonry.

1.02 UNIT PRICES

- A. No separate payment will be made for removing existing pavements and structures under this Section unless included in bid documents. Include payment in unit price for work in appropriate sections.
- B. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.
- B. Coordinate removal work with utility companies.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Obtain advance approval from Engineer for dimensions and limits of removal work.
- B. Identify known utilities below grade. Stake and flag locations.

3.02 PROTECTION

- A. Protect utilities that remain from damage.
- B. Protect trees, other plant growth, and features designated to remain.
- C. Protect adjacent public and private property from damage.

- D. Protect bench marks, monuments, and existing structures designated to remain from damage or displacement.

3.03 REMOVALS

- A. Remove by methods that will not damage underground utilities. Do not use a drop hammer near existing underground utilities.
- B. Minimize amount of earth loaded during removal operations.
- C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut a minimum depth of 2 inches.
- D. Where street and driveway saw cut locations coincide or fall within three feet of existing construction or expansion joints, break-out to existing joint.
- E. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.

3.04 DISPOSAL

- A. Inlet frames, grates, and plates; and manhole frames and covers, may remain Owner property. Disposal shall be in accordance with requirements of Section 01564 - Waste Material Disposal.
- B. Remove debris resulting from Work under this section from site in accordance with requirements of Section 01564 - Waste Material Disposal.

END OF SECTION

SECTION 02226

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, backfilling, and compaction of backfill for structures.

1.02 UNIT PRICES

- A. No payment will be made for structural excavation and backfill under this Section. Include payment in unit price or lump sum for construction of structures.

1.03 DEFINITIONS

- A. Unsuitable Material: Unsuitable soil materials are the following:
 - 1. Materials that are classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D 2487.
 - 2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.
 - 3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
 - 4. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.
- C. Select Material: Material as defined in Section 02229 - Utility Backfill Materials.
- D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.
- E. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics, as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

- F. Foundation Base: For foundation base material, use crushed aggregate with filter fabric, as required, cement stabilized sand, or concrete seal slab. The foundation base provides a smooth, level working surface for the construction of the concrete foundation.
- G. Foundation Subgrade: Foundation subgrade is the surface of the natural soil which has been excavated and prepared to support the foundation base or foundation backfill, where needed.
- H. Ground Water Control Systems: Installations external to the excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower the ground water, intercepting seepage which would otherwise emerge from the side or bottom of the excavation, and depressurization to prevent failure or heaving of the excavation bottom. Refer to Section 01563 - Control of Ground Water and Surface Water.
- I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from the excavation. Remove rain water and surface water which accidentally enters the excavation as a part of excavation drainage.
- J. Excavation Drainage: Removal of surface and seepage water in the excavation by sump pumping and using French drains surrounding the foundation to intercept the water.
- K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below the foundation as shown on Drawings, and backfilled with foundation backfill material.
- L. Shoring System: A structure that supports the sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit a work plan for excavation and backfill for each structure with complete written description which identifies details of the proposed method of construction and the sequence of operations for construction relative to excavation and backfill activities. The descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to the City Engineer that the procedures meet the requirements of the Specifications and Drawings.
- C. Submit excavation safety system plan.
 - 1. The excavation safety system plan shall be in accordance with applicable OSHA requirements for all excavations.

2. The excavation safety system plan shall be in accordance with the requirements of Section 01526 - Trench Safety System, for all excavations that fall under State and Federal trench safety laws.
- D. Submit a ground and surface water control plan in accordance with requirements in this Section and Section 01563 - Control of Ground Water and Surface Water.
- E. Submit backfill material sources and product quality information in accordance with requirements of Section 02229 - Utility Backfill Materials.
- F. Submit project record documents under provisions of Section 01720 - Project Record Documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.05 TESTS

- A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the Owner in accordance with requirements of Section 01410 - Testing Laboratory Services and as specified in this Section.
- B. Contractor shall perform embedment and backfill material source qualification testing in accordance with requirements of Section 02229- Utility Backfill Materials.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with equipment suitable for achieving the requirements of this Specification.
- B. Use equipment which will produce the degree of compaction specified. Backfill within 3 feet of walls shall be compacted with hand-operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to the depth of the fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

- A. Backfill materials shall conform to the classifications and product descriptions of Section 02229 - Utility Backfill Materials. The classification or product description for backfill applications shall be as shown on the Drawings and as specified.

PART 3 EXECUTION

3.01 PREPARATION

- A. Conduct an inspection to determine condition of existing structures and other permanent installations.
- B. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Conform to requirements of Section 01570 - Traffic Control and Regulation. Maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by the Work, and is considered hazardous to traffic movements.
- C. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified in Section 01526 - Trench Safety Systems for excavations over 5 feet deep.
- D. Remove old pavements and structures, including sidewalks and driveways, in accordance with requirements of Section 02076 - Removing Existing Pavements and Structures.
- E. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01563 - Control of Ground Water and Surface Water.

3.02 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Drawings, and in accordance with requirements of Section 01535 - Tree and Plant Protection.
- B. Protect and support above-grade and below-grade utilities which are to remain.
- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on the Drawings.
- D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.
- E. Maintain excavation and backfill areas until start of subsequent work. Repair and recompact slides, washouts, settlements, or areas with loss of density at no additional cost to the City.

3.03 EXCAVATION

- A. Perform excavation work so that the underground structure can be installed to depths and alignments shown on Drawings. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to the absolute minimum necessary. No additional payment will be made for excess excavation not authorized by Engineer.
- B. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work. Notify Engineer and obtain instructions before proceeding in such areas.

- C. Immediately notify the agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Engineer and agency for any repairs or relocations, either temporary or permanent.
- D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.
- E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.
- F. Conduct hauling operations so that trucks and other vehicles do not create a dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud, or other materials that spill onto streets or are deposited onto streets by vehicle tires.
- G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by the Work.
- H. Provide sheeting, shoring, and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on Drawings, and to protect the Work and adjacent structures or improvements. Sheeting, shoring, and bracing used to protect workmen and the public shall conform to requirements of Section 01526 - Trench Safety Systems.
- I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, concrete fill, cement stabilized sand, or other material approved by Engineer.
- J. After completion of the structure, remove sheeting, shoring, and bracing unless Engineer has approved in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures or improvements.
- K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or material approved by Engineer.

3.04 HANDLING EXCAVATED MATERIALS

- A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at a sufficient distance from excavation to prevent slides or cave-ins.
- B. Provide additional backfill material in accordance with requirements of Section 02251 - Utility Backfill Materials, if adequate quantities of suitable material are not available from excavation and trenching operations at the site.

3.05 DEWATERING

- A. Provide ground water control per Section 01563 - Control of Ground Water and Surface Water.
- B. Maintain the ground water surface a minimum of two feet below the bottom of the foundation base.
- C. Maintain ground water control as directed by Section 01563 - Control of Ground Water and Surface Water and until the structure is sufficiently complete to provide the required weight to resist hydrostatic uplift with a minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

- A. Notify Engineer at least 48 hours prior to planned completion of foundation excavations. Do not place the foundation base until the excavation is accepted by the Engineer.
- B. Excavate to elevations shown on Drawings, as needed to provide space for the foundation base, forming a level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or a material as directed by the Engineer. Prior to placing material over it, recompact the subgrade, scarifying, as needed, to 95 percent of the maximum Standard Proctor Density according to ASTM D 698. If the specified level of compaction cannot be achieved, moisture condition the subgrade and recompact until 95 percent is achieved, over-excavate to provide a minimum layer of 24 inches of foundation backfill material, or other means acceptable to the Engineer.
- C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by the Engineer.
- D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in a satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.
- E. Soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to the required subgrade, shall be removed and replaced with foundation backfill material, as directed by Engineer, at no additional cost to the Owner.
- F. Place foundation base, or foundation backfill material, where needed, over the subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with a seal slab or cement-stabilized sand.
- G. All crushed aggregate, and other free draining Class I materials, shall have a geotextile filter fabric separating it from native soils or select material backfill. The fabric shall overlap a minimum of 12 inches beyond where another material stops contact with the soil.

- H. Crushed aggregate, and other Class I materials, shall be placed in uniform layers of 8-inch maximum thickness. Compaction shall be by means of at least two passes of a vibratory compactor.

3.07 FOUNDATION BASE

- A. After the subgrade is properly prepared, including the placement of foundation backfill where needed, the foundation base shall be placed. The foundation base shall consist of a 12-inch layer of crushed aggregate or cement stabilized sand. Alternately, a 4-inch minimum seal slab may be placed. The foundation base shall extend a minimum of 12 inches beyond the edge of the structure foundation.
- B. Where the foundation base and foundation backfill are of the same material, both can be placed in one operation.

3.08 BACKFILL

- A. Complete backfill to surface of natural ground or to lines and grades shown on Drawings. Use existing material that qualifies as select material, unless indicated otherwise. Deposit backfill in uniform layers and compact each layer as specified.
- B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that the concrete has reached a minimum of 85 percent of the specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until the slab or intermediate walls have been placed and concrete has attained sufficient strength.
- C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.
- D. Maintain fill material at no less than 2 percent below nor more than 2 percent above optimum moisture content. Place fill material in uniform 8-inch maximum loose layers. Compaction of fill shall be to at least 95 percent of the maximum Standard Proctor Density according to ASTM D 698 under paved areas. Compact to at least 90 percent around structures below unpaved areas.
- E. Where backfill is placed against a sloped excavation surface, run compaction equipment across the boundary of the cut slope and backfill to form a compacted slope surface for placement of the next layer of backfill.
- F. Place backfill using cement-stabilized sand in accordance with Section 02252 - Cement Stabilized Sand.

3.09 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01410 - Testing Laboratory Services.

- B. Tests will be performed initially on minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.
- C. In-place density tests of compacted subgrade and backfill will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions:
 - 1. A minimum of one test for every 100 cubic yards of compacted backfill material.
 - 2. A minimum three density tests for each full work shift.
 - 3. Density tests will be performed in all placement areas.
 - 4. The number of tests will be increased if inspection determines that soil types or moisture contents are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density.
- D. At least three tests for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.
- E. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at Contractor's expense.

3.10 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess materials in accordance with requirements of Section 01564 - Waste Material Disposal.

END OF SECTION

SECTION 02227

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities.

1.02 UNIT PRICES

- A. No additional payment will be made for trench excavation, embedment and backfill. Include payment in the unit price for installed underground piping, sewer, conduit, or duct work.
- B. No separate or additional payment will be made for surface water control, or for excavation drainage. Include payment in the unit price for the installed piping, sewer, conduit, or duct work.
- C. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. Pipe Foundation: Suitable and stable native soils that are exposed at the trench subgrade after excavation to depth of bottom of the bedding as shown on the Drawings, or foundation backfill material placed and compacted in over-excavations.
- B. Pipe Bedding: The portion of trench backfill that extends vertically from top of foundation up to a level line at bottom of pipe, and horizontally from one trench sidewall to opposite sidewall.
- C. Haunching: The material placed on either side of pipe from top of bedding up to springline of pipe and horizontally from one trench sidewall to opposite sidewall.
- D. Initial Backfill: The portion of trench backfill that extends vertically from springline of pipe (top of haunching) up to a level line 12 inches above top of pipe, and horizontally from one trench sidewall to opposite sidewall.
- E. Pipe Embedment: The portion of trench backfill that consists of bedding, haunching and initial backfill.
- F. Trench Zone: The portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.

- G. Unsuitable Material: Unsuitable soil materials are the following:
1. Materials that are classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D 2487.
 2. Materials that cannot be compacted to required density due to either gradation, plasticity, or moisture content.
 3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
 4. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- H. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement are considered suitable, unless otherwise indicated.
- I. Backfill: Suitable material meeting specified quality requirements, placed and compacted under controlled conditions.
- J. Ground Water Control Systems: Installations external to trench, such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of trench excavation, and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01563 - Control of Ground Water and Surface Water.
- K. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from trench excavation. Rain water and surface water accidentally entering trench shall be controlled and removed as a part of excavation drainage.
- L. Excavation Drainage: Removal of surface and seepage water in trench by sump pumping and using a drainage layer, as defined in ASTM D 2321, placed on the foundation beneath pipe bedding or thickened bedding layer of Class I material.
- M. Trench Conditions are defined with regard to the stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.
1. Dry Stable Trench: Stable and substantially dry trench conditions exist in pipe embedment zone as a result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.
 2. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.
 - a. Stable Trench with Seepage in Clayey Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.

- b. Stable Wet Trench in Sandy Soils: Excavation drainage is provided in the embedment zone in combination with ground water control in predominately sandy or silty soils.
- 3. Unstable Trench: Unstable trench conditions exist in the pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.

- N. Subtrench: Subtrench is a special case of benched excavation. Subtrench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or embedment materials directly against undisturbed soils. Depth of a subtrench depends upon trench stability and safety as determined by the Contractor.

- O. Trench Dam: A placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along the trench.

- P. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of foundation as shown on Drawings, and backfilled with foundation backfill material.

- Q. Foundation Backfill Materials: Natural soil or manufactured aggregate of controlled gradation, and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.

- R. Trench Safety Systems include both Protective Systems and Shoring Systems as defined in Section 01526 - Trench Safety Systems.

- S. Trench Shield (Trench Box): A portable worker safety structure moved along the trench as work proceeds, used as a Protective System and designed to withstand forces imposed on it by cave-in, thereby protecting persons within the trench. Trench shields may be stacked if so designed or placed in a series depending on depth and length of excavation to be protected.

- T. Shoring System: A structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins, or to prevent movements of the ground affecting adjacent installations or improvements.

1.04 SCHEDULING

- A. Schedule work so that pipe embedment can be completed on the same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.

1.05 SUBMITTALS

- A. Conform to Section 01300 - Submittals.
- B. Submit a written description for information only of the planned typical method of excavation, backfill placement and compaction, including:
 - 1. Sequence of work and coordination of activities.
 - 2. Selected trench widths.
 - 3. Procedures for foundation and embedment placement, and compaction.
 - 4. Procedure for use of trench boxes and other premanufactured systems while assuring specified compaction against undisturbed soil.
 - 5. Procedure for installation of Special Shoring at locations identified on the Drawings.
- C. Submit a ground and surface water control plan in accordance with requirements in this Section and Section 01563 - Control of Ground Water and Surface Water.
- D. Submit backfill material sources and product quality information in accordance with requirements of Section 02229 - Utility Backfill Materials.
- E. Submit a trench excavation safety program in accordance with requirements of Section 01526 - Trench Safety System. Include designs for special shoring meeting the requirements defined in Paragraph 1.03 of Section 01526.
- F. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts, and gradients.

1.06 TESTS

- A. Perform backfill material source qualification testing in accordance with requirements of Section 02229 - Utility Backfill Materials.
- B. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the Owner in accordance with requirements of Section 01410 - Testing Laboratory Services and as specified in this Section.

1.07 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Drawings, and in accordance with requirements of Section 01535 - Tree and Plant Protection.
- B. Protect and support above-grade and below-grade utilities which are to remain.

- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities are indicated on the Drawings.

1.08 SPECIAL SHORING DESIGN REQUIREMENTS

- A. Have Special Shoring designed or selected by the Contractor's Professional Engineer to provide support for the sides of the excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a premanufactured system selected by the Contractor's Professional Engineer to meet the project site requirements based on the manufacturer's standard design.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with hydraulic excavator or other equipment suitable for achieving the requirements of this Section.
- B. Use only hand-operated tamping equipment until a minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.
- C. Use trench shields or other Protective Systems or Shoring Systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.
- D. Use Special Shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting the Special Shoring design requirements.

2.02 MATERIAL CLASSIFICATIONS

- A. Embedment and Trench Zone Backfill materials: Conform to the classifications and product descriptions of Section 02229 - Utility Backfill Materials.
- B. Concrete Backfill: Conform to requirements for Class B concrete as specified in the pertinent Section.
- P. Geotextile (Filter Fabric): Conform to requirements of Section 02249 - Geotextile.
- Q. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.
- E. Timber Shoring Left in Place: Untreated oak.

PART 3 EXECUTION

3.01 STANDARD PRACTICE

- A. Install flexible pipe, including "semi-rigid" pipe, to conform to standard practice described in ASTM D 2321, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.
- B. Install rigid pipe to conform with standard practice described in ASTM C 12, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.

3.02 PREPARATION

- A. Establish traffic control to conform with requirements of Section 01570 - Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections where Work is in progress or where affected by the Work, and is considered hazardous to traffic movements.
- B. Perform Work to conform with applicable safety standards and regulations. Employ a trench safety system as specified in Section 01526 - Trench Safety Systems.
- C. Immediately notify the agency or company owning any existing utility line which is damaged, broken, or disturbed. Obtain approval from the Engineer and agency for any repairs or relocations, either temporary or permanent.
- D. Remove existing pavements and structures, including sidewalks and driveways, to conform with requirements of Section 02076 - Removing Existing Pavements and Structures, as applicable.
- E. Install and operate necessary dewatering and surface water control measures to conform with Section 01563 - Control of Ground Water and Surface Water.
- F. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed in accordance with Section 01050 - Field Surveying.
- G. PREPARATION: Complete, as incidental to construction, site preparation work including clearing and grubbing; removal and disposal of trash, rubbish, debris, and minor obstacles to construction; relocation of savable items; stripping topsoil within excavation areas, stockpiling topsoil; and, after construction, spreading topsoil over disturbed areas as required and finishing and grading surface within construction areas.

- H. Perform a Potential Conflict Investigation at all critical locations. Locate existing utilities ahead of pipe laying activities. Notify Engineer in writing immediately upon identification of any conflict. In the event, Contractor will not be entitled to extra cost for downtime including, but not limited, payroll, equipment, overhead demobilization and remobilization.

3.03 EXCAVATION

- A. Except as otherwise specified or shown on the Drawings, install underground utilities in open cut trenches with vertical sides.
- B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on the Drawings. Avoid disturbing surrounding ground and existing facilities and improvements. Excavate trench so that pipe is centered in trench. Do not obstruct sight distance for vehicles utilizing roadways or detours with stockpiled materials.
- C. Determine trench excavation widths using the following schedule (as a minimum) as related to pipe outside diameter (O.D.) or as shown on the drawings. Maximum trench width shall be the minimum trench width plus 24 inches.

<u>Nominal Pipe Size, Inches</u>	<u>Minimum Trench Width, Inches</u>
Less than 18	O.D. + 18
18 to 30	O.D. + 24
Greater than 30	O.D. + 36

- D. Use sufficient trench width or benches above the embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from the surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.
- E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify the Engineer and obtain instructions before proceeding.
- F. Shoring of Trench Walls.
 - 1. Install Special Shoring in advance of trench excavation or simultaneously with the trench excavation, so that the soils within the full height of the trench excavation walls will remain fully laterally supported at all times.
 - 2. For all types of shoring, support trench walls in the pipe embedment zone throughout the installation. Provide trench wall supports sufficiently tight to prevent washing the trench wall soil out from behind the trench wall support.

3. Unless otherwise directed by the Engineer, leave sheeting driven into or below the pipe embedment zone in place to preclude loss of support of foundation and embedment materials. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and the trench wall in the vicinity of the pipe zone.
 4. Employ special methods for maintaining the integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
 5. If sheeting or other shoring is used below top of the pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into the embedment zone 1 inch. Fill voids left on removal of supports with compacted backfill material.
- G. Use of Trench Shields. When a trench shield (trench box) is used as a worker safety device, the following requirements apply:
1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to the trench sidewalls.
 2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor the degree of compaction reduced.
 3. When required, place, spread, and compact pipe foundation and bedding materials beneath the shield. For backfill above bedding, lift the shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.
 4. Maintain trench shield in position to allow sampling and testing to be performed in a safe manner.
- H. Cover:
1. Provide 24 in. Minimum cover over top of pipe where surface grades are definitely established and 30 in. in other locations.
 2. Greater depth of cover may be necessary on vertical curves or to provide necessary clearance beneath pipes, conduits, drains, drainage structures or other obstructions encountered at normal pipe grades.
 3. For water mains, provide 4 ft. minimum cover unless noted otherwise.
 4. Measure depth of backfill cover vertically from top of pipe to finish ground or pavement surface elevations.
- I. Trenching:
1. Excavation for pipe stubs to be laid transversely across streets may be made with trench hoe.
 2. Where surface or underground obstructions make excavation inaccessible to trenching machine, trench hoe may be used.

3. Where trench hoe is used, do not use excavated material composed of large chunks and clods for backfill.
 4. No excavated material will be stockpiled along trench or on paved surfaces. Load excavated material into dump truck as trench is excavated.
 5. Topsoil excavated from the trench shall be returned to trench to be used as backfill material for the top 12 inches of the trench.
 6. For trench excavations requiring cement stabilized sand backfill to subgrade of pavement, stockpiling of cement stabilized sand on pavement is not permitted.
- J. Voids under paving area outside shield will require removal of pavement, consolidation and replacement of pavement in accordance with Contract Documents. Repair damage resulting from failure to provide adequate supports.
- K. Place sand or soil behind shoring or trench shield to prevent soil outside shoring from collapsing and causing voids under pavement. Immediately pack suitable material in outside voids following excavation to avoid caving of trench walls.
- L. Do not use excavators with side cutters installed while working within 15 feet of pipeline company=s pipeline. Use a small, rubber-tired excavator, such as a backhoe, to do exploratory excavation. Bucket that is used to dig in close proximity to pipelines shall not have teeth or shall have a guard installed over teeth to approximate a bucket without teeth. Excavate by hand within 1 foot of pipeline company=s line. Do not use larger excavation equipment normally used to dig water main trench in vicinity of pipeline until all pipelines have been uncovered and fully exposed. Do not place large excavation and hauling equipment directly over pipelines unless approved by pipeline company=s representative.
- M. Regrade adjacent ground surfaces where surfaces have been disturbed during construction operations to original and matching grades.
- N. Trees and shrubs designated to remain that sustain cutting or injury to roots, trunk , or limbs shall be pruned by a tree surgeon and cut or injury painted with asphaltic horticultural coating without cost to Owner.
- O. Perform repair on pipe in locations shown on plans/specifications.
- P. Where pipe is to be installed in fill, complete area fill and compaction to an elevation not less than 1 ft. above top of pipe before open-cut excavation and trenching for pipe.
- Q. Excavate adequate but not excessive working space and clearances for installation of work and form removal.
- R. Allow not less than 6 in. clearance in horizontal dimensions of excavations for outside plastering of manholes and similar structures constructed of masonry units.
- S. Do not undercut excavation faces for extended footings of structures.
- T. Excavate by hand within 2 ft. of existing utility to remain.

- U. **BLASTING:** Use of explosions will not be permitted.
- V. **UNAUTHORIZED EXCAVATION:** Refill excavation below subgrade elevations with tamped sand, gravel, cement stabilized sand, or concrete.

3.04 HANDLING EXCAVATED MATERIALS

- A. Use only excavated materials which are suitable as defined in this Section and conforming with Section 02229 - Utility Backfill Materials. Place material suitable for backfilling in stockpiles at a distance from the trench to prevent slides or cave-ins.
- B. When required, provide additional backfill material conforming with requirements of Section 02229 - Utility Backfill Materials.
- C. Do not place stockpiles of excavated materials on streets and adjacent properties. Maintain site conditions in accordance with Section 01500 - Temporary Facilities and Controls.
- D. Dispose of unsuitable excavated materials off-site in legal manner.
- E. Excess excavated material shall become the property of the contractor to be disposed of off-site in a legal manner.

3.05 GROUND WATER CONTROL

- A. Implement ground water control according to Section 01563 - Control of Ground Water and Surface Water. Provide a stable trench to allow installation in accordance with the Specifications.

3.06 TRENCH FOUNDATION

- A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.
- B. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes, and not less than one in every 300 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.
- C. Where rock or other incompressible material is encountered, remove material to depth 6 in. below subgrade and backfill with tamped sand, gravel, or concrete.
- D. Reinforce trench bottoms or subgrade surfaces for concrete structures which are solid, but which become mucky on top due to construction operations with specified sand.
- E. Use only tamped sand, gravel, or concrete to bring fills to lines and grades indicated and for replacing unsatisfactory materials.

3.07 PIPE EMBEDMENT PLACEMENT AND COMPACTION

- A. Immediately prior to placement of embedment materials, the bottoms and sidewalls of trenches shall be free of loose, sloughing, caving, or otherwise unsuitable soil.
- B. Place geotextile to prevent particle migration from the in-situ into open-graded (Class I) embedment materials or drainage layers.
- C. Place embedment including bedding, haunching and initial backfill to meet requirements indicated on Drawings.
- D. For pipe installation, manually spread embedment materials around the pipe to provide uniform bearing and side support when compacted. Do not allow materials to free-fall from heights greater than 24 inches above top of pipe. Perform placement and compaction directly against the undisturbed soils in the trench sidewalls, or against sheeting which is to remain in place.
- E. Do not place trench shields or shoring within height of the embedment zone unless means to maintain the density of compacted embedment material are used. If moveable supports are used in embedment zone, lift the supports incrementally to allow placement and compaction of the material against undisturbed soil.
- F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.
- G. Place haunching material manually around the pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside the pipe with sand bags or other suitable means.
- H. Place electrical conduit directly on foundation without bedding.
- I. Shovel pipe embedment material in place and compact it using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of the next lift.
 - 1. Class I embedment materials.
 - a. Maximum 6-inches compacted lift thickness.
 - b. Systematic compaction by at least two passes of vibrating equipment. Increase compaction effort as necessary to effectively embed the pipe to meet the deflection test criteria.
 - c. Moisture content as determined by Contractor for effective compaction without softening the soil of trench bottom, foundation or trench walls.
 - 2. Class II embedment and cement stabilized sand.
 - a. Maximum 6-inches compacted thickness.
 - b. Compaction by methods determined by Contractor to achieve a minimum of 95 percent of the maximum dry density as determined according to

- ASTM D 698 for Class II materials and according to ASTM D 558 for cement stabilized materials.
- c. Moisture content of Class II materials within 3 percent of optimum as determined according to ASTM D 698. Moisture content of cement stabilized sands on the dry side of optimum as determined according to ASTM D 558 but sufficient for effective hydration.
- J. Place trench dams in Class I embedments in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.08 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

- A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only the minimum length of trench open as necessary for construction.
- B. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave the sheeting in place. Cut off sheeting 1.5 feet or more above the crown of the pipe. Remove trench supports within 5 feet from the ground surface.
- C. For sewer pipes, use backfill materials described here as determined by trench limits. As trench zone backfill in paved areas for streets and to one foot back of curbs and pavements, use cement stabilized sand for pipe of nominal sizes less than 36 inches, or bank run sand for pipe of nominal sizes 36 inches and larger or as indicated on the Drawings. Uniformly backfill trenches partially within limits one foot from streets and curbs according to the paved area criteria. Use select backfill within one foot below pavement subgrade for rigid pavement. For asphalt concrete or limestone roadway, use flexible base material within one foot below pavement subgrade.
- D. For water lines, backfill in trench zone, including auger pits, with bank run sand, select fill material as specified in Section 02229 - Utility Backfill materials.
- E. For trench excavations under pavement, place trench zone backfill in lifts and compact by methods indicated below or as stated on the plans. Fully compact each lift before placement of the next lift.
 - 1. Bank run sand.
 - a. Maximum 9-inches compacted lift thickness.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 3 percent of optimum determined according to ASTM D 698
 - 2. Cement-stabilized sand.
 - a. Place backfill in 8 in. maximum layers to achieve uniform placement and required compaction.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 558.

- c. Moisture content on the dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.
- 3. Select fill
 - a. Maximum 6-inches compacted thickness.
 - b. Compaction by equipment providing tamping or kneading impact to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 2 percent of optimum determined according to ASTM D 698.
 - d. Add backfill material as necessary where backfill settled below ground surface.
- F. Do not backfill with wet, mucky, or unsuitable materials or with large rocks or clods of material.
- G. Trench backfill above pipe embedment shall conform to requirements for type and location of pipe as shown on the drawing.
- H. Place backfill material to minimum depth 12 in. above pipe before ceasing backfilling operations for day.
- I. Base Material Backfill for Patching of Existing Pavement: Provide 12 in. of base material.
- J. Flooding of backfill for compaction (water tamping) is not acceptable. Obtain compaction by mechanical means which allows access to all areas of backfill.

3.09 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

- A. Meet the requirements of adjoining utility installations for backfill of pipeline structures, as shown on the Drawings.

3.10 FIELD QUALITY CONTROL

- A. Test for material source qualifications as defined in Section 02229 - Utility Backfill Materials.
- B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction.
- C. Laboratory Quality Control by Contractor:
 - 1. Establish optimum moisture-maximum density curve for bedding and backfill material, ASTM D 698.
 - a. For those soils which will not exhibit a well defined moisture-density relationship, determine maximum and minimum index densities of the soil, ASTM D4253 and D4254, for calculation of the relative density of the soil in the field.
 - 2. Establish optimum moisture-maximum density curve, ASTM D 698; Atterberg Limits, ASTM D 4318; and sieve analysis, ASTM D 422 for the following:

- a. Borrow bedding and backfill material to be used.
 - b. Excavated material of questionable suitability for use as bedding and backfill material.
 3. One optimum moisture-maximum density curve, ASTM D 698, shall be established for each significant change in materials.
 4. Bedding and backfill materials which do not meet specified requirements shall be replaced with suitable materials.
- D. Field Quality Control by Owner
1. Laboratory density testing of trench backfill:
 - a. One field in-place density test per 500 linear ft. of trench for each fill layer.
 - b. One field in-place density test per 150 linear ft. of trench for each fill layer under existing or proposed paved areas and at least one test per fill layer at each road crossing.
 2. Laboratory density testing of general fill: One field in-place density test per 100 cu. yds. of fill placed.
 3. Field in-place density tests shall be in compliance with ASTM D 1556, ASTM D 2922, or ASTM D 2167.
- E. Submit minimum 10 lb. Samples of any borrow bedding and backfill material to be used to materials testing laboratory.
- F. Recondition, recompact, and retest at Contractor's expense if tests indicate Work does not meet specified compaction requirements. For hardened soil cement with nonconforming density, core and test for compressive strength at Contractor's expense.
- G. Acceptability of crushed rock compaction will be determined by inspection.

3.11 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess materials in accordance with requirements of Section 01564 - Waste Material Disposal.

3.12 POTENTIAL OBSTRUCTION INVESTIGATION

- A. Horizontal and vertical location of various underground lines shown on Drawings, including but not limited to water mains, gas lines, storm sewers, sanitary sewers, telephone lines, electric lines or power ducts, pipelines (petrochemical or petroleum product), concrete and debris, are based on best information available but are only approximate locations. At critical locations field verify horizontal and vertical locations of such lines within a zone 2 feet vertically and 4 feet horizontally of proposed main. Verify location of existing utilities prior to commencing construction. Use extreme caution and care when uncovering these lines. Any damage to known or unknown utilities or obstructions occurring during Potential Obstruction Investigation will be full responsibility of Contractor. No separate payment shall be made for performing such efforts.

- B. Prior to actual field verification phase, notify all utility companies involved and request that their respective utility lines be marked in field. If any utility or pipeline company requires their line be excavated, or exposed prior to construction, comply with that request and utilize a methodology approved by the said company in locating or exposing their lines. Provide Engineer with 48 hours notice prior to any field excavation or related work.
- C. Once known, unknown or potential obstructions have been uncovered, survey vertical and horizontal locations relative to project baseline and datum and plot on 11" X 17" copy of Drawings.
- D. Submit 11" X 17" copy of Drawing with plotted utility or obstruction location titled Potential Obstruction Report to Engineer before or simultaneous with pipe shop drawing submittal.
- E. Engineer will promptly review Potential Obstruction Report and approve construction of proposed main as designed or modify design if necessary. Contractor will be promptly notified of any design modifications.

END OF SECTION

SECTION 02229

UTILITY BACKFILL MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Material Classifications
- B. Utility Backfill Materials
 - 1. Concrete sand.
 - 2. Gem sand.
 - 3. Pea gravel.
 - 4. Crushed stone.
 - 5. Crushed concrete.
 - 6. Bank run sand.
 - 7. Select backfill.
 - 8. Random backfill.
- C. Material handling and quality control requirements.

1.02 UNIT PRICES

- A. No payment will be made for backfill material unless specifically listed in the bid proposal. Include payment in unit price for applicable utility installation.
- B. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. Backfill: Suitable material meeting specified quality requirements for the designated application as embedment or trench zone backfill.
- B. Embedment: Material placed under controlled conditions within the embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching and initial backfill.

- C. Trench Zone Backfill: Material meeting specified quality requirements and placed under controlled conditions in the trench zone from top of embedment zone to base course in paved areas or to the surface grading material in unpaved areas.
- D. Foundation: Either suitable soil of the trench bottom, or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.
- E. Source: A source selected by the Contractor for supply of embedment or trench zone backfill material. A selected source may be the project excavation, off-site borrow pits, commercial borrow pits, or sand and aggregate production or manufacturing plants.
- F. Refer to Section 02227 - Excavation and Backfill for Utilities, for other definitions regarding utility installation by trench construction.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01300 - Submittals.
- B. Submit a description of source, material classification and product description, production method, and application of backfill materials.
- C. Submit test results for samples of off-site backfill materials to comply with Paragraph 3.03, Material Quality Control.
- D. Identify off-site sources for backfill materials at least 14 days ahead of intended use so that the Engineer may obtain samples for verification testing.
- E. Before stockpiling materials, submit a copy of temporary easement or approval from landowner for stockpiling backfill material on private property.

1.05 TESTS

- A. Perform tests of sources for backfill material in accordance with Paragraph 3.03A.
- B. Verification tests of backfill materials may be performed by the Owner in accordance with Section 01410 - Testing Laboratory Services and in accordance with Paragraph 3.03B.
- C. Random fill obtained from the Project excavation as source is exempt from prequalification requirements by Contractor, but must be inspected for unacceptable materials based on ASTM D 2488.

PART 2 PRODUCTS

2.01 MATERIAL CLASSIFICATIONS

- A. Materials for backfill shall be classified for the purpose of quality control in accordance with the Unified Soil Classification Symbols as defined in ASTM D 2487. Material use and application is defined in utility installation specifications and Drawings either by

class, as described in Paragraph 2.01B, or by product descriptions, as given in Paragraph 2.02.

B. Class Designations Based on Laboratory Testing:

1. Class I: Well graded sands and gravels, gravel-sand mixtures, crushed well graded rock, little or no fines (GW, SW)
 - a. Plasticity Index: Nonplastic
 - b. Gradation: D_{60}/D_{10} - greater than 4 percent. Amount passing No. 200 Sieve - less than or equal to 5 percent
2. Class II: Poorly graded gravels and sands, silty sands and gravels, little to moderate fines (GM, GP, SP, SM)
 - a. Plasticity Index: Nonplastic to 4
 - b. Gradation (GP, SP): Amount passing No. 200 Sieve - less than 5 percent
 - c. Gradation (GM, SM): Amount passing No. 200 Sieve - between 12 percent and 50 percent
3. Class III: Clayey gravels and sands, poorly graded mixtures of sand, gravel, and clay (GC, SC)
 - a. Plasticity Index: greater than 7
 - b. Gradation: Amount passing No. 200 Sieve - between 12 percent and 50 percent
4. Class IV: Lean clays (CL)
 - a. Plasticity Index: greater than 7
 - b. Liquid Limit: less than 50
 - c. Gradation: Amount passing No. 200 Sieve - greater than 50 percent
 - d. Inorganic
5. Use soils with dual class designation according to ASTM D 2487 according to the more restrictive class.

2.02 PRODUCT DESCRIPTIONS

- A. Soils classified as silt (ML), silty clay (CL - ML with PI of 4 to 7), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in

unimproved areas as approved by Engineer. Soils classified as fat clay (CH) may be used as backfill materials where allowed by the applicable backfill installation specification. Refer to Section 02226 - Excavation and Backfill for Structures and Section 02227 - Excavation and Backfill for Utilities.

- B. Provide backfill material that is free of stones greater than 6 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to the following limits for deleterious materials:
 - 1. Clay lumps: Less than 0.5 percent for Class I, and less than 2.0 percent for Class II, when tested in accordance with ASTM C 142.
 - 2. Lightweight pieces: Less than 5 percent when tested in accordance with ASTM C 123.
 - 3. Organic impurities: No color darker than standard color when tested in accordance with ASTM C 40.

- C. Manufactured materials may be substituted for natural soil or rock products where indicated in the product specification, and approved by Engineer, provided that the physical property criteria are determined to be satisfactory by testing.

- D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by the Unified Soil Classification System (ASTM D 2487) meeting the following requirements:
 - 1. Less than 15 percent passing the number 200 sieve when tested in accordance with ASTM C 136. The amount of clay lumps or balls not exceeding 2 percent.
 - 2. Material passing the number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318:
 - a. Liquid limit not exceeding 25.
 - b. Plasticity index not exceeding 7.

- E. Concrete Sand: Natural sand, manufactured sand, or a combination of natural and manufactured sand conforming to the requirements of ASTM C 33 and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85

No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

- F. Gem Sand: Sand conforming to the requirements of ASTM C 33 for course aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	95 to 100
No. 4	60 to 80
No. 8	15 to 40

- G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

- H. Crushed Aggregates: All crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:

1. All materials of one product delivered for the same construction activity from a single source.
2. Non-plastic fines.
3. Los Angeles abrasion test wear not exceeding 40 percent when tested in accordance with ASTM C 131.
4. Gradations, as determined in accordance with TEX-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment By Ranges of Nominal Pipes Sizes		
	>15"	15" – 8"	<8"
1"	95 - 100	100	-
3/4"	60 – 90	90 – 100	100
1/2"	25 – 60	-	90 – 100
3/8"	-	20 – 55	40 – 70
No. 4	0 – 5	0 – 10	0 - 15
No. 8	-	0 – 5	0 - 5

5. Crushed stone: Produced from oversize quarried aggregate, sized by crushing from a naturally occurring single source. Crushed gravel or uncrushed gravel are not acceptable materials for utility embedment.
6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are the same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, base course material, reinforcing steel fragments, soil, debris, or deteriorated concrete fragments.
 - I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with a plasticity index between 7 and 20 or clayey soils treated with lime in accordance with Section 02570 - Pavement Repair and Resurfacing, to meet plasticity criteria.
 - J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by the applicable backfill installation specification. Refer to Section 02226 - Excavation and Backfill for Structures and Section 02227 - Excavation and Backfill for Utilities.
 - K. Cement Stabilized Sand: Conform to requirements of Section 02252 - Cement Stabilized Sand.
 - L. Concrete Backfill: Conform to Class B concrete as specified in Section 03305 - Concrete for Utility Construction or Section 03310 - Concrete for Structures.
 - M. Pavement Restoration: Conform to requirements of Section 02570 - Pavement Repair and Resurfacing.

PART 3 EXECUTION

3.01 SOURCES

- A. Use of material encountered in the trench excavations is acceptable, provided applicable specification requirements are satisfied. If excavation material is not acceptable, provide from other source.
- B. Obtain approval for each material source by the Engineer before delivery is started. If sources previously approved do not produce uniform and satisfactory products, furnish materials from other approved sources. All materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet the requirements of the specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once a material is approved by the Engineer, expense for sampling and testing required to change to a different material will be credited to the Owner through a change order.
- C. Bank run sand, select backfill, and random backfill, if available in the Project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete the work from off-site sources.
- D. The Owner does not represent or guarantee that any soil found in the excavation work will be suitable and acceptable as backfill material.

3.02 MATERIAL HANDLING

- A. When backfill material is obtained from either a commercial or non-commercial borrow pit, have that pit opened to expose the vertical faces of the various strata of acceptable material to be used. Excavate the material by vertical cuts extending through the exposed strata to achieve uniformity in the product.
- B. Establish temporary stockpile locations for practical material handling and control, and verification testing by the Engineer in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.
- C. When stockpiling backfill material near the Project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering the drainage system.
- D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.03 MATERIAL QUALITY CONTROL

- A. Ensure that material selected, produced and delivered to the Project meets applicable specifications and is of sufficient uniform properties to allow practical construction and quality control. Responsibilities include:
1. Source or Supplier Qualification. Perform testing, or obtain representative tests by suppliers, for selection of material sources and products. Provide test results for a minimum of three samples for each source and material type. Test samples of processed materials from current production representing material to be delivered. Tests shall verify that the materials meet specification requirements. Repeat qualification test procedures each time the source characteristic changes or there is a planned change in source location or supplier. Qualification tests shall include, as applicable:
 - a. Gradation. Complete sieve analyses shall be reported regardless of the specified control sieves. The range of sieves shall be from the largest particle through the No. 200 sieve.
 - b. Plasticity
 - c. Los Angeles abrasion
 - d. Clay lumps
 - e. Light weight pieces
 - f. Organic impurities
 2. Production Testing. Establish a program to provide assurance that backfill materials delivered from the sources and placed in the Work meet applicable specification requirements. Report results to the Engineer.
 3. Assist the Engineer in obtaining material samples for verification testing at the source or at the production plant.
 4. Notify the Engineer in the field when non-conforming material is detected.
- B. Quality Control
1. The Engineer may sample and test backfill at:
 - a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
 - b. On-site stockpiles.
 - c. Materials placed in the Work.

2. The Engineer may resample material at any stage of work or location if changes in characteristics are apparent.
3. The Engineer will notify Contractor at the Project site about non-conforming materials and will, as appropriate, resample materials to verify results.

C. Tolerances

The following tolerances apply to production quality control testing.

1. Embedment Material and Select Backfill: The Engineer may accept material provided that not more than one out of the most recent five consecutive tests are out of the specification limits for:
 - a. Gradation: Not more than 5 percentage points on any individual sieve.
 - b. Plasticity: Not more than 2 percentage points.
2. Trench Zone Backfill Material: Except for select and random backfill, the Engineer may accept the material provided that not more than one out of the most recent three consecutive tests are out of the specification limits for:
 - a. Gradation: Not more than 8 percentage points on any individual sieve.
 - b. Plasticity: Not more than 5 percentage points.
3. Select and Random Backfill: No quantified tolerances. Remove non-conforming material identifiable by visual-manual procedure.

END OF SECTION

SECTION 02249

GEOTEXTILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Geotextile fabric, also called filter fabric, in applications such as a pipe embedment wrap, around the exterior of a tunnel liner, or around the foundations of pipeline structures and slope stabilization.

1.02 UNIT PRICES

- A. No separate payment will be made for work performed under this Section. Include the cost of such work in unit prices for work requiring geotextile, such as pipe embedment, sewer line in tunnel, or placement of manhole foundations, as appropriate.

1.03 SUBMITTALS

- A. Conform to Section 01300 - Submittals.
- B. Submit the standard manufacturer's catalog sheets and other pertinent information, for approval, prior to installation.
- C. Submit installation methods, as a part of the work plan for tunneling or for excavation and backfill for utilities. Obtain approval from Engineer for geotextile material and the proposed installation method prior to use of the geotextile.

PART 2 PRODUCTS

2.01 GEOTEXTILE

- A. Provide a geotextile (filter fabric) designed for use in geotechnical applications which forms a permeable layer or media while retaining the soil matrix.
- B. Use a fabric which meets the physical requirements for Class A Subsurface Drainage installation conditions as defined in AASHTO M288 and as specified in paragraph 2.02.

2.02 PROPERTIES

- A. Material: Nonwoven, nonbiodegradable, fabric consisting only of continuous chain polymer filaments or yarns, at least 85 percent by weight polyolefins, polyesters or polyamide, formed into a dimensionally stable network.
- B. Chemical Resistance: Inert to commonly encountered chemicals and hydrocarbons over a pH range of 3 to 12.

C. Physical Resistance: Resistant to mildew and rot, ultraviolet light exposure, insects and rodents.

D. Minimum Test Values:

<u>Property</u>	<u>Value (Min.)</u>	<u>Test Method</u>
Grab Strength	180 lbs.	ASTM D 4632
Trapezoidal Tear Strength	50 lbs.	ASTM D 4533
Puncture Strength	80 lbs.	ASTM D 4833
Mullen Burst Strength	290 psi.	ASTM D 3786
Apparent Opening Size ⁽¹⁾	0.25 mm	ASTM D 4751
Permittivity (sec ⁻¹)	0.2	ASTM D 4491

⁽¹⁾Maximum average roll value

PART 3 EXECUTION

3.01 LINE WORK

A. Use geotextile with backfill for utilities in conformance with Section 02227 - Excavation and Backfill for Utilities.

3.02 TUNNEL WORK

A. Use geotextile outside of a tunnel primary liner to prevent the migration of soil fines into the excavated tunnel resulting in voids or settlement. Conform to Section 02310 - Tunnel Excavation and Primary Liner. Select a geotextile, subject to the minimum requirements of Paragraph 2.02, meeting tunnel liner design requirements and installation conditions.

END OF SECTION

SECTION 02252

CEMENT STABILIZED SAND

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cement stabilized sand for backfill and bedding.

1.02 UNIT PRICES

- A. No payment will be made for cement stabilized sand under this Section unless an extra unit price item is included in the Bid Proposal. Include payment for cement stabilized sand in unit price for applicable utility or structure installation section.
- B. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit material qualification and mix design tests to include:
 - 1. Three series of tests of sand or fine aggregate material from the proposed source. Tests shall include procedures defined in Paragraph 2.01.
 - 2. Three moisture-density relationship tests prepared using the material qualified by the tests of Paragraph 1.03B.1. Blends of fine aggregate from crushed concrete and bank run sand shall be tested at the ratio to be used for the mix design testing.
 - 3. Mix design report to meet the design requirements of Paragraph 1.04. The mix design shall include compressive strength tests after 48-hours and 7 days curing.

1.04 DESIGN REQUIREMENTS

- A. Design sand-cement mixture to produce a minimum unconfined compressive strength of 100 pounds per square inch in 48 hours when compacted to 95 percent in accordance with ASTM D558 and when cured in accordance with ASTM D1632, and tested in accordance with ASTM D1633. Mix for general use shall contain a minimum of 1-1/2 sacks of cement per cubic yard. Mix for use as sanitary sewer embedment within 9 feet of waterlines shall contain 2 sacks of cement per cubic yard. Compact mix with a moisture content on the dry side of optimum.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Type 1 Portland cement conforming to ASTM C150.
- B. Sand: Clean, durable sand meeting grading requirements for fine aggregates of ASTM C33, or requirements for Bank Run Sand of Section 02229 - Utility Backfill Materials, and the following requirements:
 - 1. Classified as SW, SP or SM by the United Soil Classification System of ASTM D2487.
 - 2. Deleterious materials:
 - a. Clay lumps, ASTM C142; less than 0.5 percent.
 - b. Lightweight pieces, ASTM C123; less than 5.0 percent.
 - c. Organic impurities, ASTM C40; color no darker than the standard color.
 - 3. Plasticity index of 4 or less when tested in accordance with ASTM D4318.
- C. Fine aggregate manufactured from crushed concrete meeting the quality requirements for crushed rock material of Section 02229 - Utility Backfill Materials, may be used as a complete or partial substitute for bank run sand. The blending ratio of fine aggregate from crushed concrete and bank run sand shall be defined in the mix design report.
- D. Water: Potable water, free of oils, acids, alkalis, organic matter or other deleterious substances, meeting requirements of ASTM C94.

2.02 MIXING MATERIALS

- A. Thoroughly mix sand, cement and water in proportions of the mix design using a pugmill-type mixer. The plant shall be equipped with automatic weight controls to ensure correct mix proportions.
- B. Stamp batch ticket at plant with time of loading directly after mixing. Material not placed and compacted within 4 hours after mixing shall be rejected.

PART 3 EXECUTION

3.01 PLACING

- A. Place sand-cement mixture in 8-inch-thick loose lifts and compact to 95 percent of ASTM D558, unless otherwise specified. The moisture content during compaction shall be on the dry side of optimum but sufficient for hydration. Perform and complete compaction of sand-cement mixture within 4 hours after addition of water to mix at the plant.
- B. Do not place or compact sand-cement mixture in standing or free water.

3.02 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01410 - Testing Laboratory Services.
- B. One sample of cement stabilized sand shall be obtained for each 150 tons of material placed per day with no less than one sample per day of production. Random samples of delivered cement stabilized sand shall be taken in the field at point of delivery in accordance with ASTM 3665. Obtain three individual samples of approximately 12 to 15 lb each from the first, middle, and last third of the truck and composite them into one sample for test purpose.
- C. Prepare and mold four specimens (for each sample obtained) in accordance with ASTM D 558, Method A, without adjusting moisture content. Samples will be molded at approximately same time material is being used, but no later than 4 hours after water is added to mix.
- D. After molding, specimens will be removed from molds and cured in accordance with ASTM D 1632.
- E. Specimens will be tested for compressive strength in accordance with ASTM D 1633, Method A. Two specimens will be tested at 48 hours plus or minus 2 hours and two specimens will be tested at 7 days plus or minus 4 hours.
- F. A strength test will be average of strengths of two specimens molded from same sample of material and tested at same age. Average daily strength will be average of strengths of all specimens molded during one day's production and tested at same age.
- G. Precision and Bias: Test results shall meet recommended guideline for precision in ASTM D 1633 Section 9.
- H. Reporting: Test reports shall contain, as a minimum, the following information:
 - 1. Supplier and plant number
 - 2. Time material was batched
 - 3. Time material was sampled
 - 4. Test age (exact hours)
 - 5. Average 48-hour strength
 - 6. Average 7-day strength
 - 7. Specification section number
 - 8. Indication of compliance / non-compliance
 - 9. Mixture identification
 - 10. Truck and ticket numbers
 - 11. The time of molding
 - 12. Moisture content at time of molding
 - 13. Required strength
 - 14. Test method designations
 - 15. Compressive strength data as required by ASTM D 1633
 - 16. Supplier mixture identification
 - 17. Specimen diameter and height, in.

18. Specimen cross-sectional area, sq. in.

3.03 ACCEPTANCE

- A. Strength level of material will be considered satisfactory if:
 - 1. The average 48-hour strength is greater than 100 psi with no individual strength test below 70 psi.
 - 2. All 7-day individual strength tests (average of two specimens) are greater than or equal to 100 psi.
- B. Material will be considered deficient when 7-day individual strength test (average of two specimens) is less than 100 psi but greater than 70 psi. See Paragraph 3.04 Adjustment for Deficient Strength.
- C. The material will be considered unacceptable and subject to removal and replacement at Contractor's expense when individual strength test (average of two specimens) has 7-day strength less than 70 psi.
- D. When moving average of three daily 48-hour averages falls below 100 psi, discontinue shipment to project until plant is capable of producing material, which exceeds 100 psi at 48 hours. Five 48-hour strength tests shall be made in this determination with no individual strength tests less than 100 psi.
Testing laboratory shall notify Contractor, Project Manager, and material supplier by facsimile of tests indicating results falling below specified strength requirements within 24 hours.
- E. If any strength test of laboratory cured specimens falls below the specified strength, Contractor may, at his own expense, request test of cores drilled from the area in question in accordance with ASTM C42. In such cases, three (3) cores shall be taken for each strength test that falls below the values given in 3.03.A.
- F. Cement stabilized sand in an area represented by core tests shall be considered satisfactory if the average of three (3) cores is equal to at least 100 psi and if no single core is less than 70 psi. Additional testing of cores extracted from locations represented by erratic core strength results will be permitted.

3.04 ADJUSTMENT FOR DEFICIENT STRENGTH

- A. When mixture produces 7-day compressive strength greater than or equal to 100 psi, then material will be considered satisfactory and bid price will be paid in full.
- B. When mixture produces 7-day compressive strength less than 100 psi and greater than or equal to 70 psi, material shall be accepted contingent on credit in payment. Compute credit by the following formula:

$$\text{Credit per Cubic Yard} = \frac{\$30.00 \times 2 (100 \text{ psi} - \text{actual psi})}{100}$$

- C. When mixture produces 7-day compressive strength less than 70 pounds per square inch, then remove and replace cement-sand mixture and paving and other necessary work at no cost to the Owner.

END OF SECTION

SECTION 02571

PAVEMENT REPAIR FOR UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repairing and resurfacing streets, highways, driveways, sidewalks, curbs and gutters, and other pavements that have been cut, broken, or damaged during construction.
 - 1. Parking areas, service drives, driveways, and sidewalks: Replace with material equal to or better than existing or as indicated on Drawings.
 - 2. Street pavements and curbs, curbs and gutters: Match general pavement type and provide subgrade, base, and surface materials as indicated on the Drawings and as specified in this Section.
- B. Repair State highway crossings in accordance with the highway department permit and within 1 week after utility work is installed.
- C. Conform to Section 02076 - Removing Existing Pavement and Structures, for removal of existing pavements.

1.02 UNIT PRICES

- A. Refer to Section 01025 – Measurement and Payment for unit price procedures. Quantity and measurement estimate stated in the Bid Proposal are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by Engineer shall determine payment.

1.03 NONCONFORMING PAVEMENT

- A. Remove and replace areas of non-conforming Portland cement concrete or asphaltic concrete pavement found deficient in thickness by more than 10 percent, or that fail specified tests, unless accepted by Engineer.

1.04 UNIT PRICE ADJUSTMENT

- A. For non-conforming pavement, accepted by the Engineer, unit price adjustments shall be made for actual in-place depth determined by cores as follows:
 - 1. Adjusted Unit Price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price bid.

2. Adjustment shall apply to lower limit of 90 percent of unit price. No adjustments in price will be made for excess thickness.

1.05 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit test results or other data confirming that materials meet the specified requirements for:
 1. Fill, backfill and subgrade materials
 2. Base course materials
 3. Asphalt materials and mix designs
 4. Concrete materials and mix design
 5. Joint material

PART 2 PRODUCTS

2.01 SUBGRADE

- A. Provide fill and backfill materials beyond the limits of the utility trench as indicated on the Drawings and conforming to the following classifications. The classifications follow Unified Soil Classification Symbols as defined in ASTM D2487. Use soils with dual designation according to ASTM D2487 according to the least restrictive class.
 1. Class I: Well graded sands and gravels, gravel-sand mixtures, crushed well graded rock, little or no fines (GW, SW)
 - a. Plasticity Index - Nonplastic.
 - b. Gradation - D_{60}/D_{10} - greater than 4 percent passing No. 200 Sieve - less than or equal to 5 percent.
 2. Class II: Poorly graded gravels and sands, silty sands and gravels, little to moderate fines (GM, GP, SP, SM).
 - a. Plasticity Index: Nonplastic to 4 percent.
 - b. Gradation: percent passing No. 200 Sieve - less than 5 percent (GP, SP).
 - c. Gradation: percent passing No. 200 Sieve - between 12 percent and 50 percent (GM, SM).

3. Class III: Clayey gravels and sands, poorly graded mixtures of sand, gravel, and clay (GC, SC).
 - a. Plasticity Index: greater than 7.
 - b. Gradation: percent passing No. 200 Sieve between 12 percent and 50 percent.
4. Cement Stabilized Sand: Conform to requirements of Section 02252 - Cement Stabilized Sand.
5. Lime Stabilized Subgrade: Lime for subgrade stabilization shall conform to the following:
 - a. Type A - Hydrated lime: Dry material consisting essentially of calcium hydroxide or mixture of calcium hydroxide and an allowable percentage of calcium oxide and magnesium hydroxide.
 - b. Type B - Commercial lime slurry: Liquid mixture consisting essentially of lime solids and water in slurry form. Water or liquid portion shall not contain dissolved material in sufficient quantity to be injurious or objectionable for purpose intended.

c. Lime shall conform to following requirements:

<u>Chemical Composition</u>	<u>Type A</u>	<u>Type B</u>
Active lime content, % by weight Ca(OH) ₂ + CaO	90.0 min ⁽¹⁾	87.0 min ⁽²⁾
Unhydrated lime content, % by weight CaO	5.0 max	---
Free water content, % by weight H ₂ O	5.0 max	---

Sizing

Wet Sieve, as % by weight residue retained:

No. 6	0.2 max	0.2 max ⁽²⁾
No. 30	4.0 max	4.0 max ⁽²⁾

Dry sieve, as % by weight residue retained:

1-inch	---	---
¾-inch	---	---

Notes:

⁽¹⁾ Maximum 5.0 percent by weight CaO shall be allowed in determining total active lime content.

⁽²⁾ Maximum solids content of slurry

- d. Lime slurry may be delivered to the job site as commercial lime, or may be prepared at the job site by using hydrated lime or quicklime. The slurry shall be free of liquids other than water and shall be of a consistency that can be handled and uniformly applied without difficulty.
- 6. Concrete Backfill: Conform to Class B (2000 psi) concrete as specified in Section 03305 - Concrete for Utility Construction or Section 03310 - Structural Concrete, as applicable.

2.02 BASE COURSE MATERIALS

A. Crushed Stone Flexible Base Course Materials

- 1. Crushed Stone: Material retained on the No. 40 Sieve meeting the following requirements:
 - a. Durable particles of crusher-run broken limestone, sandstone, or granite obtained from an approved source.
 - b. Los Angeles abrasion test percent of wear not to exceed 40 when tested in accordance with ASTM C131.
- 2. Soil Binder: Material passing the No. 40 Sieve meeting the following requirements when tested in accordance with ASTM D4318.
 - a. Maximum Liquid Limit: 40
 - b. Maximum Plasticity Index: 12
 - c. Maximum Lineal Shrinkage: 7 (when calculated from volumetric shrinkage at liquid limit).

B. Mixed Materials shall have a minimum compressive strength of 35 psi at 0 psi lateral pressure and 175 psi at 15 psi lateral pressure using triaxial testing procedures. Mixed materials shall be graded as follows:

<u>Sieve</u>	<u>Percent Retained</u>
1 ¾-inch	0 to 10
No. 4	45 to 75
No. 40	60 to 85

2.03 ASPHALTIC CONCRETE

C. Coarse Aggregate: Gravel, crushed stone or a combination of the two, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Aggregate shall conform to

ASTM C33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C131.

- D. Fine Aggregate: Sand or stone screenings or combination of both passing No. 10 sieve. Use aggregate conforming to ASTM C33, except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Confirm a Plasticity Index of not more than 6 for fine aggregate passing the No. 40 sieve when tested by Tex-106-E. The sand equivalent shall have a minimum value of 45 when tested by Tex-203-F.
- E. Composite Aggregate: Conform to following limits when graded in accordance with ASTM C136.

<u>Gradation of Composite Aggregate</u>	
<u>Sieve Size</u>	<u>Percent Passing</u>
1/2-inch	100
3/8-inch	85 to 100
#4	50 to 70
#10	32 to 42
#40	11 to 26
#80	4 to 14
#200	1 to 8

- F. Asphaltic Material: Moisture-free homogeneous material which will not foam when heated to 347 degrees F. Material shall not be cracked. City Engineer will approve grade of asphalt to use after design tests have been made. Use only one grade of asphalt after grade is determined by test design for project and shall meet the following requirements:

<u>Test</u>	<u>AC-10</u>		<u>AC-20</u>	
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
Viscosity, (140°F) poises	800	1,200	1,600±	
Viscosity, (275°F) cs	150	---	210	---
Penetration, (77°F), 100 g, 5 sec.	70	---	40	---
Flash Point, COC, (°F)	425	---	450	---
Solubility in trichloroethylene, %	99.0	---	99.0	---
<u>Tests on residues from thin film oven tests</u>				
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
Viscosity, (140°F) stokes	---	4,000	---	8,000
Ductility, (77°F), 5 cms per min	50	---	20	---
Spot tests	Negative for all grades			

G. Prime Coat

1. Cutback Asphalt Prime Coat. Moisture-free homogeneous material (MC-30 or MC-70) which will not foam when heated to 347 degrees F and which meets the following requirements:

<u>Type – Grade Properties</u>	MC-30		MC-70	
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
Water, percent	---	0.2	---	0.2
Flash Point, TOC, °F	100	---	100	---
Kinematic Viscosity at 140°F, cst	30	60	70	140
	MC-30		MC-70	
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
Distillate expressed as percent by volume of total distillate to 680°F				
to 437°F	---	25	---	20
to 500°F	40	70	20	60
to 600°F	75	93	65	90
Residue from 680°F Distillation, volume, %	50	---	55	---
Tests on Distillation Residue:				
Penetration at 77°F, 100 g, 5 sec.	120	250	120	250
Ductility at 77°F, 5 cm/min. cms	100*	---	100*	---
Solubility in Trichloroethylene, %	99	---	99	---
Spot Test		All Negative		

* If penetration of residue is more than 200 and ductility at 77 degrees F is less than 100 cm, material will be acceptable if its ductility at 60 degrees F is more than 100.

2. Emulsified Petroleum Resin Prime Coat (EPR-1 Prime): Slow curing emulsion of petroleum resin and asphalt cement conforming to the following requirements. For use, EPR-1 may be diluted with water up to a maximum of three parts water to one part EPR-1 in order to achieve the desired concentration of residual resin/asphalt and facilitate application.

<u>Properties</u>	<u>Min.</u>	<u>Max.</u>
Furol Viscosity at 77°F, sec	14	40
Residue by Evaporation, % by weight	60	---
Sieve Test, %	---	0.1

Particle Charge Test		Positive
Tests on the Distillation Residue:		
Flash Point, COC (°F)	400	---
Kinematic Viscosity @ 140°F (cst)	190	350

H. Tack Coat

1. Cutback Asphalt Tack Coat

Moisture-free homogeneous asphalt material (RC-250) which will not foam when heated to 347°F and which meets the following requirements:

<u>Properties</u>	<u>Min.</u>	<u>Max.</u>
Water, percent	---	0.2
Flash Point, TOC, (°F)	80	---
Kinematic Viscosity at 140°F, cst	250	400

Distillate: Expressed as percent by volume of total distillate to 680°F:

to 437°F	40	75
to 500°F	65	90
to 600°F	85	---
Residue from 680°F Distillation, Volume, percent	70	---
Tests on Distillation Residue:		
Penetration at 77°F, 100 g, 5 sec.	100	150
Ductility at 77°F, 5 cm/min. cms	100	---
Solubility in Trichoroethylene	99	---
Spot Test	All Negative	

2. Emulsified Tack Coat

Homogeneous material which shows no separation of asphalt after mixing and shall meet the viscosity requirements at any time within 30 days after delivery. Emulsion material (SS-1) for tack coat shall meet the following:

<u>Properties</u>	<u>Min.</u>	<u>Max.</u>
Furol Viscosity at 77°F, sec.	30	100
Residue by Distillation, %	60	---
Oil Portion of Distillate, %	---	2
Sieve Test, %	---	0.1

Miscibility (Standard Test)	Passing	Passing
Cement Mixing, %	---	0.2
Storage Stability, 1 Day, %	---	1
Test on Residue:		
Penetration at 77°F, 100 g, 5 sec	120	160
Solubility in Trichloroethylene, %	97.5	---
Ductility at 77°F, 5 cm/min, cms	100	---

I. Asphalt Concrete Pavement Mixes. Employ and pay certified testing laboratory to prepare design mixes. Test or certify test on the proposed mixes have been performed on similar materials in accordance with Tex-126-E or Tex-204-F and Tex-208-F.

1. Density and Stability Requirements:

Percent Density		HVEEM Stability Percent	
<u>Min.</u>	<u>Max.</u>	<u>Optimum</u>	<u>Not Less Than</u>
94.5	97.5	96	35

2. Proportions for Asphaltic Material: Provide 4 to 8 percent of mixture by weight. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay-like particles or silt present when tested in accordance with Tex-217-F, Part II.

2.03 PORTLAND CEMENT CONCRETE PAVING MATERIALS

A. Concrete shall conform to requirements for Class A concrete as specified in Section 03305 - Concrete for Utility Construction or Section 03310 - Structural Concrete, as applicable.

B. Reinforcing shall conform to requirements for bars and welded wire fabric as specified in Section 03305 - Concrete for Utility Construction or Section 03210 - Reinforcing Steel, as applicable.

2.04 JOINT MATERIALS

A. Board Expansion Joint Material: Filler board of selected stock. Use wood of density and type as follows:

1. Clear, all-heart cypress weighing no more than 40 pounds per cubic foot, after being oven dried to constant weight.
2. Clear, all-heart redwood weighing no more than 30 pounds per cubic foot, after being oven dried to constant weight.

B. Preformed Expansion Joint Material: Bituminous fiber and bituminous mastic composition material conforming to ASTM D994 and ASTM D1751.

- C. Joint Sealing Compound: Hot-poured rubber-asphalt compound conforming to ASTM D3405.
- D. Load Transmission Devices:
 - 1. Smooth, steel dowel bars conforming to ASTM A615, Grade 60. When indicated on Drawings, encase one end of dowel bar in approved cap having inside diameter 1/16 inch greater than diameter of dowel bar.
 - 2. Deformed steel tie bars conforming to ASTM A615, Grade 60.
- E. Metal Supports for Reinforcing Steel and Joint Assembly: Employ metal supports of approved shape and size that will secure reinforcing steel and joint assembly in correct position during placing and finishing of concrete.

2.05 SIDEWALK AND DRIVEWAY MATERIALS

- A. Sand bed shall be bank run sand, classified as SW, SP, or SM by the Unified Soil Classification System of ASTM D2487, with the following:
 - 1. Less than 0.5 percent clay lumps (ASTM C142).
 - 2. Less than 5.0 percent lightweight pieces (ASTM C123).
 - 3. Organic impurities, color no darker than standard color (ASTM C40).
 - 4. Plasticity index of 4 or less per ASTM D4318.
- B. Portland cement concrete shall conform to requirements for Portland cement concrete paving in this Section.
- C. Asphaltic concrete shall conform to requirements for asphaltic concrete paving in this Section.
- D. Gravel paving shall conform to the requirements of Class II backfill in this section but with a gradation to match the gravel surface being replaced.

PART 3 EXECUTION

3.01 EQUIPMENT

- A. Alternate equipment and methods, other than those required by this section, may be used provided the Contractor demonstrates that equal or better results will be obtained. Maintain equipment for preparing subgrade and for finishing and compacting pavement in good working order.

3.02 SUBGRADE

A. Preparation

1. Verify backfill of new utilities is complete, in accordance with Section 02227 - Excavation and Backfill for Utilities.
2. Correct subgrade deviations of plus or minus 1/2 inch in cross section or in 16-foot length by loosening, adding, or removing material, reshaping, and recompacting by sprinkling and rolling.
3. Prepare sufficient subgrade in advance of base course operations.

B. Unstabilized Subgrade. Replace and compact unstabilized subgrade in accordance with the requirements for compaction, tolerance, testing and protection of lime stabilized subgrade.

C. Lime Stabilized Subgrade

1. Scarify or excavate to bottom elevations to receive stabilized subgrade as indicated on the drawings. Remove material or windrow to expose secondary grade. Correct wet or unstable material below secondary grade by scarifying, adding lime, and compacting. Obtain uniform stability.
2. Lime Slurry Application
 - a. Mix hydrated lime with water to form a slurry of the solids content specified. Commercial lime slurry shall have dry solids content as specified.
 - b. Apply slurry with a distributor truck equipped with an agitator to keep lime and water in a consistent mixture. Make successive passes over measured section of roadway to attain proper moisture and lime content. Limit spreading to an area where preliminary mixing operations can be completed on the same working day.
 - c. Apply so that dry subgrade will contain a minimum lime content of 5 percent by weight of dry subgrade unless otherwise instructed by Testing Laboratory.
3. Preliminary Mixing
 - a. Do not mix and place material when temperature is below 40 degrees F and falling. Base may be placed when temperature taken in shade and away from artificial heat is above 35 degrees F and rising.

- b. Use approved single-pass or multiple-pass rotary speed mixers to mix soil, lime, and water to required depth. Obtain a homogeneous friable mixture free of clods and lumps.
 - c. Mix and pulverize until all material passes a 1-3/4 inch sieve; a minimum of 85 percent, excluding nonslacking fractions, passes a 3/4 inch sieve; and a minimum of 60 percent excluding nonslacking fractions pass a No. 4 sieve.
 - d. Shape mixed subgrade to final lines and grades.
 - e. Seal subgrade as a precaution against heavy rainfall by rolling lightly with light pneumatic rollers.
 - f. Cure soil-lime material for 1 to 4 days. Keep subgrade moist during cure.
4. Compaction
- a. Aerate or sprinkle to attain optimum moisture content. Remove and reconstruct sections where average moisture content exceeds ranges specified at time of final compaction.
 - b. Start compaction immediately after final mixing, unless approved by Engineer.
 - c. Spread and compact in two or more approximately equal layers where total compacted thickness is to be greater than 8 inches.
 - d. Compact with approved heavy pneumatic or vibrating rollers, or a combination of tamping rollers and light pneumatic rollers. Begin compaction at the bottom and continue until entire depth is uniformly compacted.
 - e. Do not allow stabilized materials to mix with underlying material. Correct irregularities or weak spots immediately by replacing material and recompacting.
 - f. Compact to following minimum densities at a moisture content of optimum to 3 percent above optimum as determined by ASTM D698, unless otherwise indicated on the Drawings:
 - (1). Areas to receive pavement without subsequent base course: Minimum density of 98 percent of maximum dry density.
 - (2). Areas to receive subsequent base course: Minimum density of 95 percent of maximum dry density.

tests. Rework and recompact areas that do not conform to compaction requirements at no cost to the City.

5. Fill test sections with new compacted lime stabilized subgrade.

G. Protection

1. Maintain subgrade to lines and grades and in good condition until placement of base or surface course.
2. Repair defects immediately by replacing material to full depth.

3.03 BASE COURSE

A. Placement

1. Spread and shape base in lifts to compacted thickness not to exceed 6 inches. Complete spreading, shaping, and compacting on same day material is deposited.
2. Place base so that projecting reinforcing steel from curbs or pavement remain at approximate center of base or pavement as indicated on the Drawings.
3. Start compaction operations as soon as possible after placement. Use sheep foot, steel, or pneumatic rollers or other equipment, as approved.
4. Maintain moisture between optimum and 3 percent above optimum moisture.
5. Compact to 95 percent of Modified Proctor density in accordance with ASTM D1557, unless otherwise indicated on the Drawings.
6. Finish to grade and compact lift before placing any successive lift.
7. Maintain shape by grading throughout operation.
8. Provide total thickness indicated on Drawings.

B. Tolerances

1. Completed base surface shall be smooth and conform to typical section and established lines and grades.
2. Top surface of embankment: Plus or minus 1/4 inch in cross section, or in 16-foot length.

C. Field Quality Control

1. Testing will be performed under provisions of Section 01410 - Testing Laboratory Services.

2. A minimum of one core will be taken at random locations per 1000 linear feet per lane of roadway or 500 square yards of base or at least once per location of base placement to determine in-place depth. For areas of less than 500 square yards, the Engineer may waive the depth core test, provided the contractor can demonstrate by measurement the thickness of the base.
3. Contractor may obtain and pay for additional cores in the vicinity of cores indicating nonconforming in-place depths. If the average of the tests falls below the required depth, place and compact additional material at no additional cost to the Owner.
4. Compaction Testing will be performed in accordance with ASTM D1556 or ASTM D2922 and ASTM 3017 at a random location near each depth determination. Rework and recompact areas that do not conform to compaction requirements.
5. Fill cores and density test sections with new compacted crushed stone flexible base.

D. Protection

1. Sprinkle to prevent excessive loss of moisture.
2. Restrict construction traffic on finished base to equipment required to complete the work.

3.04 ASPHALTIC CONCRETE PAVEMENT

A. Preparation

1. Thoroughly clean base course surface of loose material by brooming prior to application of tack coat.
2. Prepare sufficient base in advance of paving for efficient operations.

B. General Prime Coat Application

1. Apply prime coat with approved type of self-propelled pressure distributor or other approved equipment. Distribute prime coat evenly and smoothly under pressure necessary for proper distribution.
2. Keep all storage tanks, piping, retorts, booster tanks and distributors used in handling asphaltic materials clean and in good operating conditions. Conduct operations so that asphaltic material does not become contaminated.
3. If yield of asphaltic material appears to be in error, recalibrate distributor prior to continuing Work.

4. Maintain the surface until Work is accepted by Owner.
5. No traffic or placing of subsequent courses shall be permitted over freshly applied prime coat until authorized by Engineer.

C. Cutback Asphalt Prime Coat Application

1. Do not use cutback asphalt during the period of April 16 to September 15.
2. Do not place prime coat when air temperature is below 60 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 50 degrees F and rising.
3. Distribute at rate of 0.25 to 0.35 gallons per square yard.
4. Provide facilities for determining temperature of asphaltic material in heating equipment and in distributor, for determining rate of application, and for obtaining uniformity at junction of two distributor loads. Provide and maintain in good working order, recording thermometer at storage heating unit.
5. Temperature of application shall be based on temperature-viscosity relationship that will permit application of asphalt with viscosity of 100 to 125 centistokes. Maintain asphalt within 15 degrees F of temperature required to meet viscosity. Selected temperature shall be within following range.

<u>Prime Coat Type</u>	<u>Minimum (F)</u>	<u>Maximum (F)</u>
MC-30	70	150
MC-70	125	175

6. Do not allow temperature of MC-30 to exceed 175 degrees F at any time.
7. Do not allow temperature of MC-70 to exceed 200 degrees F at any time.

D. Emulsified Prime Coat Application

1. Do not place prime coat when air temperature is below 36 degrees F and falling.
2. Distribute at rate of 0.15 to 0.25 gallons per square yard.

E. Tack Coat Application

1. Apply tack coat uniformly by use of approved distributor at rate not to exceed 0.05 gallons per square yard of surface. Where the asphaltic concrete mixture will adhere to the surface on which it is placed without the use of a tack coat, the tack coat may be eliminated if approved by the Engineer.

2. Paint contact surfaces of curbs and structures and joints with thin uniform coat of tack coat.
 3. Application:
 - a. Do not use cutback asphalt during the period of April 16 to September 15.
 - b. Do not place tack coat when air temperature is below 50 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.
 - c. Temperature of tack coat shall be between 125 degrees F and 180 degrees F when applied.
 - d. Do not heat tack coat above 200 degrees F at any time.
 4. Tack Coat Protection. No traffic or placing of subsequent courses shall be permitted over freshly applied tack coat until authorized by Engineer.
- F. Placement of Asphaltic Concrete
1. Do not place asphaltic mixture when air temperature is below 50 degrees F and falling. Mixture may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.
 2. Haul prepared and heated asphaltic concrete mixture in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between 250 degrees F and 325 degrees F when laid.
 3. For large areas, spread material into place with approved mechanical spreading and finishing machine of screening or tamping type. Use track-mounted finish machine to place base course directly on subgrade or base as shown on the Drawings.
 4. In restricted areas where use of paver is impractical, spread and finish asphalt by mechanical compactor. Use wood or steel forms, rigidly supported to assure correct grade and cross section. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove any lumps that do not break down readily. Place asphalt courses in same sequence as if placed by machine.
 5. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Spread lifts in such manner that, when compacted, finished course will be smooth, of uniform density, and will be to section, line and grade as shown.

6. Place courses as nearly continuously as possible. Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.
7. When new asphalt is laid against existing or old asphalt, existing or old asphalt shall be saw cut full depth to provide straight smooth joint.

G. Compaction of Asphaltic Concrete

1. Begin rolling while pavement is still hot and as soon as it will bear roller without undue displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water.
2. Compress surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing from 8 to 10 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mixture temperature drops below 175 degrees F.
3. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.
4. Along walls, curbs, headers and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.
5. Compact binder course and surface course to density not less than 93 percent of the maximum possible density of voidless mixture composed of same materials in like proportions.

H. Tolerances

1. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed 1/8 inch.
2. Completed surface, when tested with 10-foot straightedge laid parallel to centerline of pavement, shall show no deviation in excess of 1/8 inch in 10 feet. Correct any surface not meeting this requirement.

I. Field Quality Control

1. Testing will be performed under provisions of Section 01410 - Testing Laboratory Services.

2. Minimum of one core will be taken at random locations per 1000 feet per lane of roadway or 500 square yards of pavement or at least once per location of pavement placement to determine in-place depth and density. For areas less than 500 square yards the Engineer may waive the in-place depth test provided the Contractor can demonstrate by measurement the thickness of the pavement placed.
3. In-place density will be determined in accordance with Tex-207-F and Tex-227-F from cores or sections of asphaltic base located near each depth determination. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by Engineer.
4. Contractor may obtain and pay for three additional cores in vicinity of cores indicating nonconforming in-place depths. In-place depth at these locations shall be average depth of four cores.
5. Fill cores and density test sections with new compacted asphaltic pavement.

J. Protection

1. Do not open pavement to traffic until 12 hours after completion of rolling, or as shown on Drawings.
2. Maintain asphaltic concrete pavement in good condition until completion of Work.
3. Repair defects immediately by replacing asphaltic concrete pavement to full depth.

3.05 PORTLAND CEMENT CONCRETE PAVING

A. Preparation

1. Properly prepare, shape and compact each section of subgrade before placing forms, reinforcing or concrete. After forms have been set to proper grade and alignment, use subgrade planer to shape subgrade to its final cross section. Check contour of subgrade with template.
2. Remove subgrade that will not support loaded form. Replace and compact subgrade to required density.

B. Concrete Paving Equipment

1. Subgrade Planer and Template:

- a. For large areas, use subgrade planer with adjustable cutting blades to trim subgrade to exact section shown on Drawings. Select planer mounted on rollers which ride on forms. Planer frame must have sufficient weight so that it will remain on form at all times, and have such strength and rigidity that, under tests made by changing support from wheels to center, planer will not develop deflection of more than 1/8 inch. Tractors used to pull planer shall not produce ruts or indentations in subgrade. When slip form method of paving is used, operate subgrade planer on prepared track grade or have it controlled by electronic sensor system operated from string line to establish horizontal alignment and elevation of subbase.
 - b. For restricted areas, where planer is impractical, prepare the subgrade by mechanical tampers and other equipment as approved by the Engineer.
 - c. Provide template for checking contour of subgrade. Template shall be long enough to rest upon side forms and have such strength and rigidity that, when supported at center, maximum deflection shall not exceed 1/8 inch. Fit template with accurately adjustable rods projecting downward at 1-foot intervals. Adjust these rods to gauge cross sections of slab bottom when template is resting on side forms.
2. Machine Finisher: For large areas, provide a power-driven, transverse finishing machine designed and operated to strike off and consolidate concrete. Machine shall have two screeds accurately adjusted to crown of pavement and with frame equipped to ride on forms. Use finishing machine with rubber tires if it operates on concrete pavement.
 3. Hand Finishing: For restricted areas, provide mechanical strike and tamping template 2 feet longer than width of pavement to be finished. Shape template to pavement section. Also, provide two bridges to ride on forms and span pavement for finishing expansion and dummy joints. Provide floats and necessary edging and finishing tools.
 4. Burlap Drag for Finishing Slab: Furnish four plies of 10-ounce burlap material fastened to bridge to form continuous strip of burlap full width of pavement. The 3-foot width of burlap material shall be in contact with pavement surface. Keep burlap drags clean and free of encrusted mortar.
 5. Vibrators: For large areas, furnish mechanically operated synchronized vibrators mounted on tamping bar which rides on forms and hand-manipulated mechanical vibrators. Furnish vibrators with frequency of vibration to provide maximum consolidation of concrete without segregation. For restricted areas, hand operated vibrators may be utilized.
 6. Traveling Form Paver: Approved traveling form paver may be used in lieu of construction methods employing forms, consolidating, finishing and floating

equipment. Requirements of this specification for subgrade, pavement tolerances, pavement depth, alignments, consolidation, finishing and workmanship shall be met. If traveling form paver does not provide concrete paving that meets the compaction, finish and tolerance requirements of this specification, its use shall be immediately discontinued when so ordered by Engineer and conventional methods shall be used.

- a. Equip traveling paver with longitudinal transangular finishing float adjustable to crown and grade. Float shall be long enough to extend across pavement to side forms or edge of slab.
- b. Insure that continuous deposit of concrete can be made at paver to minimize starting and stopping. Use conventional means of paving locations inaccessible to traveling paver, or having horizontal or vertical curvature that traveling paver cannot negotiate.
- c. Where Drawings require tie bars for adjacent paving, securely tie and support bars to prevent displacement. Tie bars may be installed with approved mechanical bar inserter mounted on traveling-form paver. Replace any pavement in which tie bars assume final position other than that shown on Drawings, unless corrective alternates are authorized in writing by Engineer.

C. Forms

1. Side Forms: Use metal forms of approved shape and section. Preferred depth of form shall be equal to required edge thickness of pavement. Forms with depths greater or less than required edge thickness of pavement will be permitted, provided difference between form depth and edge thickness is not greater than 1 inch, and further provided that forms of depth less than pavement edge are brought to required edge thickness by securely attaching wood or metal strips to bottom of form, or by grouting under form. Bottom flange of form shall be same size as thickness of pavement. Aluminum forms are not allowed. Forms shall be approved by Engineer. Length of form sections shall be not less than 10 feet and each section shall provide for staking in position with not less than 3 pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of 200-foot radius or less. Forms shall have ample strength and shall be provided with adequate devices for secure setting so that when in-place they will withstand, without visible springing or settlement, impact and vibration of finishing machine. In no case shall base width be less than 8 inches for form 8 inches or more in height. Forms shall be free from warp, bends or kinks and shall be sufficiently true to provide reasonable straight edge on concrete. Top of each form section, when tested with straight edge, shall conform to requirements specified for surface of completed pavement. Provide sufficient forms for satisfactory placement of concrete. For short radius curves, forms less than 10

feet in length or curved forms may be used. For curb returns at street intersections and driveways, wood forms of good grade and quality may be used.

2. Form Setting: Rest forms directly on subgrade. Do not shim with rocks or dirt. Accurately set forms to required grade and alignment and, during entire operation of placing, compacting and finishing of concrete, do not deviate from this grade and alignment more than 1/8 inch in 10 feet of length. Do not remove forms for at least 8 hours after completion of finishing operations. Provide supply of forms that will be adequate for orderly and continuous placing of concrete. For large areas, set forms and check grade for at least 300 feet ahead of placement or as approved by Engineer. Adjacent slabs may be used instead of forms, provided that concrete is well protected from possible damage by finishing equipment. These adjacent slabs shall not be used for forms until concrete has aged at least 7 days.

D. Reinforcing Steel and Joint Assemblies

1. Accurately place reinforcing steel and joint assemblies and position them securely as indicated on Drawings. Wire reinforcing bars securely together at intersections and splices. Bars and coatings shall be free of rust, dirt or other foreign matter when concrete is placed. Place reinforcing steel and secure to chairs.
2. Place pavement joint assemblies at required locations and elevations, and rigidly secure parts in required positions. Install dowel bars accurately in joint assemblies as shown, each parallel to pavement surface and to centerline of pavement. Rigidly secure in required position to prevent displacement during placing and finishing of concrete. Accurately cut header boards, joint filler and other material used for forming joints to receive each dowel bar. Where indicated on the drawings, drill dowels into existing pavement, secure with epoxy, and provide paving headers, as required, to provide rigid pavement sections.

E. Placement

1. Place concrete only when air temperature taken in shade and away from artificial heat is above 35 degrees F and rising. Concrete shall not be placed when temperature is below 40 degrees F and falling.
2. Place concrete within 60 minutes of mixing. Remove and dispose of concrete not placed within this period.
3. Concrete slump during placement shall be 1 to 4 inches, except when using traveling-form paver slump shall be maximum of 2 inches.
4. Deposit concrete rapidly and continuously on subgrade or base in successive batches. Distribute concrete to required depth and for entire width of placement

in manner that will require as little rehandling as possible. Where hand spreading is necessary, distribute concrete with shovels or by other approved methods. Use only concrete rakes in handling concrete. At end of day or in case of unavoidable interruption of more than 30 minutes, place transverse construction joint at point of stopping work. Remove and replace sections less than 10 feet long.

5. Take special care in placing and spading concrete against forms and at longitudinal and transverse joints to prevent honeycombing. Voids in edge of finished pavement will be cause for rejection.

F. Compaction

1. Consolidate the concrete using mechanical vibrators. Extend a vibratory unit across the pavement, not quite touching side forms. Space individual vibrators at close enough intervals to vibrate and consolidate entire width of pavement uniformly. Mount mechanical vibrators to avoid contact with forms, reinforcement, transverse or longitudinal joints.
2. Furnish enough hand-manipulated mechanical vibrators for proper consolidation of concrete along forms, at joints and in areas not covered by mechanically controlled vibrators.

G. Finishing

1. Finish concrete pavement with power-driven transverse finishing machines or by hand finishing methods.
 - a. Use transverse finishing machine to make at least two trips over each area. Make last trip continuous run of not less than 40 feet. After transverse screening, use hand-operated longitudinal float to test and level surface to required grade.
 - b. Hand finish with mechanical strike and tamping template as wide as pavement to be finished. Shape template to pavement section. Move strike template forward in direction of placement, maintaining slight excess of material in front of cutting edge. Make at least two trips over each area. Screed pavement surface to required section. Work screed with combined transverse and longitudinal motion in direction work is progressing. Maintain screed in contact with forms. Use longitudinal float to level surface.
2. On narrow strips and transitions, finish concrete pavement by hand. Thoroughly work concrete around reinforcement and embedded fixtures. Strike off concrete with strike-off screed. Move strike-off screed forward with combined transverse and longitudinal motion in direction work is progressing, maintaining screed in contact with forms, and maintaining slight excess of materials in front of cutting

edge. Tamp concrete with tamping template. Use longitudinal float to level surface.

3. After completion of straightedge operation, make first pass of burlap drag as soon as construction operations permit and before water sheen has disappeared from surface. Follow with as many passes as required to produce desired texture depth. Permit no unnecessary delays between passes. Keep drag wet, clean and free from encrusted mortar during use.

H. Joints and Joint Sealing

1. Placement

- a. When new work is adjacent to existing concrete, place joints at same location as existing joints in adjacent pavement.
- b. If the limit of removal of existing concrete or asphaltic pavement does not fall on existing joint, saw cut existing pavement minimum of 1-1/2 inches deep to provide straight, smooth joint surface without chipping, spalling or cracks.

2. Construction Joints. Place transverse construction joint wherever concrete placement must be stopped for more than 30 minutes. Place longitudinal construction joints at interior edges of pavement lanes using No. 6 deformed tie bars, 30 inches long and spaced 18 inches on centers.

3. Expansion Joints. Place 3/4-inch expansion joints at radius points of curb returns for cross street intersections, or as located in adjacent pavement but no further than 60 feet apart. Use no boards shorter than 6 feet. When pavement is 24 feet or narrower, use not more than 2 lengths of board. Secure pieces to form straight joint. Shape board filler accurately to cross section of concrete slab. Use load transmission devices of type and size shown on Drawings. Seal with joint sealing compound.

4. Contraction Joints. Place contraction joints at same locations as in adjacent pavement or at spaces indicated on Drawings. Place smoothed, painted and oiled dowels accurately and normal to joint. Seal groove with joint sealing compound.

5. Longitudinal Weakened Plane Joints. Place longitudinal weakened plane joints at spaces indicated on Drawings. Seal groove with joint sealing compound.

6. Sawed Joints

- a. Contractor may use sawed joints as an alternate to contraction and weakened plane joints. Circular cutter shall be capable of cutting straight line groove minimum of 1/2 inch wide. Depth shall be one quarter of pavement thickness plus 1/2 inch. Commence sawing as soon as concrete

- has hardened sufficiently to permit cutting without chipping, spalling or tearing and prior to initiation of cracks. Once sawing has commenced, it shall be continued until completed. Make saw cut with one pass. Complete sawing within 24 hours of concrete placement. Saw joints at required spacing consecutively in sequence of concrete placement.
- b. Concrete Saw: Provide sawing equipment adequate in power to complete sawing to required dimensions and within required time. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at work site at all times during sawing operations. Sawing equipment shall be on job at all times during concrete placement.
7. Joints for Curb, Curb and Gutter. Place 3/4-inch preformed expansion joints through curb and gutters at locations of expansion and contraction joints in pavement; at end of radius returns at street intersections and driveways; and at curb inlets. Maximum spacing shall be 120-foot centers.
 8. Joints for Concrete Sidewalks. Provide 3/4-inch expansion joints conforming to ASTM D1751 along and across sidewalk at back of curbs, at intersections with driveways, steps, and walls; and across walk at intervals not to exceed 36 feet. Provide expansion joint material conforming to ASTM D994 for small radius curves and around fire hydrants and utility poles. Extend the expansion joint material full depth of the slab.
 9. Joints for Concrete Driveways. Provide 3/4-inch expansion joints conforming to ASTM D1751 across driveway in line with street face of sidewalks, at existing concrete driveways, and along intersections with sidewalks and other structures. Extend expansion joint material full depth of slab.
 10. Joint Sealing
 - a. Seal joints only when surface and joints are dry, ambient temperature is above 50 degrees F and less than 85 degrees F, and weather is not foggy or rainy.
 - b. Joint sealing equipment shall be in first-class working condition, and be approved by Engineer.
 - c. Clean joints of loose scale, dirt, dust and curing compound. Remove loose material from concrete surfaces adjacent to joints. Use concrete grooving machine or power-operated wire brush and other equipment such as plow, brooms, brushes, blowers or hydro- or abrasive-cleaning machines, as required to produce satisfactory results.
 - d. Fill joints neatly with joint sealer to depth shown. Pour sufficient joint sealer into joints so that, upon completion, surface of sealer within joint

will be 1/4 inch below level of adjacent surface or at elevation as directed.

11. Protection
 - a. Maintain joints in good condition until completion of Work.
 - b. Replace damaged joints material with new material.
- I. Concrete Curing. Conform to requirements of Section 03305 - Concrete for Utility Construction or Section 03310 - Structural Concrete.
- J. Tolerances. Test entire surface before initial set and correct irregularities or undulations. Bring surface within requirements of following test and then finish. Place 10-foot straightedge parallel to center of roadway to bridge any depressions and touch high spots. Do not permit ordinates measured from face of straight edge to surface of pavement to exceed 1/16 inch per foot from nearest point of contact. Maximum ordinate with 10-foot straightedge shall not exceed 1/8 inch. Grind spots in excess of requirements of this paragraph to meet surface test requirements. Restore texture by grooving concrete to meet surface finishing specifications.
- K. Field Quality Control
 1. Testing will be performed under provisions of Section 01410 - Testing Laboratory Services.
 2. Compressive Strength Test Specimens: Four test specimens for compressive strength test will be made for each 150 cubic yards or less of pavement that is placed in one day. Two specimens will be tested at 7 days or at number of hours as directed by the project manager for high early strength concrete. Test the remaining 2 specimens at 28 days. Specimens will be made, cured and tested in accordance with ASTM C39. Minimum compressive strength shall be 3000 pounds per square inch at 7 days and 3500 pounds per square inch at 28 days.
 3. Yield test will be made in accordance with ASTM C138 for cement content per cubic yard of concrete. If such cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.
 4. Minimum of one 4-inch core to measure in-place depth will be taken at random locations per 1000 feet per lane or 500 square yards of pavement or at least once per location of pavement placement. Each core may be tested for 28-day compressive strength according to methods of ASTM C42. The 28-day compressive strength of each core tested shall be a minimum of 3000 pounds per square inch. Compressive strength shall not be utilized to satisfy the flexural strength requirements.

5. For areas less than 500 square yards, the Engineer may waive the in-place depth test provided the Contractor can demonstrate by measurement the thickness of the pavement placed. Compressive strength cylinders may be made as indicated in Section 03305 - Concrete for Utility Construction or Section 03310 - Structural Concrete if the core for in place depth determination is not required.
6. Contractor may obtain and pay for three additional cores in vicinity of cores indicating nonconforming in-place depths. In-place depth at these locations shall be average depth of four cores.
7. Fill cores and density test sections with new concrete paving or non-shrink grout.

L. Protection

1. Barricade pavement section from use until concrete has attained minimum design strength.
2. To provide access at driveways, city street intersections, esplanades, and other locations approved by Engineer; Contractor may use high-early-strength cement or place an additional 2 inches of concrete pavement on untreated subgrade in lieu of specified concrete pavement depth on stabilized base or lime treated subgrade. Additional depths of concrete placement shall be paid for under original specified concrete depth.
3. On those sections of pavement to be opened to traffic, seal joints, clean pavement and place earth against pavement edges before permitting use by traffic. Such opening of pavement to traffic shall not relieve Contractor from responsibility for the Work.
4. Maintain concrete paving in good condition until completion of Work.
5. Repair defects by replacing concrete to full depth.

3.06 PAVEMENT MARKINGS

- A. Restore pavement markings to match those existing or as indicated on the Drawings and details.

3.07 SIDEWALKS AND DRIVEWAYS

A. Replacement

1. Replace sidewalks and driveways which are removed or damaged during construction with paving of the same type and with thickness and width equivalent to one removed or damaged. Asphaltic concrete and Portland cement concrete shall meet the requirements of this Section.

2. Provide replaced and new sidewalks with wheelchair ramps if sidewalk intersects curb at street or driveway intersection.

B. Preparation and Placement

1. Identify and protect utilities which are to remain.
2. Protect living trees, other plant growth, and features designated to remain.
3. Excavate subgrade 6 inches beyond outside lines of sidewalk or driveway. Shape to the line, grade, and cross section. For soils with plasticity index above 40 percent, stabilize soil with lime. Compact subgrade to minimum of 90 percent maximum dry density as determined by ASTM D698.
4. For concrete surface, immediately after subgrade is prepared, cover with 2-inch-thick compacted sand bed. Place concrete as indicated below.
5. For asphaltic concrete surface, place and compact directly on prepared subgrade.
6. For gravel surface, place and compact gravel directly on prepared subgrade.

C. Concrete Placement

1. Forms: Straight, unwarped wood or metal forms with nominal 4-inch depth. Securely stake forms to line and grade, and maintain in true position during concrete placement.
2. Reinforcement: Install 6 x 6, W2.9 x W2.9 welded wire fabric or No. 3 reinforcing steel bars on 18-inch centers longitudinally and transversely. Lay longitudinal bars in walk continuously, except through expansion joints. Support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
3. Expansion Joints: Install expansion joints in accordance with Section.
4. Colored concrete: Where indicated on the drawings, apply coloring agent in accordance with manufacturers' instructions.
5. Place concrete in forms to specified depth and tamp thoroughly with "jitterbug" tamp, or other acceptable method. Bring mortar to surface.
6. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush.
7. Unless otherwise indicated on Drawings, mark off joints 1/8 inch deep, at spacing equal to width of walk. Use joint tool equal in width to edging tool.
8. Finish edges with tool having 1/4-inch radius.

9. After concrete has set sufficiently, refill space along sides of sidewalk to top of walk with suitable material. Tamp fill firm and solid.

D. Protection

1. Maintain sidewalks and driveway in good condition until completion of Work.
2. Replace sidewalks and driveway subsequently damaged by Contractor's operations.

END OF SECTION

SECTION 02601

PRECAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precast concrete sanitary sewer manholes.
- B. Precast concrete sanitary sewer manholes with PVC liner where corrosion-resistant manholes are specifically indicated in the Drawings.

1.02 UNIT PRICES

- A. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01300 - Submittals.
- B. Submit manufacturer's data and details of following items for approval:
 - 1. Shop drawings of manhole sections and base units and construction details, including reinforcement, jointing methods, materials and dimensions.
 - 2. Certification from manufacturer that precast manhole design is in full accordance with ASTM C 478 and design criteria as established in paragraph 2.01 E of this specification.
 - 3. Frames, grates, rings, and covers.
 - 4. Materials to be used in fabricating drop connections.
 - 5. Materials to be used for pipe connections at manhole walls.
 - 6. Materials to be used for stubs and stub plugs, if required.
 - 7. Materials and procedures for corrosion-resistant liner and coatings, if required.
 - 8. Plugs to be used for sanitary sewer hydrostatic testing.
 - 9. Manufacturer's data for pre-mix (bag) concrete, if used for channel inverts and benches.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

- A. Use manhole sections and base sections conforming to ASTM C 478. Use base riser section with integral floors, unless shown otherwise. Provide adjustment rings which are standard components of the manufacturer of the manhole sections meeting material requirements of ASTM C 478. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- B. Construct barrels for precast manholes from 48-inch diameter standard reinforced concrete manhole sections unless otherwise indicated on Drawings. Use various lengths of manhole sections in combination to provide the correct height with the fewest joints. Wall sections shall be designed for depth as shown and loading conditions as described in paragraph 2.01E, but shall not be less than 5 inches thick. Base section shall have a minimum thickness of 12 inches under the invert.
- C. Provide cone tops to receive cast iron frames and covers, unless indicated otherwise. Use tops designed to support an H-20 loading.
- D. Where the Drawings indicate that manholes larger than 48-inch diameter are required, precast base sections of the required diameter shall be provided with flat slab top precast sections used to transition to 48-inch diameter manhole access riser sections. Transition can be concentric or eccentric. The transition shall be located to provide a minimum of 7-foot head clearance from the top of bench to underside of transition.
- E. Design Loading Criteria: The manhole walls, transition slabs, cone tops, and manhole base slab shall be designed by the manufacturer to the requirements of ASTM C 478 for the depth as shown on Drawings and the following design criteria:
 - 1. AASHTO H-20 loading applied to the manhole cover and transmitted down to the transition and base slabs.
 - 2. Unit soil weight of 120 pcf located above all portions of the manhole, including base slab projections.
 - 3. Lateral soil pressure based on saturated soil conditions producing an at-rest equivalent fluid pressure of 100 pcf, with soil pressure acting on empty manhole.
 - 4. Internal liquid pressure based on a unit weight of 63 pcf, with manhole filled with liquid from invert to cover, with no balancing external soil pressure.
 - 5. Dead load of manhole sections fully supported by the transition and base slabs.
 - 6. Design additional reinforcing steel to transfer stresses at openings.
 - 7. The minimum clear distance between any two wall penetrations shall be 12 inches or half the diameter of the smaller penetration, whichever is greater.

- F. Form joints between sections with o-ring gaskets conforming with ASTM C 443.
- G. Do not incorporate manhole steps in manhole sections.
- H. Do not use brick masonry in construction of sanitary sewer manholes.

2.02 CONCRETE

- A. Conform to requirements of Section 03305 - Concrete for Utility Construction.
- B. Channel Inverts: Concrete for inverts not integrally formed with manhole base shall be either 5 sack premix (bag) concrete or Class A concrete, with a minimum compressive strength of 4000 psi.
- C. Cement Stabilized Sand Foundation: Provide cement stabilized sand foundation under base section in lieu of foundation slab, where allowed, conforming to requirements of Section 02252 - Cement Stabilized Sand.
- D. Concrete Foundation: Use Class A concrete with minimum compressive strength of 4000 psi for concrete foundation slab under manhole base section where indicated on Drawings.

2.03 REINFORCING STEEL

- A. Reinforcing steel shall conform to requirements of Section 03305 - Concrete for Utility Construction.

2.04 MORTAR

- A. Conform to requirements of ASTM C 270, Type S using Portland Cement.

2.05 MISCELLANEOUS METALS

- A. Provide cast-iron frames, rings, and covers conforming to requirements of Section 02603 - Frames, Grates, Rings and Covers.

2.06 DROP CONNECTIONS AND STUBS

- A. Drop connections and stubs shall conform to the same pipe material requirements used in the main pipe, unless otherwise indicated on the Drawings.

2.07 PIPE CONNECTIONS FOR SANITARY SEWERS

- A. Use resilient connectors conforming to requirements of ASTM C 923. Metallic mechanical devices as defined in ASTM C 923 shall be made of the following materials:
 - 1. External clamps: Type 304 stainless steel

2. Internal, expandable clamps on standard manholes: Type 304 stainless steel, 11 gage minimum.
3. Internal, expandable clamps on corrosion-resistant manholes:
 - a. Type 316 stainless steel, 11 gage minimum , or
 - b. Type 304 stainless steel, 11 gage minimum, coated with minimum 16 mil fusion-bonded epoxy conforming to AWWA C 213.
- B. Where rigid joints between pipe and a cast-in-place manhole base are specified or shown on the Drawings, use polyethylene-isoprene waterstop meeting the physical property requirements of ASTM C 923, Press-Seal WS Series, or equal.

2.08 SEALANT MATERIALS

- A. Sealing materials between precast concrete adjustment ring and manhole cover frame shall be Adeka Ultraseal P201, or approved equal.

2.09 CORROSION RESISTANT MANHOLE MATERIALS

- A. Manholes shall be corrosion resistant only if stated on the drawings.
- B. For precast concrete manholes provide Xypex corrosion resistant additive as manufactured by Xypex Chemical Corporation. Xypex Admix must be added to concrete mix at time of batching.
- C. For cast-in-place manholes provide corrosion resistant barrier coating on all interior surfaces. The materials shall be applied by an approved certified applicator. Acceptable material as indicated in Section 2764 – 2.04 Corrosion Resistant Manhole Materials.
- D. The Contractor shall have manufacturer’s representative present on site at all times during the installation of corrosion resistant barrier.
- E. The Contractor shall make provisions in his unit price bid for each structure to maintain dry conditions for the corrosion resistant liner application and subsequent curing as per manufacturer’s recommendations.

2.10 BACKFILL MATERIALS

- A. Backfill materials shall conform to the requirements of Section 02227 - Excavation and Backfill for Utilities.

2.11 NON-SHRINK GROUT

- A. For non-shrink grout, use prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. It shall meet the

requirements of ASTM C 1107 and shall have a minimum 28-day compressive strength of 7000 psi.

2.12 PROHIBITED MATERIALS

- A. Do not use brick masonry for construction of sanitary sewer manholes, including adjustment of manholes to grade. Use only specified materials listed above.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines and grades are correct.
- B. Determine if the subgrade, when scarified and recompact, can be compacted to 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. If it cannot be compacted to that density, the subgrade shall be moisture conditioned until that density can be reached or shall be treated as an unstable subgrade.

3.02 PLACEMENT

- A. Install precast manholes to conform to locations and dimensions shown on Drawings.
- B. Place manholes at points of change of alignment, grade, size, pipe intersections, and end of sewer.

3.03 MANHOLE BASE SECTIONS AND FOUNDATIONS

- A. Place precast base on 12-inch-thick (minimum) foundation of cement stabilized sand or a concrete foundation slab. Compact cement-sand in accordance with requirements of Section 02252 - Cement Stabilized Sand.
- B. Unstable Subgrade Treatment: When unstable subgrade is encountered, the subgrade will be examined by the Engineer to determine if the subgrade has heaved upwards after being excavated. If heaving has not occurred, the subgrade shall be over-excavated to allow for a 24-inch thick layer of crushed stone wrapped in filter fabric as the foundation material under the manhole base. If there is evidence of heaving, a pile-supported concrete foundation, as detailed on the Drawings, shall be provided under the manhole base, when indicated by the Engineer.

3.04 PRECAST MANHOLE SECTIONS

- A. Install sections, joints, and gaskets in accordance with manufacturer's printed recommendations.
- B. Install precast adjustment rings above tops of cones or flattop sections as required to adjust the finished elevation and to support manhole frame.

- C. Seal any lifting holes with non-shrink grout.
- D. Where PVC liners are required, seal joints between sections in accordance with manufacturers recommendations.

3.05 PIPE CONNECTIONS AT MANHOLES

- A. Install approved resilient connectors at each pipe entering and exiting sanitary sewer manholes in accordance with manufacturer's instructions.
- B. Ensure that no concrete, cement stabilized sand, fill, or other rigid material is allowed to enter the space between the pipe and the edge of the wall opening at and around the resilient connector on either the interior or exterior of the manhole. If necessary, fill the space with a compressible material to guarantee the full flexibility provided by the resilient connector.
- C. Test connection for watertight seal before backfilling.

3.06 INVERTS FOR SANITARY SEWERS

- A. Construct invert channels to provide a smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:
 - 1. Slope of invert bench: 1 inch per foot minimum; 1-1/2 inch per foot maximum
 - 2. Depth of bench to invert:
 - a. Pipes smaller than 15-inches: one-half largest pipe diameter
 - b. Pipes 15 to 24-inches: three-fourths the largest pipe diameter.
 - c. Pipes larger than 24-inches: equal to the largest pipe diameter
 - 3. Invert slope through manhole: 0.10-foot drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on Drawings.
- B. Form invert channels with concrete if not integral with manhole base section. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.07 DROP CONNECTIONS FOR SANITARY SEWERS

- A. Install Drop Connection when sewer line enters manhole higher than 24-inches above the invert of the lowest pipe in the manhole.
- B. Install RELINER Inside Drop Components. The bowl size shall be determined by incoming pipe size and flow rates. The bowl shall be installed as per manufacturer's

instructions using stainless steel fasteners. The appropriately sized drop pipe of SDR 35 PVC shall be securely attached to the manhole wall using stainless steel RECLINER Adjustable Clamping Brackets and stainless steel fasteners. The connection of Drop Bowl to drop pipe shall be by flexible external pipe coupler. The turn-out at the base end of the drop pipe shall be accomplished with a cast-in RECLINER Drop End Flume System or an appropriately angles PVC pipe elbow.

3.08 STUBS FOR FUTURE CONNECTIONS

- A. In manholes, where future connections are indicated on the Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.09 MANHOLE FRAME AND ADJUSTMENT RINGS

- A. Combine precast concrete adjustment rings so that the elevation of the installed casting cover is 3/8 inch below the pavement surface. Seal between adjustment ring and the precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply a latex-based bonding agent to precast concrete surfaces to be joined with non-shrink grout. Set the cast iron frame on the adjustment ring in a bed of approved sealant. The sealant bed shall consist of two beads of sealant, each bead having minimum dimensions of 1/2-inch and 3/4-inch wide.
- B. For manholes in unpaved areas, top of frame shall be set a minimum of 6 inches above existing ground line unless otherwise indicated on Drawings. In unpaved areas, encase the manhole frame in mortar or non-shrink grout placed flush with the face of the manhole ring and the top edge of the frame. Provide a rounded corner around the perimeter.

3.10 BACKFILL

- A. Place and compact backfill materials in the area of excavation surrounding manholes in accordance with requirements of Section 02227 - Excavation and Backfill for Utilities. Use embedment zone backfill material, as specified for the adjacent utilities, from manhole foundation up to an elevation 12 inches over each pipe connected to the manhole. Provide trench zone backfill, as specified for the adjacent utilities, above the embedment zone backfill.
- B. Where rigid joints are used for connecting existing sewers to the manhole, backfill under the existing sewer up to the springline of the pipe with Class B concrete or flowable fill.
- C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide a minimum of 4 inches of topsoil conforming to requirements of Section 02920 - Topsoil. Seed in accordance with Section 02932 - Hydromulch Seeding. If shown on Drawings, sod disturbed areas in accordance with Section 02935 - Sodding.

3.11 FIELD QUALITY CONTROL

- A. Conduct leakage testing of manholes in accordance with requirements of Section 02732 - Acceptance Testing for Sanitary Sewers

3.12 PROTECTION

- A. Protect manholes from damage until work has been finally accepted. Repair damage to manholes at no additional cost to Owner.

END OF SECTION

SECTION 02603

FRAMES, GRATES, RINGS, AND COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Iron castings for manhole frames and covers, inlet frames and grates, catch basin frames and grates, meter vault frames and covers, adjustment rings and extensions.
- B. Ring grates.

1.02 UNIT PRICES

- A. No payment will be made for frames, grates, rings, covers, and seals under this Section. Include payment in unit price for related item.

1.03 SUBMITTALS

- A. Submit product data in accordance with Section 01300 - Submittals.
- B. Provide copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions.
- C. Provide shop drawings for fabrication and erection of casting assemblies. Include plans, elevations, sections and connection details. Show anchorage and accessory items. Include setting drawings for location and installation of castings and anchorage devices.

PART 2 PRODUCTS

2.01 CASTINGS

- A. Castings for frames, grates, rings and covers shall conform to ASTM A48, Class 30. Provide locking covers if indicated on Drawings.
- B. Castings shall be capable of withstanding the application of an AASHTO H-20 loading without permanent deformation.
- C. Fabricate castings to conform to the shapes, dimensions, and with wording or logos shown on the Drawings.
- D. Castings shall be clean, free from blowholes and other surface imperfections. Cast holes in covers shall be clean and symmetrical, free of plugs.
- E. Castings shall be made in U.S.A.

2.02 BEARING SURFACES

- A. Machine bearing surfaces between covers or grates and their respective frames so that even bearing is provided for any position in which the casting may be seated in the frame.

2.03 SPECIAL FRAMES AND COVERS

- A. Where indicated on the Drawings, provide watertight manhole frames and covers with a minimum of four bolts and a gasket designed to seal cover to frame. Supply watertight manhole covers and frames, manufactured by East Jordan Iron Works, Inc., or approval equal.

2.04 FABRICATED RING GRATES

- A. Ring grates shall be fabricated from reinforcing steel conforming to ASTM A615.
- B. Welds connecting the bars shall conform to AWS D12.1.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install castings according to approved shop drawings, instructions given in related specifications, and applicable directions from the manufacturer's printed materials.
- B. Set castings accurately at required locations to proper alignment and elevation. Keep castings plumb, level, true and free of rack. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in formwork until permanently set.
- C. Ring grates shall be fabricated in accordance with drawings and shall be set in mortar in the mouth of the pipe bell.

END OF SECTION

SECTION 02607

ADJUSTING MANHOLES, INLETS, AND VALVE BOXES TO GRADES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adjusting elevation of manholes, inlets, and valve boxes to new grades.

1.02 UNIT PRICES

- A. No separate payment will be made for adjusting utility structures to grade under this section, unless otherwise indicated in bid proposal.
- B. Refer to Section 01025 - Measurement and Payment for unit price procedures.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. For cast in place concrete, refer to Section 03305 - Concrete for Utility Construction
- B. For precast concrete manhole sections and adjustment rings, refer to Section 02601 - Precast Concrete Manholes.
- C. For mortar mix, conform to requirements of ASTM C 270, Type S using Portland Cement.

2.02 CAST IRON ADJUSTING RINGS

- A. For cast iron adjusting rings, refer to Section 02603 - Frames, Grates, Rings and Covers.

2.03 PIPING MATERIALS

- A. For riser pipes and fittings, refer to applicable piping materials specifications in Sections 02610 through 02620.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine existing structure, valve box, frame and cover or inlet box, frame and cover or inlet, and piping and connections for damage or defects that would affect adjustment to grade. Report such damage or defects to the Engineer.

3.02 ESTABLISHING GRADE

- A. Coordinate grade related items with existing grade and finished grade or paving, and relate to established bench mark or reference line.

3.03 ADJUSTING MANHOLES AND INLETS

- A. Elevation of manhole or inlet can be raised using precast concrete rings or metal adjusting rings. Use of brick for adjustment of sanitary sewer manholes to grade is prohibited. Elevation of manhole or inlet can be lowered by removing existing masonry, adjusting rings or the top section of the barrel below the new elevation and then rebuilding or raising the elevation to the proper height.
- B. Grout inside and outside adjusting ring joints.
- C. Salvage and reuse cast iron frame and cover or grate.
- D. Protect or block off manhole or inlet bottom using wood forms shaped to fit so that no debris or soil falls to the bottom during adjustment.
- E. Set the cast iron frame for the manhole cover or grate in a full mortar bed and adjust to the established elevation. In streets, adjust covers to be 3/8 inch below pavement.
- F. Verify that manholes and inlets are free of visible leaks as a result of reconstruction. Repair leaks in a manner subject to the Engineer's approval.

3.04 ADJUSTING VALVE BOXES

- A. Salvage and reuse valve box and surrounding concrete block.
- B. Remove and replace 6-inch ductile iron riser pipe with suitable length for depth of cover required to establish the adjusted elevation to accommodate actual finish grade.
- C. Reinstall valve box and riser piping plumbed in vertical position. Provide minimum 6 inches telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box for vertical movement damping.
- D. After valve box has been set, aligned, and adjusted so that top lid is level with final grade, pour a 18-inch by 18-inch by 6-inch thick concrete pad around valve box. Center valve box horizontally within concrete slab.

3.05 BACKFILL AND GRADING

- A. Backfill the area of excavation surrounding each adjusted manhole, inlet, and valve box and compact according to requirements of Section 02227 - Excavation and Backfill for Utilities.

- B. Grade the ground surface to drain away from each manhole and valve box. Place earth fill around manholes to the level of the upper rim of the manhole frame. Place earth fill around the valve box concrete block.

- C. In unpaved areas, grade surface at a uniform slope of 1 to 5 from the manhole frame to natural grade. Provide a minimum of 4 inches of topsoil conforming to requirements of Section 02920 - Topsoil and sod in accordance with Section 02935 - Sodding.

END OF SECTION

SECTION 02620

PVC PIPE AND FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Polyvinyl chloride pressure pipe for water distribution in nominal diameters 4 inches through 16 inches.
- B. Polyvinyl chloride pressure pipe for water transmission in nominal diameters.
- C. Polyvinyl chloride sewer pipe for gravity sanitary sewers in nominal diameters 4 inches through 48 inches.
- D. Polyvinyl chloride pressure pipe for gravity sanitary sewers and force mains in nominal diameters 4 inches through 36 inches.

1.02 UNIT PRICES

- A. No separate payment will be made for PVC pipe under this section. Include cost in unit price for related item.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01300 - Submittals.
- B. Submit shop drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

1.04 QUALITY CONTROL

- A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C 900 or AWWA C 905 for pressure pipe applications, or the appropriate ASTM standard specified for gravity sewer pipe.
- B. Submit manufacturer's certification that PVC pressure pipe has been hydrostatically tested at the factory in accordance with AWWA C 900 or AWWA C 905 and this Section.
- C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from any other source is not acceptable.

Furnish copies of test reports to the Engineer for review. Cost of testing shall be borne by Contractor or Supplier.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Use PVC compounds in the manufacture of pipe that contain no ingredient in an amount that has been demonstrated to migrate into water in quantities considered to be toxic.
- B. Furnish PVC pressure pipe manufactured from Class 12454-A or Class 12454-B virgin PVC compounds as defined in ASTM D 1784. Use compounds qualifying for a rating of 4000 psi for water at 73.4 degrees F per requirements of PPI TR3. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage.
- C. For PVC pressure pipe used for water mains, provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.
- D. Gaskets:
 - 1. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
 - 2. Pipes to be installed in potentially contaminated areas, especially where free product is found near the elevation of the proposed sewer, shall have the following gasket materials for the noted contaminants.

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other contaminants	As recommended by the pipe manufacturer

- E. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.

2.02 WATER SERVICE PIPE

- A. Pipe 2-inch: Class 200, SDR 21; nominal 20-foot lengths.
- B. Pipe 4-inch through 12-inch: AWWA C 900, Class 150, DR 18; nominal 20-foot lengths; cast iron equivalent outside diameters.

- C. Pipe 16-inch: AWWA C 905; Class 235; DR 18; nominal 20-foot lengths; cast iron equivalent outside diameter.
- D. PVC transmission waterline shall be in accordance to the provisions in the following table:

WALL CONSTRUCTION	MANUFACTURER	ASTM DESIGNATION	DR(max)/ STIFFNESS
Solid	J-M Manufacturing Co., Inc.	AWWA C900 or AWWA C905	DR 18, 235PSI
	Diamond Plastics Corp.	AWWA C900 or AWWA C905	DR 18, 235PSI
	North American Pipe Corporation (NAPCO)	AWWA C900 or AWWA C905	DR 18, 235PSI
	IPEX	AWWA C900 or AWWA C905	DR 18, 235PSI

- E. Joints: ASTM D 3139; push-on type joints in integral bell or separate sleeve couplings. Do not use socket type or solvent weld type joints.
- F. Make curves and bends by deflecting the joints. Do not exceed maximum deflection recommended by the pipe manufacturer. Submit details of other methods of providing curves and bends for review by the Engineer.
- G. Hydrostatic Test: AWWA C 900, AWWA C 905, ANSI A21.10 (AWWA C110); at point of manufacture; submit manufacturer's written certification.

2.03 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

- A. Bends and Fittings: ANSI A21.10, ductile iron; ANSI A21.11 single rubber MJ joints; minimum 150 psi pressure rating.
- B. Coatings and Linings: Conform to requirements of Section 02610 - Ductile-Iron Pipe and Fittings.
- C. Restraints for large diameter PVC pipe (AWWA C905) at the bell shall be consist of the following:
 1. The restraint shall be manufactured of ductile iron conforming to ASTM A536.
 2. A backup ring shall be utilized behind the PVC bell.
 3. A restraint ring, incorporating a plurality or individually actuating gripping surfaces, shall used to connect the bell ring and gripping ring.
 4. The restraint shall be the Series 2800 as manufactured by EBAA Iron, Inc., or approved equal.

2.04 GRAVITY SANITARY SEWER PIPE

- A PVC gravity sanitary sewer pipe shall be in accordance with the provisions in the following table:

WALL CONSTRUCTION	MANUFACTURER	PRODUCT OPTIONS	ASTM DESIGNATION	SDR (Max.)/ STIFFNESS	DIAMETER SIZE RANGE
Solid	J-M Manufacturing Co, Inc.	Approved	D3034	SDR 26 / PS 115	6" to 15"
	CertainTeed	Approved	F679 (T-1)	SDR 26 / PS 115	18" to 24"
	Can-Tex				
	Carlson Company	Approved	F679 (T-1)	SDR 35 / PS 46	27" to 36"
	Diamond Plastics Corp	Approved	AWWA C900	DR 18 / N/A	4" to 12"
	North American Pipe Corporation (NAPCO)				
		Approved	AWWA C905	DR 18 / N/A	14" to 36"

- B When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F679, except provide wall thickness as required for SDR 26 and pipe strength of 115 psi.
- C For sewers up to 12-inch-diameter crossing over waterlines, or crossing under waterlines with less than 2 feet separation, provide minimum 150 psi pressure-rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings.
- D Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM
- E D 3139 and ASTM F 477, shall be provided. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. The manufacturer shall test a sample from each batch conforming to requirements ASTM D2444.
- F Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

1.02 SANITARY SEWER FORCE MAIN PIPE

- A Provide PVC pressure pipe conforming to the requirements for water service pipe, and conforming to the minimum working pressure rating specified in Section 02731 - Sanitary Sewage Force Mains.
- B PVC pressure pipe for force main shall be green or white in color.
- C Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting the requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use EBAA Iron Series 2000PV,

Uniflange Series 1350 restrainer, or equal joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.

- D Fittings: Provide ductile iron fittings as per Paragraph 2.03, except furnish all fittings with one of the following internal linings:
- 1 Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to the interior surface of the fitting, as manufactured by American Cast Iron Pipe "Polybond", or U.S. Pipe "Polyline".
 - 2 Nominal 40 mils (35 mils minimum) polyurethane, Corro-pipe II by Madison Chemicals, Inc.
 - 3 Nominal 40 mils (35 mils minimum) ceramic epoxy, Protecto 401 by Enduron Protective Coatings.
 - 4 Nominal 40 mils (35mils minimum) fusion bonded epoxy
- E Exterior Protection: Provide polyethylene wrapping of ductile iron fittings as required by Section 02630 - Polyethylene Wrap.
- F Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Paragraph 2.02 E.

PART 3 EXECUTION

3.01 PROTECTION

- A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

- A. Conform to requirements of Section 02664 – Water Mains, Section 02730 - Gravity Sanitary Sewers and Section 02763 - Point Repairs to Sanitary Sewers, as applicable.
- B. Install PVC pipe in accordance with Section 02227 - Excavation and Backfill for Utilities, ASTM D 2321, and manufacturer's recommendations.
- C. Water service pipe 12 inches in diameter and smaller: Installed to clear utility lines and have minimum 4 feet of cover below lowest property line grade of street, unless otherwise required by Drawings.
- D. For water service, exclude use of PVC within 200 feet (along the public right-of-way) of underground storage tanks or in undeveloped commercial acreage. Underground storage tanks are primarily located on service stations but can exist at other commercial establishments.

END OF SECTION

SECTION 02730

GRAVITY SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gravity sanitary sewers and appurtenances, including cleanouts, stacks, and service connections.

1.02 UNIT PRICES

- A. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit proposed methods, equipment, materials and sequence of operations for sewer construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.

1.04 QUALITY ASSURANCE

- A. Qualifications. Install a sanitary sewer that is watertight both in pipe-to-pipe joints and in pipe-to-manhole connections. Perform testing in accordance with Section 02732 - Acceptance Testing for Sanitary Sewers.
- B. Regulatory Requirements.
 - 1. Install sewer lines to meet the minimum separation distance from any potable water line, as scheduled below. The separation distance is defined as the distance between the outside of the water pipe and the outside of the sewer pipe. When possible, install new sanitary sewers no closer to water lines than 9 feet in all directions. Where this separation distance cannot be achieved, new sanitary sewers shall be installed as specified in this section.
 - 2. Make notification to the Engineer if water lines are uncovered during sanitary sewer installation where the minimum separation distance cannot be maintained.
 - 3. Lay gravity sewer lines in straight alignment and grade.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Inspect pipe and fittings upon arrival of materials at the job site.

- B. Handle and store pipe materials and fittings to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe and fittings along the ground. Do not roll pipe unrestrained from delivery trucks.
- C. Use mechanical means to move or handle pipe. Employ acceptable clamps, rope or slings around the outside barrel of pipe and fittings. Do not use hooks, bars, or other devices in contact with the interior surface of the pipe to lift or move lined pipe.

PART 2 PRODUCTS

2.01 PIPE

- A. Provide piping materials for gravity sanitary sewers of the sizes and types indicated on the Drawings or as specified.
- B. Reinforced concrete pipe is not acceptable.

2.02 PIPE MATERIAL SCHEDULE

- A. Unless otherwise shown on the Drawings, use pipe materials that conform to requirements specified in one or more of the following Sections:
 - 1. Section 02610 - Ductile Iron Pipe and Fittings.
 - 2. Section 02618 - Centrifugally Cast Fiberglass Pipe.
 - 3. Section 02619 - HDPE Solid and Profile Wall Pipe.
 - 4. Section 02620 - PVC Pipe.
- B. Where shown on the Drawings, provide pipe meeting the minimum class, dimension ratio, or other criteria indicated.
- C. Pipe materials other than those listed above shall not be used for gravity sanitary sewers.

2.03 APPURTENANCES

- A. Stacks. Conform to the requirements of Section 02762 - Sanitary Sewer Service Stubs or Reconnections.
- B. Service Connections. Conform to requirements of Section 02762 - Sanitary Sewer Service Stubs or Reconnections.
- C. Roof, street or other type of surface water drains shall not be connected or reconnected into the sanitary sewer lines.

2.04 BEDDING, BACKFILL, AND TOPSOIL MATERIAL

- A. Bedding and Backfill: Conform to requirements of Section 02227 - Excavation and Backfill for Utilities, Section 02229 - Utility Backfill Material, and Section 02252 - Cement Stabilized Sand.
- B. Topsoil: Conform to requirements of Section 02920 - Topsoil.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation if construction will affect traffic. Conform to requirements of Section 01570 - Traffic Control and Regulation.
- B. Provide barricades, flashing warning lights, and warning signs for excavations. Conform to requirements of Section 01570 - Traffic Control and Regulation. Maintain barricades and warning lights where work is in progress or where traffic is affected by the work.
- C. Perform work in accordance with OSHA standards. Employ a trench safety system as specified in Section 01526 - Trench Safety System for excavations over 5 feet deep.
- D. Immediately notify the agency or company owning any utility line which is damaged, broken or disturbed. Obtain approval from the Engineer and agency or utility company for any repairs or relocations, either temporary or permanent.
- E. Remove old pavements and structures including sidewalks and driveways in accordance with requirements of Section 02076 - Removing Existing Pavements and Structures.
- F. Install and operate dewatering and surface water control measures in accordance with Section 01563 - Control of Ground Water and Surface Water.
- G. Do not allow sand, debris or runoff to enter sewer system.

3.02 DIVERSION PUMPING

- A. Install and operate required bulkheads, plugs, piping, and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow. Obtain approval for diversion pumping equipment and procedures from the Engineer.
- B. Design piping, joints and accessories to withstand twice the maximum system pressure or 50 psi, whichever is greater.
- C. No sewage shall be diverted into any area outside of the sanitary sewer.
- D. In the event of accidental spill or overflow, immediately stop the overflow and take action to clean up and disinfect spillage. Promptly notify the Engineer so that required

reporting can be made to the Texas Commission on Environmental Quality and the Environmental Protection Agency by the Engineer.

3.03 EXCAVATION

- A. Earthwork. Conform to requirements of Section 02227 - Excavation and Backfill for Utilities. Use bedding as indicated on Drawings.
- B. Line and Grade. Establish the required uniform line and grade in the trench as shown in the drawings. Maintain this control for a minimum of 100 feet behind and ahead of the pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of the work. Use of appropriately sized grade boards which are substantially supported is also acceptable. Protect the boards and location stakes from damage or dislocation.
- C. Trench Excavation. Excavate pipe trenches to depths shown on Drawings and as specified in Section 02227 - Excavation and Backfill for Utilities.

3.04 PIPE INSTALLATION BY OPEN CUT

- A. Install pipe in accordance with the pipe manufacturer's recommendations and as specified in the following paragraphs.
- B. Install pipe only after excavation is completed, the bottom of the trench fine graded, bedding material is installed, and the trench has been approved by the Engineer.
- C. Install pipe to the line and grade indicated. Place pipe so that it has continuous bearing of barrel on bedding material and is laid in the trench so the interior surfaces of the pipe follow the grades and alignment indicated. Provide bell holes where necessary.
- D. Install pipe with the spigot ends toward the direction of flow.
- E. Form a concentric joint with each section of adjoining pipe so as to prevent offsets.
- F. Keep the interior of pipe clean as the installation progresses. Where cleaning after laying the pipe is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull it forward past each joint immediately after the joint has been completed. Remove foreign material and debris from the pipe.
- G. Provide lubricant, place and drive home newly laid sections with come-a-long winches so as to eliminate damage to sections. Install pipe to "home" mark where provided. Use of backhoes or similar powered equipment will not be allowed unless protective measures are provided and approved in advance by the Engineer.
- H. Keep excavations free of water during construction and until final inspection.
- I. When work is not in progress, cover the exposed ends of pipes with an approved plug to prevent foreign material from entering the pipe.

- J. If a water line is encountered closer than nine feet to the proposed sewer and no special provisions are indicated on the Drawings, notify the Engineer before proceeding.
- K. Where the length of stubs is not indicated, install a 10-foot length of pipe or extend to the right-of-way and seal the free end with an approved plug. No stubs are to terminate under existing pavement.

3.05 PIPE INSTALLATION OTHER THAN OPEN CUT

- A. For installation of pipe by augering, or jacking conform to requirements of specification sections on augering or jacking work as appropriate.

3.06 INSTALLATION OF APPURTENANCES

- A. Service Connections. Install service connections to conform to requirements of Section 02762 - Sanitary Sewer Service Stubs or Reconnections.
- B. Stacks. Construct stacks to conform to requirements of 02762 - Sanitary Sewer Service Stubs or Reconnections.
- C. Construct manholes to conform to requirements of Section 02600 - Cast-in-Place Manholes, Section 02601 - Precast Concrete Manholes, and Section 02602 - Fiberglass Manholes, as applicable. Install frames, rings and covers to conform to requirements of Section 02603 - Frames, Grates, Rings and Covers.

3.07 SEPARATION FROM WATER LINES

- A. Water Line/New Sewer Line Separation - When new sanitary sewers are installed, they shall be installed no closer to waterlines than nine feet in all directions. Sewers that parallel waterlines must be installed in separate trenches. Where the nine foot separation distance cannot be achieved, the following guidelines will apply.
 - 1. Where a sanitary sewer parallels a waterline, the sewer shall be constructed of cast iron, ductile iron, or PVC pipe meeting ASTM specifications with a pressure rating for both the pipe and joints of 150 psi. The vertical separation shall be a minimum of two feet between outside diameters and the horizontal separation shall be a minimum of four feet between outside diameters. The sewer shall be located below the waterline.
 - 2. Where a sanitary sewer crosses a waterline and the sewer is constructed of cast iron, ductile iron or PVC with a minimum pressure rating of 150 psi, an absolute minimum distance of 6 inches between outside diameters shall be maintained. In addition the sewer shall be located below the waterline where possible and one length of the sewer pipe must be centered on the waterline.
 - 3. Where a sewer crosses under a waterline and the sewer is constructed of ABS truss pipe, similar semi-rigid plastic composite pipe, clay pipe or concrete pipe with gasketed joints, a minimum two foot separation distance shall be

maintained. The initial backfill shall be cement stabilized sand (two or more bags of cement per cubic yard of sand) for all sections of sewer within nine feet of the waterline. This initial backfill shall be from one quarter diameter below the centerline of the pipe to one pipe diameter (but not less than 12 inches) above the top of the pipe.

4. Where a sewer crosses over a waterline all portions of the sewer within nine feet of the waterline shall be constructed of cast iron, ductile iron, or PVC pipe with a pressure rating of at least 150 psi using appropriate adapters. In lieu of this procedure the new conveyance may be encased in a joint of 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at 5 feet intervals with spacers or be filled to the springline with washed sand. The encasement pipe should be centered on the crossing and both ends sealed with cement grout or manufactured seal.

- B. Waterline/Manhole Separation - Unless sanitary sewer manholes and the connecting sewer can be made watertight and tested for no leakage, they must be installed so as to provide a minimum of nine feet of horizontal clearance from an existing or proposed waterline. Where the nine foot separation distance cannot be achieved, a carrier pipe as described in subsection (A)(4) of this section may be used where appropriate.

3.08 INSPECTION AND TESTING

- A. Visual Inspection. Check pipe alignment in accordance with Section 02732 - Acceptance Testing For Sanitary Sewers.
- B. Mandrel Testing. Use a Mandrel Test to test flexible pipe for deflection. Refer to Section 02732 - Acceptance Testing for Sanitary Sewers.
- C. Leakage Testing. After backfilling a line segment and prior to tie-in of service connections, test for leakage in accordance with Section 02732 - Acceptance Testing for Sanitary Sewers. Maintain piezometers installed to conform with Section 01563 - Control of Ground Water and Surface Water, until acceptance testing is completed.
- D. The Contractor shall perform television inspection of the completed sewer before acceptance.

3.09 BACKFILL AND SITE CLEANUP

- A. Backfill and compact soil in accordance with Section 02227 - Excavation and Backfill for Utilities.
- B. Backfill the trench in specified lifts only after pipe installation is approved by the Engineer.
- C. Repair and replace removed or damaged pavement, curbs, gutters, and sidewalks as specified in Section 02570 - Pavement Repair and Resurfacing.

- D. Provide hydromulch seeding in areas of commercial, industrial or undeveloped land use over the surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at a uniform slope to natural grade as indicated on the Drawings. Provide a minimum of 4 inches of topsoil as specified in Section 02920 - Topsoil and apply hydromulch according to requirements of Section 02932 - Hydromulch Seeding.
- E. Provide sodding in areas of residential land use over the surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at a uniform slope to natural grade as indicated on the Drawings. Provide a minimum of 4 inches of topsoil per Section 02920 - Topsoil. Sod disturbed areas in accordance with Section 02935 - Sodding.
- F. Conform to requirements of Section 01564 - Waster Material Disposal.

END OF SECTION

SECTION 02732

ACCEPTANCE TESTING FOR SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acceptance testing criteria and procedures for sanitary sewers, including:
 - 1. Visual inspection of sewer pipes.
 - 2. Mandrel testing for flexible sewer pipes.
 - 3. Leakage testing of sewer pipes.
 - 4. Leakage testing of manholes.
 - 5. Smoke testing of point repairs.
 - 6. Post Cleaning and Television Inspection of rehabilitated sanitary sewer.
- B. Tests listed in this Section are not necessarily required on this Project. Required test is named in other Sections which refer to this Section for testing criteria and procedures.

1.02 UNIT PRICES

- A. No payment will be made for Acceptance Testing for Sanitary Sewers under this section. Payment for work performed as described under this section shall be included in the unit price bid for applicable work items.

1.03 PERFORMANCE REQUIREMENTS

- A. Gravity flow sanitary sewers are required to have a straight alignment and uniform grade between manholes.
- B. Flexible pipe, including “semi-rigid” pipe, is required to show no more than 5 percent deflection. Test pipe no sooner than 30 days after backfilling of a line segment but prior to final acceptance using a standard mandrel to verify that installed pipe is within specified deflection tolerances.
- C. Maximum allowable leakage for infiltration or exfiltration.
 - 1. The total exfiltration, as determined by a hydrostatic head test, shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of 2 feet above the crown of the pipe at the upstream manhole or 2 feet above the groundwater elevation, whichever is greater.

2. When pipes are installed more than 2 feet below the groundwater level, an infiltration test shall be used in lieu of the exfiltration test. The total infiltration shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours. Groundwater elevation must be at least 2 feet above the crown of the pipe at the upstream manhole.
 3. Refer to Table 02732-1, Water Test Allowable Leakage, at the end of this Section, for measuring leakage in sewers. Perform leakage testing to verify that leakage criteria is met.
- D. Perform air testing in accordance with requirements of this Section and the Texas Commission on Environmental Quality requirements. Refer to Table 02732-2, Time Allowed For Pressure Loss From 3.5 psig to 2.5 psig, Table 02732-3, Minimum testing Times for Low Pressure Air Test, and Table 02732-4, Vacuum Test Time Table, at the end of this Section.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01300-Submittals.
- B. Test Plan: Before testing begins and in adequate time to obtain approval through the submittal process, prepare and submit a test plan for approval by Engineer. Include testing procedures, methods, equipment, and tentative schedule. Obtain advance written approval for deviations from the Drawings and Specifications.
- C. Test Reports: Submit test reports for each test on each segment of sanitary sewer.

1.05 GRAVITY SANITARY SEWER QUALITY ASSURANCE

- A. Repair, correct, and retest manholes or sections of pipe which fail to meet specified requirements when tested.
- B. Provide testing reports.

1.06 SEQUENCING AND SCHEDULING

- A. Perform testing as work progresses. Schedule testing so that no more than 1000 linear feet of installed sewer remains untested at any one time.
- B. Coordinate testing schedules with Engineer. Perform testing under observation of Engineer.

PART 2 PRODUCTS

2.01 DEFLECTION MANDREL

- A. Mandrel Sizing. The rigid mandrel shall have an outside diameter (O.D.) equal to 95 percent of the inside diameter (I.D.) 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 minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe. Dimensions shall be per appropriate standard. Statistical or other “tolerance package” shall not be considered in mandrel sizing.

- B. Mandrel Design. The rigid mandrel shall be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more “runners” or “legs” as long as the total number of legs is an odd number. The barrel section of the mandrel shall have a length of at least 75 percent of the inside diameter of the pipe. The rigid mandrel diameter during testing. A proving ring shall be provided and used for verifying each size mandrel.
- C. Proving Ring. Furnish a “proving ring” with each mandrel. Fabricate the ring of 2-inch-thick, 3-inch-wide bar steel to a diameter 0.02-inches larger than approved mandrel diameter.
- D. Mandrel Dimensions (5% allowance). Average inside diameter and minimum mandrel diameter are specified in Table 02732-5, Pipe vs. Mandrel Diameter, at the end of this Section. Mandrels for higher strength, thicker wall pipe or other pipe not listed in the table may be used when approved by the Engineer.

2.02 EXFILTRATION TEST

- A. Test Equipment:
 - 1. Pipe plugs.
 - 2. Pipe risers where the manhole cone is less than 2 feet above highest point in pipe or service lead.

2.03 INFILTRATION TEST

- A. Test Equipment:
 - 1. Calibrated 90° V-notch weir.
 - 2. Pipe plugs.

2.04 LOW PRESSURE AIR TEST

- A. Minimum Requirement for Equipment:
 - 1. Control panel.
 - 2. Low-pressure air supply connected to control panel.
 - 3. Pneumatic plugs: Acceptable size for diameter of pipe to be tested; capable of withstanding internal test pressure without leaking or requiring external bracing.
 - 4. Air hoses from control panel to:

- a. Air supply
 - b. Pneumatic plugs
 - c. Sealed line for pressuring
 - d. Sealed line for monitoring internal pressure
- B. Testing Pneumatic Plugs: Place a pneumatic plug in each end of a length of pipe on the ground. Pressurize plugs to 25 psig; then pressurize sealed pipe to 5 psig. Plugs are acceptable if they remain in place against the test pressure without external aids.

2.05 GROUND WATER DETERMINATION

- A. Equipment: Pipe probe or small diameter casing for ground water elevation determination.

2.06 SMOKE TESTING

- A. Equipment:
- 1. Pneumatic plugs.
 - 2. Smoke generator as supplied by Superior Signal Company, or an approved equal.
 - 3. Blowers producing 2500 scfm minimum.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide labor, equipment, tools, test plugs, risers, air compressor, air hose, pressure meters, pipe probe, calibrated weirs, or any other device necessary for proper testing and inspection.
- B. The selection of test methods and pressures for gravity sanitary sewers shall be determined based on ground water elevation. Determine ground water elevation using equipment and procedures conforming to Section 01563-Control of Ground Water and Surface Water.

3.02 VISUAL INSPECTION OF GRAVITY SANITARY SEWERS

- A. Check pipe alignment visually by flashing a light between structures. Verify if alignment is true and no pipes are misplaced. In case of misalignment or damaged pipe, remove and re-lay or replace pipe segment.

3.03 MANDREL TESTING FOR GRAVITY SANITARY SEWERS

- A. Perform deflection testing on flexible and semi-rigid pipe to confirm pipe has no more than 5 percent deflection. Mandrel testing shall conform to ASTM D 3034. Perform testing no sooner than 30 days after backfilling of line segment, but prior to final acceptance testing of the line segment.
- B. Pull the approved mandrel by hand through sewer sections. Replace any section of sewer not passing the mandrel. Mandrel testing is not required for stubs.
- C. Retest repaired or replaced sewer sections.

3.04 LEAKAGE TESTING FOR GRAVITY SANITARY SEWERS

- A. Test Options:
 - 1. Test gravity sanitary sewer pipes for leakage by either exfiltration or infiltration methods, as appropriate, or with low pressure air testing.
 - 2. Test new or rehabilitated sanitary sewer manholes with water or low-pressure air. Manholes tested with low-pressure air shall undergo a physical inspection prior to testing.
 - 3. Leakage testing shall be performed after backfilling of a line segment, and prior to tie-in of service connections.
 - 4. If no installed piezometer is within 500 feet of the sewer segment, Contractor shall provide a temporary piezometer for this purpose.
- B. Compensating for Ground Water Pressure:
 - 1. Where ground water exists, install a pipe nipple at the same time sewer line is placed. Use a ½ - inch capped pipe nipple approximately 10 inches long. Make the installation through manhole wall on top of the sewer line where line enters manhole.
 - 2. Immediately before performing line acceptance test, remove cap, clear pipe nipple with air pressure, and connect a clear plastic tube to nipple. Support tube vertically and allow water to rise in the tube. After water stops rising, measure height in feet of water over invert of the pipe. Divide this height by 2.3 feet/psi to determine the ground water pressure to be used in line testing.
- C. Exfiltration test:
 - 1. Determine ground water elevation.
 - 2. Plug sewer in downstream manhole.
 - 3. Plug incoming pipes in upstream manhole.

4. Install riser pipe in outgoing pipe of upstream manhole if highest point in service lead (house service) is less than 2 feet below bottom of manhole cone.
 5. Fill sewer pipe and manhole or pipe riser, if used, with water to a point 2-1/2 feet above highest point in sewer pipe, house lead, or ground water table, whichever is highest.
 6. Allow water to stabilize for one to two hours. Take water level reading to determine drop of water surface, in inches, over a one-hour period, and calculate water loss (1 inch of water in 4 feet diameter manhole equals 8.22 gallons) or measure the quantity of water required to keep water at same level. Loss shall not exceed that calculated from allowable leakage according to Table 02732-1 at the end of this section.
- D. Infiltration test: Ground water elevation must be not less than 2.0 feet above highest point of sewer pipe or service lead (house service).
1. Determine ground water elevation.
 2. Plug incoming pipes in upstream manhole.
 3. Insert calibrated 90° V-notch weir in pipe on downstream manhole.
 4. Allow water to rise and flow over weir until it stabilizes.
 5. Take five readings of accumulated volume over a period of 2 hours and use average for infiltration. The average must not exceed that calculated for 2 hours from allowable leakage according to the Table 02732-1 at the end of this Section.
- E. Low Air Pressure Test: When using this test conform to ASTM C 828, ASTM C 924, or ASTM F 1417, as applicable, with holding time not less than that listed in Table 02732-2.
1. Air testing for sections of pipe shall be limited to lines less than 36-inch average inside diameter.
 2. Lines 36-inch average inside diameter and larger shall be “joint” tested at each joint. The minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch during a joint test shall be 10 seconds, regardless of pipe size. “Joint Test” shall be conducted as follows:
 - a. Each joint shall be tested successfully.
 - b. Joint Tester shall be set over joint to be tested so that the two inflation tubes straddle the joint.
 - c. Inflate “inflation tubes” to 25 psig to seal off joint to be tested.

- d. Apply air pressure into void between inflation tubes until pressure reaches 4 psig.
 - e. After pressure has stabilized, bleed air pressure back to 3.5 psig.
 - f. Record time required for pressure to drop from 3.5 psig to 2.5 psig.
 - g. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than 10 seconds, the joint shall be presumed to be free from defect. When the time is less than 10 seconds pipe breakage, joint leakage or leaking tester seals are indicated and an inspection must be made to determine the cause. The contractor shall effect such repairs as may be required to accomplish a successful air joint test.
 - h. The joint shall be air tested before the pipe has been backfilled. Air testing shall be performed as pipe installation progresses.
3. For pipe sections less than 36-inch average inside diameter:
- a. Determine ground water level.
 - b. Plug both ends of pipe. For concrete pipe, flood pipe and allow 2 hours to saturate concrete. Then drain and plug concrete pipe.
 - c. After a manhole-to-manhole section of sanitary sewer main has been sliplined and prior to any service lines being connected to new liner, plug liner at each manhole with pneumatic plugs.
 - d. Pressurize pipe to 4.0 psig. Increase pressure 1.0 psi for each 2.3 feet of ground water over highest point in the system. Allow pressure to stabilize for 2 to 4 minutes. Adjust pressure to start at 3.5 psig (plus adjustment for ground water table). See Table 02732-2 at the end of this Section.
 - e. To determine air loss, measure the time interval for pressure to drop to 2.5 psig. The time must exceed that listed in the Table 02732-2 at the end of this Section for pipe diameter and length. For sliplining, use diameter of carrier pipe.
- F. Retest: Any section of pipe which fails to meet requirements shall be repaired and retested.

3.05 TEST CRITERIA TABLES

- A. Exfiltration and Infiltration Water Tests: Refer to Table 02732-1, Water Test Allowable Leakage, at the end of this Section.
- B. Low Pressure Air Test:

1. Times in Table 02732-2, Time Allowed for Pressure Loss From 3.5 psig to 2.5 psig, at the end of this Section, are based on the equation from Texas Commission on Environmental Quality (TCEQ) Design Criteria 317.2(a)(4)(B).

$$T = 0.0850 (D) (K) / (Q)$$

where:

- T = time for pressure to drop 1.0 pounds per square inch gauge in seconds
- K = 0.000419 DL, but not less than 1.0
- D = average inside diameter in inches
- L = length of line of same pipe size in feet
- Q = rate of loss, 0.0015 ft³/min./sq. ft. internal surface
2. Since a K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as given in Table 02732-3, Minimum Testing Times for Low Pressure Air Test.
 3. Notes:
 - (a). When two sizes of pipe are involved, the time shall be computed by the ratio of lengths involved.
 - (b). Lines with 27-inch average inside diameter and larger may be air tested at each joint.
 - (c). Line with an average inside diameter greater than 36 inches must be air tested for leakage at each joint.
 - (d). If the joint test is used, a visual inspection of the joint shall be performed immediately after testing.
 - (e). For joint test, the pipe is to be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure has stabilized, the minimum times allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be 10 seconds.

3.06 LEAKAGE TESTING FOR MANHOLES

- A. After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures.
- B. Plug influent and effluent lines, including service lines, with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendations. Place plugs a minimum of 6

inches outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled.

C. Vacuum Testing:

1. Install vacuum tester head assembly at top access point of manhole and adjust proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to the recommended maximum inflation pressure; do not overinflate.
2. Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for the time period specified in Table 02732-4, Vacuum Test Time Table.
3. If the drop in vacuum exceeds 1 inch Hg over the specified time period tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

D. Hydrostatic Exfiltration Testing: Hydrostatic exfiltration testing shall be performed as follows:

1. Seal wastewater lines coming into the manhole with an internal pipe plug. Then, fill the manhole with water and maintain it full for at least one hour.
2. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot of manhole diameter per foot of manhole depth per hour.
3. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3.07 SMOKE TEST PROCEDURE FOR POINT REPAIRS

A. Application: Perform smoke test to:

1. Locate points of line failure for point repair.
2. Determine if point repairs are properly made.
3. Determine if service connections have been reconnected to the rehabilitated sewer.
4. Check integrity of connections to newly replaced service taps to liners and to existing private service connections.

B. Limitations: Do not backfill service taps until completion of this test. Test only those taps in a single manhole section at any one time. Keep the number of open excavations to a minimum.

- C. Preparation: Prior to smoke testing, give written notice to area residents no fewer than 2 days, nor more than 7 days, prior to proposed testing. Also give notice to City's Police and Fire Departments 24 hours prior to actual smoke testing.
- D. Isolate Section: Isolate manhole section to be tested from adjacent manhole sections to keep smoke localized. Temporarily seal the annular space at manhole for sliplined sections.
- E. Smoke Introduction:
 - 1. Operate equipment according to manufacturer's recommendation and as approved by Engineer.
 - 2. Conduct test by forcing smoke from smoke generators through sanitary sewer main and service connections. Operate smoke generators for a minimum of 5 minutes.
 - 3. Introduce smoke into upstream and downstream manholes as appropriate. Monitor the tap/connection for smoke leaks. Note sources of leaks.
- F. Repair and Retest: Repair and replace any taps or connections noted as leaking and then retest. Taps and connections may be left exposed in only one manhole section at a time. If repair or replacement, testing or retesting, and backfilling of the excavation is not completed within one workday, properly barricade and cover each excavation as approved by Engineer.
- G. Service Connections: On houses where smoke does not issue from plumbing vent stacks to confirm reconnection of sewer service to the newly installed liner pipe, perform a dye test to confirm reconnection. Introduce dye into the service line through a plumbing fixture inside the structure or a sewer cleanout immediately outside the structure and flush with water. Observe flow at service reconnection or downstream manhole. Detection of dye confirms a reconnection.

TABLE 02732-1
 WATER TEST ALLOWABLE LEAKAGE

DIAMETER OF RISER OR STACK IN INCHES	VOLUME PER INCH OF DEPTH		ALLOWANCE LEAKAGE*	
	Inch	Gallons	Pipe Size in Inches	Gallon/Minute per 100 Ft.
1	0.7854	.0034	6	0.0039
2	3.1416	.0136	8	0.0053
2.5	4.9087	.0212	10	0.0066
3	7.0686	.0306	12	0.0079
4	12.5664	.0306	15	0.0099
5	19.6350	.0544	18	0.0118
6	28.2743	.1224	21	0.0138
8	50.2655	.2176	24	0.0158
			27	0.0177
			30	0.0197
			36	0.0237
			42	0.0276
For other diameters, multiply square of diameters by value for 1" diameter.			Equivalent to 50 gallons per inch of inside diameter per mile per 24 hours.	

* Allowable leakage rate shall be reduced to 10 gallons per inch of inside diameter per mile per 24 hours, when sewer is identified as located within the 25-year flood plain

**TABLE 02732-2
TIME ALLOWED FOR PRESSURE LOSS FROM 3.5 PSIG TO 2.5 PSIG**

Pipe Diameter (in)	Minimum Time (min. sec)	Length for Minimum Time (ft)	Time for Longer Length (sec/ft)	Specification Time for Length (L) Shown (min. sec)										
				100 ft.	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	500 ft	550 ft	600 ft
6	5:40	398	0.8548	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:25	7:07	7:50	8:33
8	7:33	298	1.5196	7:33	7:33	7:33	7:33	7:36	8:52	10:08	11:24	12:40	13:56	15:12
10	9:27	239	2.3743	9:27	9:27	9:27	9:54	11:52	13:51	15:50	17:48	19:47	21:46	23:45
12	11:20	199	3.4190	11:20	11:20	11:20	14:15	17:06	19:57	22:48	25:39	28:30	31:20	34:11
15	14:10	159	5.3423	14:10	14:10	17:48	22:16	26:43	31:10	35:37	40:04	44:31	48:58	53:25
18	17:00	133	7.6928	17:00	19:14	25:39	32:03	38:28	44:52	51:17	57:42	64:06	70:31	76:56
21	19:50	114	10.4708	19:50	26:11	34:54	43:38	52:21	61:05	69:48	78:32	87:15	95:59	104:42
24	22:40	99	13.6762	22:48	34:11	45:35	56:59	68:23	79:47	91:10	102:34	113:58	125:22	136:46
27	25:30	88	17.3089	28:51	43:16	57:42	72:07	86:33	100:58	115:24	129:49	144:14	158:40	173:05
30	28:20	80	21.3690	35:37	53:25	71:14	89:02	106:51	124:39	142:28	160:16	178:05	195:53	213:41
33	31:10	72	25.8565	43:06	64:38	86:11	107:44	129:17	150:50	172:23	193:55	215:28	237:01	258:34

**TABLE 02732-3
MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST**

PIPE DIAMETER (inches)	MINIMUM TIME (seconds)	LENGTH FOR MINIMUM TIME (feet)	TIME FOR LONGER LENGTH (seconds)
6	340	398	0.855 (L)
8	454	298	1.520 (L)
10	567	239	2.374 (L)
12	680	199	3.419 (L)
15	850	159	5.342 (L)
18	1020	133	7.693 (L)
21	1190	114	10.471 (L)
24	1360	100	13.676 (L)
27	1530	88	17.309 (L)
30	1700	80	21.369 (L)
33	1870	72	25.856 (L)

TABLE 02732-4
VACUUM TEST TIME TABLE

DEPTH IN FEET	TIME IN SECONDS BY PIPE DIAMETER		
	48"	60"	72"
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
(5.0	6.5	8.0

* Add T times for each additional 2-foot depth.
(The values listed above have been extrapolated from ASTM C 924-85)

TABLE 02732-5
 PIPE VS. MANDREL DIAMETER

Material and Wall Construction	Nominal Size(Inches)	Average I.D. (Inches)	Minimum Mandrel Diameter (Inches)
PVC-Solid (SDR 26)	6	5.764	5.476
	8	7.715	7.329
	10	9.646	9.162
PVC-Solid (SDR 35)	12	11.737	11.150
	15	14.374	13.655
	18	17.629	16.748
	21	20.783	19.744
	24	23.381	22.120
	27	26.351	25.033
PVC-Truss	8	7.750	7.363
	10	9.750	9.263
	12	11.790	11.201
	15	14.770	14.032
PVC-Profile (ASTM F 794)	12	11.740	11.153
	15	14.370	13.652
	18	17.650	16.768
	21	20.750	19.713
	24	23.500	22.325
	27	26.500	25.175
	30	29.500	28.025
	36	35.500	33.725
HDPE-Profile	42	41.500	39.425
	48	47.500	45.125
	18	18.000	17.100
	21	21.000	19.950
	24	24.000	22.800
	27	27.000	25.650
	30	30.000	28.500
	36	36.000	34.200
	42	42.000	39.900
	48	48.000	45.600
Fiberglass-Centrifugally	54	54.000	51.300
	60	60.000	57.000
	12	12.85	11.822
	18	18.66	17.727
	20	20.68	19.646
	24	24.72	23.484
	30	30.68	29.146
	36	36.74	34.903
	42	42.70	40.565
	48	48.76	46.322
	54	54.82	52.079
	60	60.38	57.361

END OF SECTION

SECTION 02733

CLEANING AND TELEVISION INSPECTION

1.0 GENERAL

- A. The purpose of the cleaning and television inspection of the sewer line is to remove all debris, solids, sand, grease, grit, etc. from the sewer and manholes thus improving pipe flow and performing television inspection for sewer evaluation.

2.0 EXECUTION

- A. The designated sanitary sewers and manholes shall be cleaned using mechanical, hydraulically propelled and/or high velocity sewer cleaning equipment. The cleaning process shall remove all grease, sand, silt, solids, rags, debris, etc., from each sewer segment, including manholes. Selection of cleaning equipment and the method for cleaning, shall be based on the condition of the sanitary sewer mains at the time work commences and will be subject to the Engineer's approval. All cleaning equipment and devices shall be operated by experienced personnel. Satisfactory precautions shall be taken to protect the sanitary sewer mains and manholes from damage that might be inflicted by the improper use of the cleaning process or equipment. Any damage done to a sewer by the Contractor due to his negligence shall be repaired by him at no additional cost and to the satisfaction of the Engineer. Cleaning shall also include the initial manhole wall, washing by high pressure water jet.
- B. The Contractor, when instructed by the Engineer, will be required to demonstrate the performance capabilities of the cleaning equipment proposed for use on the project. If the results obtained by the proposed sanitary sewer cleaning equipment are not satisfactory, the Contractor shall use different equipment and/or attachments, as required, to meet specifications. More than one type of equipment/attachments may be required at a location. When hydraulic or high velocity cleaning equipment is used a suitable sand trap, weir, dam or suction shall be constructed in the downstream manhole in such a manner that all the solids and debris are trapped for removal.

3.0 WATER USAGE

- A. The Contractor shall be responsible for obtaining transient water meters from the Owner which shall be installed on the trucks or at fire hydrants. All related charges for the set-up and the water bill shall be considered incidental to the cleaning and television inspection of the existing sanitary sewer mains. Care shall be exercised to prevent contamination of the potable water system. Backflow preventers and/or an 18-inch air gap shall be used by the Contractor when drawing water from a public hydrant. No fire hydrant shall be obstructed or used when there is a fire in the area. The Contractor shall remove the water meters/piping, etc., from all fire hydrants at the end of each working day. At no time shall water be wasted on streets or plugs left opened.

4.0 HYDRAULIC CLEANING

- A. Hydraulically propelled devices which require a head of water to operate, must utilize a collapsible dam. The dam must be easily collapsible to prevent damage to the sewer, property, etc. When using hydraulically propelled devices, precautions shall be taken to insure that the water pressure created does not cause damage or flooding to public or private property, The Contractor shall not increase the hydraulic gradient of the sanitary sewers beyond the elevation that could cause overflow of sewage into area waterways. The flow of wastewater present in the sanitary sewer main shall be utilized to provide necessary fluid for hydraulic cleaning devices whenever possible. The Contractor shall clean and disinfect the areas where spillage/overflow has occurred to the Engineer's satisfaction.

5.0 HIGH VELOCITY CLEANING

- A. Cleaning equipment that use a high velocity water jet for moving debris shall be capable of producing a minimum volume of 50 gpm with a pressure of 1500 psi at the pump. Any variations to this pumping rate must be approved, in advance, by the Engineer. A working pressure gauge shall be used on the discharge or all high pressure water pumps. The Contractor shall use in addition to conventional nozzles, a nozzle which directs the cleaning force to the bottom of the pipe for sewers 18-inch and larger. The Contractor shall operate the equipment so that the pressurized nozzle continues to move at all times. The pressure nozzle shall be turned off or reduced anytime the hose is held or delayed in order to prevent damage to the line.

6.0 MECHANICAL CLEANING

- A. Mechanical cleaning, in addition to normal cleaning when required by the Engineer, shall be by approved equipment and accessories driven by power winching devices. The Contractor shall submit the equipment manufacturer's operational manual and guidelines to the Engineer which shall be followed strictly, unless modified by the Engineer. All equipment and devices shall be operated by experienced operators so that they do not damage the pipe in the process of cleaning. Buckets, scrappers, scooters, porcupines, kits, heavy duty brushes, metal pigs and other debris-removing equipment/accessories shall be used as appropriate and necessary in the field, in conjunction with the approved power machines. The use of cleaning devices such as rods, metals pigs, porcupines, root saws, snakes, scooters, sewer balls, kits and other approved equipment, in conjunction with hand winching device, and/or, gas, electric rod propelled devices shall be considered normal cleaning equipment.

7.0 REMOVAL AND DISPOSAL OF DEBRIS

- A. All sludge, dirt, sand, rocks, grease and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing of debris from upstream manhole section to downstream manhole section will not be allowed. All debris from the manholes shall be loaded into an enclosed container that is permitted by the Owner for liquid waste hauling.

- B. All solids or semi solids resulting from the cleaning operations shall be removed from the site and disposed of at the end of each work day. The Contractor must submit a list of legal disposal sites for dumping. The Contractor shall not be allowed to accumulate debris, and/or liquid waste, sludge, etc., on the site except in totally enclosed containers approved by the Engineer. All waste shall be disposed at a legally permitted disposal site by a transporter which has a valid Owner Liquid Waste Transporter Permit. The Owner's and Regulator's copies of the completed manifest shall be sent to the Engineer within 24 hours after the disposal of the waste materials.
- C. UNDER NO CIRCUMSTANCES SHALL SEWAGE OR SOLIDS REMOVED IN THE CLEANING PROCESS BE DUMPED ONTO STREETS OR INTO DITCHES, CATCH BASINS, STORM DRAINS, SANITARY SEWER MANHOLES, CLEANOUTS OR DUMPS. NO CLEANING SHALL BE DONE PRIOR TO CHECKING BOTH UPSTREAM AND DOWNSTREAM MANHOLES FOR FLOW MONITORS OR OTHER MECHANICAL DEVICES.

8.0 TELEVISION INSPECTION

Prior to pre-construction television (TV) inspection of any sanitary sewer, the Contractor shall clean that sewer as described above. TV inspection of sanitary sewer shall be required as follows:

- A. The Contractor shall televise existing sanitary sewers to evaluate lines and determine if conditions exist which will require line rehabilitation. It shall be performed on the sanitary sewer lines requiring rehabilitation as shown on the plans/specifications or as directed by the Engineer.
- B. Pre-installation TV is an inspection of sewer lines specified for rehabilitation. Use pre-installation TV to confirm cleaning, location of service connections, and constructability of line rehabilitation as shown on the drawings and described in the specifications.
- C. Post-installation TV is an inspection to determine that rehabilitation of a sanitary sewer has been completed according to drawings and specifications. The post TV video recording policy will allow payment for work based on the inspector's daily reports, but still requires the Contractor to submit post rehabilitated television video recording within one calendar month after the date of the pay estimate in which the segment was completed. If no video recording is received within that period, credit for that line segment will automatically be deleted from the following months pay estimate.
- D. Contractor shall use a Television Inspection Report form to document results of TV inspections. Immediately after cleaning, the sanitary sewer line shall be televised to determine the condition of the line and to locate existing service connections. It is the Contractor's responsibility to use the proper closed-circuit television inspection equipment to produce a color video. The Contractor shall submit video recordings and evaluation reports to the Owner for review. The video recordings shall be DVD

video format, recorded at Standard Play (SP) for viewing on television. Each video recording shall be permanently labeled with the following information:

Project No: _____ Contractor's Name: _____

Inspection Type: Survey Pre-Installation Post-Installation

DVD No.: _____ Date Televised: _____ Date Submitted: _____

Street/Easement/Alley (Location):

Pipe Diameter: _____

Pipe Material: _____

Pipe Length: _____

Manhole Station: From: _____ Depth: _____ ft. _____ in.
To: _____ Depth: _____ ft. _____ in.

All video recordings will become the property of the Owner. Video recordings shall be a quality sufficient for the engineer to evaluate the condition of the sanitary sewer, locate the sewer service connections, or verify cleaning.

If quality is not sufficient, Contractor shall be required to re-televiser the sanitary sewer and provide a new tape at no additional cost to the Owner. Camera distortions, inadequate lighting, dirty lens or blurred/hazy picture will be cause for rejection of the video recording. Upon completion of the review, the Engineer will notify the Contractor of which sanitary sewers will be rehabilitated or will need additional work. The Engineer shall have the right to delete from the project any or all of the sanitary sewer which do not require rehabilitation in the opinion of the Engineer, however, payment shall be made for the accepted TV inspection video.

- E. The Contractor shall provide the Owner a color video recording showing the completed work, including the condition of the restored service connection. The video recording shall be taken by a pan and tilt radial viewing pipe inspection camera that pans $\pm 275^\circ$ and rotates 360° . The camera should have an accurate footage counter which shall display on the monitor the exact distance of the camera from the center line of the starting manhole. The camera height shall be adjusted such that the camera lens is always centered ($\frac{1}{2}$ I.D. or higher) in the pipe being televised.

In no case, will the television camera be pulled or propelled through the line at a speed greater than (thirty) 30-feet per minute. A lighting system will be necessary for quality pictures. A reflector in front of the camera will enhance lighting in black pipe.

- F. Each video recording shall be accompanied by a TV Inspection report, which shall be a written log of all pipe defects, sags, service connection locations and conditions,

etc., recorded on a footage basis. These items shall also be recorded on the video recording by narrative. The pipe defects shall include separate codes for the following: radial cracks, longitudinal cracks, misaligned joints, broken joints, laterals, root intrusion, debris and infiltration. The size/length of the defect shall be reported. The beginning of all sags of ¼ pipe, ½ pipe and underwater as well as where the camera pulls out of the sag shall be reported. The clock position of each service connection and the condition shall be reported. The condition of each service connection will include the distance protruding when appropriate and the type. All other information required for analysis such as degrees of deterioration, deformation or collapsed pipe shall be reported. This log shall also identify the manhole section being televised (defined as the distance in linear feet from the center line of the starting manhole to the center line of the ending manhole), flow and camera direction, type of pipe, pipe condition, weather conditions, type of surface cover, cleaning information or any other information required by the Engineer. The Engineer may provide the Contractor a log form that utilizes codes for the above mentioned defects. At the end of the job, the Contractor shall provide a summary listing of all televised line segments provided under this project.

9.0 FLOW CONTROL

TV inspection shall be done one manhole section at a time, and the flow in the section being televised shall be adequately controlled. The depth of wastewater flow shall not exceed that shown below:

Pipe Diameter (Inches)	Depth of Flow (Percent of Pipe Diameter)
6-10	20
12-24	25
Over 24	30

If the wastewater flow depth, during TV inspection of a manhole section, exceeds the maximum allowable previously stated, the Contractor shall reduce the flow depth to an acceptable level by performing the TV inspection during minimum flow hours, by diversion pumping, and/or by pulling a camera with swab or high velocity jet nozzle, as approved by the Engineer. The Contractor shall not be allowed to float the camera as a means to control the flow unless permitted by the Engineer.

10.0 PASSAGE OF TV CAMERA

There may be occasions during the TV inspection of a manhole section when the camera is unable to pass an obstruction even though flow is unobstructed. The Contractor shall televise the manhole section from the other direction in order to obtain a complete video of it. Whenever such condition arises, the Engineer shall be notified to determine if a point repair is necessary. If a point repair is required, the Contractor will repair the pipe at the designated location and then re-televiser the manhole section to verify completion of the point repair unless waived by the Engineer. TV inspection videos, when submitted, shall include

continuous manhole sections. A manhole section shall not be fragmented throughout a video recording nor shall it be distributed over two or more DVD's, unless specifically approved by the Engineer, in which case payment shall be made only for the approved portions of the video recording.

When the camera is being pulled from the "other end" of the above manhole section and a second repair location is encountered away from the first repair/obstruction location, the Contractor shall notify the Engineer to review the TV video recording at the site in a timely manner. The Engineer will direct the Contractor to make one or both point repairs. No downtime shall be allowed.

If the two point repairs are allowed and completed, the Contractor shall again proceed to re-televiser the manhole section. Generally, up to 20-feet of the sewer pipe from the finished end of the first point repair to the starting end of the second point may be lamped, and/or physically inspected at the site, to verify the condition of the sewer without further TV inspection. However, if TV inspection video is required by the Engineer, it shall be submitted at no additional cost to the Owner.

There is no guarantee that all of the sanitary sewer specified or rehabilitated are clear for the passage of the camera set up. The Contractor shall use his discretion to select the right and safe equipment, tools and methods for securing the passage of the camera, with the approval of the Engineer. The Engineer will always be the one who decides whether a pipe defect is to be repaired or not.

11.0 BYPASS PUMPING

Provide bypass pumping during cleaning and television inspection in accordance with applicable specification item.

**TABLE 02733A
 TELEVISION INSPECTION CODES**

HEADER INFORMATION		
LOCATION		
A	STREET ROW, HEAVY TRAFFIC	
B	STREET ROW, LIGHT TRAFFIC	
C	EASEMENT, POOR ACCESS	
D	EASEMENT, GOOD ACCESS	
E	PARKING LOT, POOR ACCESS	
F	PARKING LOT, GOOD ACCESS	
G	ALLEY, POOR ACCESS	
H	ALLEY, GOOD ACCESS	
I	OPEN AREA, POOR ACCESS	
J	OPEN AREA, GOOD ACCESS	
SURFACE COVER		
A	ASPHALT STREET	
B	CONCRETE STREET	
C	SHELL STREET	
D	SIDEWALK	
E	TREES/SHRUBS	
F	CLOSE TO FENCE	
G	OPEN AREA	
H	MOVABLE BUILDING	
I	UNMOVABLE BUILDING	
J	OVERHEAD UTILITIES	
K	WATERWAY OR RAILWAY	
L	HIGHWAY OR RUNWAY	
M	PIPE ABOVE GROUND	
PIPE TYPE		
ABS	ACRYLONITRILE BUTADIENE STYRENE	
BRK	BRICK	
CIP	CAST IRON PIPE	
CMP	CORRUGATED METAL PIPE	
CON	POURED IN PLACE CONCRETE	
CPP	CURED IN PLACE PIPE	
DIP	DUCTILE IRON PIPE	
FRP	FIBERGLASS REINFORCED PIPE	
PLP	PLASTIC LINED CONCRETE PIPE	
PEP	POLYETHYLENE PIPE	
PVC	POLYVINYLCHLORIDE PIPE	
RCP	REINFORCED CONCRETE PIPE	
RPM	REINFORCED PLASTIC MORTAR PIPE	
URC	UNREINFORCED CONCRETE PIPE	
VCP	VITRIFIED CLAY PIPE	
WEATHER		
DRY - WET		
CODE DESCRIPTIONS		
CRACKS		
RC-RADICAL	LC-LONGITUDINAL	
CODES	DESCRIPTION	USE IN
A (1)	<1/2" W, < 1' L	CRK
B (2)	<1/2" W, 1' - 2' L	CRK
C (3)	<1/2" W, > 2' L	CRK
D (4)	>1/2" W, < 1' L	CRK
E (5)	>1/2" W, 1' - 2' L	CRK
F (6)	>1/2" W, > 2' L	CRK
G (7)	HOLE IN PIPE - SMALL	
H (8)	PIPE MISSING - < 60°	
I (9)	PIPE MISSING - > 60°	

JOINTS		
MJ - MISALIGNED JOINT		BJ - BROKEN JOINT
CODES	DESCRIPTION	USE IN
A (3)	DRP JT > 90% CLEAR	MJ
B (6)	DRP JT 80 - 90% CLEAR	MJ
C (9)	DRP JT < 80% CLEAR	MJ
D (3)	SHF JT > 90% CLEAR	MJ
E (6)	SHF JT 80 - 90% CLEAR	MJ
F (9)	SHF JT < 80% CLEAR	MJ
G (1)	WD JT 2" - 3"	MJ
H (2)	WD JT 3" - 4"	MJ
I (3)	WD JT > 4"	MJ
J (2)	BRK JT - LIGHT	BJ
K (4)	BRK JT - MEDIUM	BJ
L (6)	BRK JT - HEAVY	BJ
N (0)	VISIBLE GASKET	MJ
O (0)	LEAKING AT JOINT	MJ
LATERALS (L)		
CODES	DESCRIPTION	
A (1)	PRT SER 0" - 1"	
B (2)	PRT SER 1" - 2"	
C (3)	PRT SER 2" - 3"	
D (4)	PRT SER 3" +	
E (5)	DEFECTIVE - SERVICE CONN.	
F (6)	DEAD/UNUSED SERVICE	
G (7)	FACTORY SERVICE	
H (0)	PLUMBER SERVICE	
ROOTS (R)		
CODES	DESCRIPTION	
A (1)	ROOTS - LIGHT	
B (2)	ROOTS - MEDIUM	
C (3)	ROOTS - HEAVY	
DEBRIS (D)		
CODES	DESCRIPTION	
A	DEBRIS - LIGHT	
B	DEBRIS - MEDIUM	
C	DRBRIS - HEAVY	
D	GREASE - LIGHT	
E	GREASE - MEDIUM	
F	GREASE - HEAVY	
INFLOW/INFILTRATION (I)		
CODES	DESCRIPTION	
A (3)	I/I - LIGHT (0-1 GPM)	
B (6)	I/I - MEDIUM (1-5 GPM)	
C (9)	I/I - HEAVY (>5 GPM)	
D (2)	I/I - SOME EVIDENCE	
E (4)	I/I - CONSIDERABLE EVIDENCE	
F (6)	I/I - GREAT EVIDENCE	
G (0)	I/I - NO EVIDENCE	
ALIGNMENT (A)		
CODES	DESCRIPTION	
A	BEGIN 1/4 PIPE WATER	
B	BEGIN 1/2 PIPE WATER	
C	CAMERA UNDERWATER	
D	END CAMERA UNDERWATER	
E	END 1/2 PIPE WATER	
F	END 1/4 PIPE WATER	
STRUCTURAL		
DS - DETERIORATED; OS - OVALITY; CS - COLLAPSED		
CODES	DESCRIPTION	USE IN
A (3)	LINE DET - LIGHT	DS
B (6)	LINE DET - MEDIUM	DS
C (9)	LINE DET - HEAVY	DS
D (3)	OVAL < 5%	OS
E (6)	OVAL > 5% & < 10%	OS
F (9)	OVAL > 10%	OS
G (9)	COLLAPSED	CS
H (0)	PIPE DET - HEAVY	DS
L (0)	PIPE DET - LIGHT	DS
M (0)	PIPE DET - MEDIUM	DS
N (0)	PIPE DET - NONE	DS
O	LINE DET - NONE	DS
Z (0)	AT MANHOLE NUMBER	CS

END OF SECTION

SECTION 02762

SANITARY SEWER SERVICE STUBS OR RECONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of service stubs on new sanitary sewers serving areas where sanitary sewer service did not previously exist.
- B. Reconnection of existing service connections along parallel, replacement, or rehabilitated sanitary sewers.

1.02 UNIT PRICES

- A. Refer to Section 01025 – Measurement and Payment for unit price procedures.

1.03 PERFORMANCE REQUIREMENTS

- A. Accurately locate in the field all proposed service stubs along the new sanitary sewer main.
- B. Properly disconnect all existing connections from the existing sewer and reconnect to the rehabilitated liner, as described in this Section.
- C. Accurately locate in the field existing service connections and proposed service stubs along the alignment of the new parallel or replacement sewer main.
- D. Reconnect all service connections, including those that go to unoccupied or abandoned buildings or to vacant lots, unless directed otherwise by the Engineer.
- E. Begin reconnection of service lines immediately after cured-in-place liner has cured.
- F. Reconnection by the excavation method shall include the stack and 4-feet of service line, as necessary to the property line for which the connection is intended. The service lines shall be replaced to the right-of-way or easement line (short side and long side) and a cleanout installed at that location.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit product data for each pipe product, fitting, coupling and adapter.
- C. Show reconnected services on record drawings. Give the exact distance from each service connection to the nearest downstream manhole.

PART 2 PRODUCTS

2.01 PVC SERVICE CONNECTION

- A. As stubouts, use Schedule 40 PVC sewer pipe, 4-inch through 10-inch, conforming to ASTM D1784 or D1785 with cell classification of 12454-B.
- B. PVC pipe shall be gasket jointed with gasket conforming to ASTM D3319 or solvent weld manufactured for use with this pipe.
- C. Provide service connection pipe in sizes shown on the Drawings. For reconnection of existing services, select service connection pipe diameter to match existing service diameter.
- D. Provide a 6-inch service connection when more than one service discharges into a single pipe.
- E. Connect service pipes to new parallel or replacement sewer mains with prefabricated, full-bodied tee or wye fittings conforming to specifications for the sewer main pipe material as specified in other Sections for all sewers up to 18 inches in diameter.
- F. Where new sewers are installed using pipe bursting, pipe augering or tunneling, or where the new sewer is greater than 18 inches in diameter, use Fowler "Inserta-Tee" to connect the service to the new sewer main.

2.02 SEWER MAIN CONNECTION

- A. Inserta Tee fittings (includes PVC Hub, Rubber Sleeve, and Stainless Steel Band) as manufactured by Inserta Tee Fittings, Co. shall be installed per manufacturers recommendation for service stacks and service reconnections (by excavation).
- B. As approved by the Engineer, pipe saddles may be utilized on sanitary sewer mains. Comply with Paragraph 2.01E for new parallel and replacement sanitary sewer mains.
- C. If applicable, supply one-piece prefabricated saddle, either polyethylene or PVC, with neoprene gasket to accomplish a complete seal. Use a saddle fabricated to fit the outside diameter of the pipe to which it will be attached. The protruding lip of the saddle must be at least 5/8-inch long with grooves or ridges to retain the stainless steel band clamps.
- D. Use 1/2-inch stainless steel band clamps for securing saddles to liner pipe. The screws, bolts, and associated appurtenances shall be stainless steel.

2.03 COUPLINGS AND ADAPTERS

- A. For connection between new PVC pipe stubout and existing service; 4-, 6-, or 8-inch diameter, use flexible adapter coupling consisting of a neoprene gasket and stainless steel shear ring, with 1/2-inch stainless steel band clamps:
 - 1. Fernco Pipe Connectors, Inc., Series 1055 with shear ring SR-8;

2. Band Seal by Mission Rubber Co., Inc.;
 3. Approved equal.
- B. For connection between new PVC pipe stub out and new service, use rubber-gasketed adapter coupling:
1. GPK Products, Inc., IPS & Sewer Adapter.
 2. Approved Equal.

2.04 STACKS

- A. Provide stacks for service connections wherever the crown of the sewer is 8 feet or more below finished grade.
- B. Construct stacks of the same material as the sanitary sewer and as shown on the Drawings.
- C. Provide stacks of the same nominal diameter at the sanitary service line.

2.05 CLEAN-OUTS

- A. Install clean-outs at property line on each service connection as shown in detail on the Drawings.

2.06 PLUGS AND CAPS

- A. Seal the upstream end of unconnected sewer service stubs with rubber gasketed plugs or caps of the same pipe type and size. Provide plugs or caps by GPK Products, Inc., or equal.

PART 3 EXECUTION

3.01 PERFORMANCE REQUIREMENTS

- A. Provide a minimum of 72 hours notice to customers whose sanitary sewer service will potentially be interrupted.
- B. Accurately field locate service connections, whether in service or not, as pipe laying progresses from downstream to upstream.
- C. Properly disconnect existing connections from the sewer and reconnect to the new sewer, as described in this Section.
- D. Reconnect service connections, including those that go to unoccupied or abandoned buildings, unless directed otherwise by the Engineer. Plug the service connection at the R.O.W. for vacant lots.

- E. Complete reconnection of service lines within 24 hours after disconnection.
- F. Reconnection shall include the stack and fittings and required pipe length to reconnect service line.
- G. Connect services 8 inches in diameter and larger to the sewer by construction of a manhole. Payment for the manhole will be made at the contract unit price for the appropriate manhole diameter and depth.

3.02 PROTECTION

- A. Provide barricades and warning lights and signs for excavations created for service connections. Conform to requirements of Section 01570 - Traffic Control and Regulation.
- B. Do not allow sand, debris or runoff to enter sewer system.

3.03 PREPARATION

- A. Where sewers are existing, field locate existing service connections, whether in service or not. Use existing service locations to reconnect service lines to new liner or new sanitary sewer main.
- B. For new parallel and replacement sanitary sewer mains, complete testing and acceptance of downstream sewers as applicable. Provide for compliance with requirements of Paragraph 3.01E.

3.04 EXCAVATION AND BACKFILL

- A. Excavate in accordance with Section 02227 - Excavation and Backfill for Utilities.
- B. Provide barricades and warning lights and signs, for excavations created for service connections. Conform to requirements of the Texas Manual on Uniform Traffic Control Devices.
- C. Perform work in accordance with OSHA standards. Employ a Trench Safety System as specified in Section 01526 - Trench Safety System for excavations requiring trench safety.
- D. Install and operate necessary ground water and surface water control measures in accordance with requirements of Section 01563 - Control of Ground Water and Surface Water.
- E. Do not allow sand, debris or runoff to enter sewer system.

- 3.05 SERVICE RECONNECTION BY EXCAVATION METHOD TO SANITARY SEWER PIPE REHABILITATED BY PIPE BURSTING, CURED IN PLACE LINER, AND SLIPLINING
- A. Installation of service reconnections shall be performed per manufacturer recommendation for each product used.
 - B. Remove a portion of existing sanitary sewer main to expose the liner pipe. Provide sufficient working space for installing a prefabricated pipe saddle.
 - C. Carefully cut the liner pipe making a hole to accept the stubout protruding from the underside of the saddle. In the event the Contractor chooses to cut the liner pipe using a remote device prior to excavation, no additional payment shall be made for such efforts.
 - D. If applicable, strap on the pipe saddle using a stainless steel band on each side of the saddle. Tighten the bands to produce a watertight seal of the saddle gasket to the liner pipe. Stainless steel bands shall be strapped 360° around line and pipe with the existing pipe removed.
 - E. For pipe saddle use a saddle with a stubout that protrudes into the liner a depth equal to the liner pipe wall thickness.
 - F. Remove and replace service line to the street right of way line.
 - G. Make up the connection between liner and existing service line using PVC sewer pipe and approved couplings and stainless steel bands to construct new stub outs and/or stacks.
 - H. Encase the entire service connection in cement stabilized sand. Place a minimum of 6-inches below and 12-inches above and on the sides of the pipe connections.
 - I. Test the service connections before backfilling.
- 3.06 SERVICE RECONNECTION ON POINT REPAIR, REMOVE AND REPLACE PIPE OR NEW PIPE
- A. Install the new service connection on the new sanitary sewer main for each service connection.
 - B. Remove and replace cracked, offset or leaking service line for up to 5 feet, measured horizontally, from the centerline of the new sanitary sewer main.
 - C. Make up the connection between the new main and the existing service line using PVC sewer pipe and approved couplings, as shown on the Drawings.
 - D. Test service connections before backfilling.
 - E. Embed the service connection and service line as specified for the new sanitary sewer main at this location, and as shown on the Drawings. Place and compact trench zone backfill in compliance with Section 02227 - Excavation and Backfill for Utilities.

3.07 RECONNECTION ON CURED-IN-PLACE SEGMENTS (REMOTE METHOD) PRIOR TO RECONNECTION BY EXCAVATION

- A. Service reconnections shall be made using remote operated cutting tools prior to reconnection by excavation on cured-in-place liners.
- B. The method and equipment used shall restore the service connection capacity to not less than 90 percent of original capacity.
- C. The Contractor shall immediately open any missed connections and repair any holes drilled in error, by a method approved by the Engineer.
- D. Complete reconnection by excavation as per Item 3.05.

3.08 PROTRUDING TAPS

- A. Pipebursting and Sliplining
 - 1. Protruding taps or service connections which obstruct the passage of the television inspection camera during cleaning and during television inspection operations or the insertion of the liner while pulling or pushing shall be removed to allow the liner to pass through. Reconnection of this service to new carrier pipe shall be paid for as a service reconnection.
 - 2. No payment shall be made at this location for any obstruction removal.
 - 3. Abandoned taps/ services which are protruding and which must be removed to allow the liner to be inserted into the sewer and the service abandoned, shall not be paid for as an obstruction removal. Payment shall be made for abandonment of service connection.
- B. Cured-in-Place Method of Rehabilitation
 - 1. See Obstruction Removal (by Remote) Section 02769 and Point Repairs to Sanitary Sewers - Section 02763.

3.09 INSTALLATION OF NEW SERVICE STUBS

- A. Install the new service connections on the new sanitary sewer main for each service connection. Provide the length of stub indicated on the Drawings. Install plug or cap on the upstream end of the service stub as needed.
- B. Test service connections before backfilling.
- C. Embed the service connection and service line as specified for the new sanitary sewer main at this location, and as shown on the Drawings. Place and compact trench zone backfill in compliance with Section 02227 - Excavation and Backfill for Utilities.

3.10 TESTING

- A. Test service reconnections and service stubs. Follow applicable procedures given in Section 02732 - Acceptance Testing for Sanitary Sewers.

3.11 CLEANUP

- A. Backfill the excavation as specified in Section 02227 - Excavation and Backfill for Utilities.
- B. Replace pavement or sidewalks removed or damaged by excavation in accordance with Section 02571 - Pavement Repair and Resurfacing. In unpaved areas, bring surface to grade and slope surrounding the excavation. Replace a minimum of 4 inches of topsoil and seed according to requirements of Section 02932 - Hydromulch Seeding.
- C. Conform to Section 01564 - Waste Material Disposal.

END OF SECTION

SECTION 02763

POINT REPAIRS TO SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repairs to existing sewer lines by replacing short lengths of failed pipe.

1.02 UNIT PRICES

- A. See Section 01025 - Measurement and Payment for Unit Prices.

1.03 PERFORMANCE REQUIREMENTS

- A. Locate and replace small lengths of one or more pipe sections where isolated line failure has occurred due to settlement, corrosion, cracked pipe, crushing or separation of joints.
- B. Engineer may identify potential locations for point repair, but Contractor is responsible for verifying locations by televising the line and providing the video recording to the Engineer.
- C. Engineer will authorize each point repair after review of the video recording of the televised line. Do not make point repairs without prior approval of Engineer.
- D. Replace carrier pipe for all point repairs unless otherwise directed by Engineer.
- E. Minimum length of pipe to be replaced shall be determined by the depth of sewer line as given in the following table. Measured depth from natural ground to flow line.

Depth of Sewer Line	Minimum Length of Replacement Pipe
0 to 10-feet	6-feet
10 to 15-feet	9-feet
Greater than 15-feet	12-feet

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300.

PART 2 PRODUCTS

2.01 PIPE

- A. PVC sewer pipe and joints: 4-inch through 24-inch pipe conforming to the requirements of Section 02620.

2.02 JOINTING MATERIALS

- A. Use Fernco adapters secured with ½-inch stainless steel bands, or approved equal and, filter fabric; encase the joint with a reinforced concrete collar.

PART 3 EXECUTION

3.01 PROTECTION

- A. Provide barricades and warning lights and signs, for excavations created by point repairs. Conform to requirements of the Texas Manual on Uniform Traffic Control Devices.
- B. Do not allow sand, debris or runoff to enter sewer system.

3.02 EXCAVATION

- A. Excavate trenches in accordance with Section 02227.
- B. Perform work in accordance with OSHA standards. Employ a Trench Safety System as specified in Section 01526 for excavations over 5-feet deep.
- C. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01563.

3.03 BYPASS PUMPING

- A. As per Section 02790.
- B. Install and operate bypass pumping equipment to maintain sewage flow and to prevent backup or overflow. Obtain approval for bypass pumping equipment and procedures from Engineer.
- C. Design all piping, joints and accessories to withstand twice the maximum system pressure or 50 psi, whichever is greater.
- D. In the event of accidental spill or overflow, immediately stop the overflow and take action to clean up and disinfect spillage. Promptly notify Engineer so that required reporting can be made to the Texas Commission on Environmental Quality and the Environmental Protection Agency.

3.04 TYPICAL SEQUENCE OF POINT REPAIR

- A. Clean and televise entire line segment from manhole to manhole to verify the location of point repair and the method of rehabilitation. Submit television inspection video recording and log data to the City and the Engineer for review prior to commencing point repair.
- B. After the City or the Engineer reviews the video recording and from their recommendation, excavate to the minimum length of existing pipe to be replaced.
- C. Prior to replacing pipe, determine condition of the existing line on both sides of point repair by lamping the line a minimum of 10-feet in each direction. Determine whether additional lengths of line beyond "minimum length" criteria, need replacement. Report need for additional replacement to Engineer and obtain approval before proceeding.
- D. Remove and replace failed pipe and connect to existing pipe using Fernco couplings. If joints cannot be made watertight using Fernco adapters, place waterstop gaskets on each joint and encase in a reinforced concrete collar as indicated on the Drawings. Reconnect affected service connections or stacks.
- E. Establish proper grade for the pipe being replaced using methods acceptable to Engineer.
- F. After completion of point repair, but prior to backfill, perform a smoke test in the presence of Engineer. Testing as specified in this section. Repair and retest sections that fail.
- G. Encase exposed pipe in cement stabilized sand conforming to Section 02252 as indicated on Drawings.
- H. Backfill the excavation as specified in Section 02227.
- I. Replace pavement or sidewalks removed or damaged by excavation in accordance with Section 02571. In unpaved areas, bring surface to grade and slope surrounding the excavation. Replace a minimum of 4-inches of topsoil and sod area in accordance with Section 02920.
- J. Perform cleaning and post-television inspection as specified in Section 02733. Point repairs that have offset joints, non-uniform grade or alignment, or other unsatisfactory conditions, shall be rejected. Replace pipe and bedding as required when cleaning and television inspection work is rejected. No separate payment shall be made for rectifying defect.

3.05 SMOKE TESTING

- A. Equipment Procedures
 1. Pneumatic Plugs

2. Smoke generator as supplied by Superior Signal Company or an approved equal.
 3. Blowers producing 2,500 cfm minimum.
- B. Application: Perform smoke test to:
1. Locate points of line failure for point repair.
 2. Determine if point repairs are properly made.
 3. Determine if service connections have been reconnected to the rehabilitated or newly installed sewer.
 4. Check integrity of connections to newly replaced service taps to liners and to existing private service connections.
- C. Limitations: Do not backfill service taps until completion of this test. Test only those taps in a single manhole section at any one time. Keep the number of open excavations to a minimum.
- D. Preparation: Prior to smoke testing, give written notices to area residents no fewer than 2 days, nor more than 7 days, prior to proposed testing. Also give notice to City's Police and Fire Departments 24 hours prior to actual smoke testing.
- E. Isolate Section: Isolate the manhole section to be tested from adjacent manhole sections to keep smoke localized. Temporarily seal the annular space at manhole for sliplined sections.
- F. Smoke Introduction:
1. Operate equipment according to manufacturer's recommendation and as approved by Engineer.
 2. Conduct test by forcing smoke from smoke generators through sanitary sewer main and service connections. Operate smoke generators for a minimum of 5 minutes.
 3. Introduce smoke into upstream and downstream manhole as appropriate. Monitor the tap/connection for smoke leaks. Note sources of leaks.
- G. Repair and Retest: Repair and replace any taps or connections noted as leaking and then retest. Taps and connections may be left exposed in only one manhole section at a time. If repair or replacement, testing or retesting, and backfilling of the excavation is not completed within one work day, properly barricade and cover each excavation as per Section 01570.
- H. Service Connections: On houses where smoke does not issue from plumbing vent stacks to confirm reconnection of sewer service to the newly installed pipe, perform a dye test to confirm reconnection. Introduce dye into the service line through a plumbing fixture inside the structure or a sewer clean out immediately outside the structure and flush with water. Observe flow at service reconnection or downstream manhole. Detection of dye confirms a reconnection.

END OF SECTION

SECTION 02764

MANHOLE REHABILITATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repair, rehabilitation, or replacement of deteriorated, leaking, or structurally unsound manholes.
- B. All physically deteriorated, leaking or structurally unsound sanitary sewer manholes, and cleanouts shall be rehabilitated per the provisions of this item. Such manholes shall be rehabilitated by one (1) of the following methods:
 - 1. New manholes constructed of cast-in-place concrete or precast concrete as shown on the plans and stated in the specifications.
 - 2. Rehabilitation by use of a liner. (A liner is defined as an applied or inserted product that improves the structural integrity of the manhole).
 - 3. Rehabilitation by use of a corrosion resistant material. A cementitious liner can be may be applied to the manhole prior to the installation of the corrosion resistant material if stated in the plans.
 - 4. Other rehabilitation work.

1.02 UNIT PRICES

- A. Refer to Section 01025 - Measurement and Payment for unit price procedures.

1.03 PERFORMANCE REQUIREMENTS

- A. Perform work needed to make manholes structurally sound, improve flow, prevent entrance of inflow or groundwater, prevent entrance of soil or debris, and provide protection against hydrogen sulfide gas attack.
- B. Manufacturer's Product Support.
 - 1. Through the Contractor, manufacturers of wall sealing or lining systems shall submit to Engineer for review and approval a detailed description of the proposed rehabilitation process. Describe surface preparation, independent laboratory test results, mix design procedures and method of controlling uniform thickness.
 - 2. A representative employed by the manufacturer and having technical training in admixture and concrete mix design shall be named and available for consultation by telephone during business hours and on site upon 48 hours notices.

3. Manufacturer's representative on concrete lining systems shall provide technical assistance to concrete batch plant operators to ensure proper usage of dispensing equipment and accurate proportions of admixtures.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Product Data: Submit product data, including surface preparation instructions and application instructions, from manufacturer of wall repair materials, hydraulic cements, quickset mortars, specialized sealants, and grouts.
- C. Installer Qualifications. Installers of liners and wall repair systems shall submit qualifications to Engineer at least 14 days prior to start of any material application. Submittal shall consist of:
 1. Manufacturer's approved equipment list, by name and model number for application of product and contractor's equipment list showing approved equipment available for use in product application.
 2. List of contractor's personnel who have satisfactorily completed manufacturer's training in product application within previous two years. Include date of certification for each person.
- D. Progress Photographs:
 1. After cleaning and sealing each manhole, submit 3" x 5" color photographs of manhole's interior walls for review by Engineer. Engineer may inspect the manhole before giving approval to begin lining.
 2. After liner installation of each manhole, submit a minimum of three additional 3" x 5" color photographs to show final condition of rehabilitated manhole.
 3. Provide photographs of sufficient quality and clarity so that interior condition can be readily determined by Engineer.
 4. Annotate each photograph. Give date, manhole number, material used, and appropriate remarks on the back using permanent ink.

1.05 PROJECT CONDITIONS

- A. Manholes Containing Mechanical or Electrical Equipment:
 1. Drawings may not show locations of flow monitoring equipment. If a manhole contains any mechanical hardware or electrical flow monitoring equipment immediately notify Engineer.
 2. Reschedule work in such manholes until equipment has been removed by Owner and further instructions are given.
 3. Do not subject manholes with mechanical hardware or electrical equipment to diversion/bypass pumping.
 4. Damage to installed equipment, due to negligence of Contractor, will be repaired by Owner and cost of repairs charged to Contractor.

B. Field Location of Manholes, Cleanouts and Inlets:

1. Contractor is responsible for locating and uncovering all manholes and cleanouts in lines being rehabilitated. If difficulty is encountered in locating a manhole or cleanout covered by ground or pavement, notify Engineer and await instructions.
2. Manholes may be located within project limits which are not part of the system being rehabilitated. Properly identify manholes before starting cleaning and sealing operations.

1.06 SALVAGE

- A. Manhole covers and frames, inlet grates and frames, and adjusting rings from abandoned manholes and inlets remain the property of the Owner. Deliver salvaged items to locations designated by Engineer.

PART 2 PRODUCTS

2.01 WALL CLEANING MATERIAL

- A. High Pressure Water: 3500-psi minimum force.
- B. Cleaners: Detergent or muriatic acid capable of removing dirt, grease, oil and other matter which would prevent a good bond of sealing material to wall. Refer to sealing material manufacturer's recommendations.

2.02 WALL REPAIR MATERIALS

- A. Hydraulic Cements: Use a blend of cement powders or hydraulic cement to stop active leaks in the manhole structure.
- B. Quickset Mortar: Use a quickset mortar to repair wide cracks, holes or disintegrated mortar.

2.03 MANHOLE CEMENTITIOUS LINER

- A. This method consists of spray applying a cementitious mix to the manhole walls and benches on the existing manholes resulting in a monolithic liner having a minimum thickness of 1-inch. The mix(es) shall be batches in accordance with manufacturer's recommendations. Adding water to facilitate application at the nozzle will not be allowed.
- B. Provide preapproved cementitious structural rehabilitation liner material for use as a liner for manhole and to repair and reform manhole benches and inverts. Use a pre-

approved cementitious structural manhole rehabilitation material which developed a minimum compressive strength of 3000 psi at 14 days as, tested per the provisions of ASTM C1140. Follow manufacturer's recommended batching and mixing instructions.

- C. Select manhole wall liner material from the following list of preapproved products:
 - 1. Permacast CR-9000 (AP/M Permaform)
 - 2. QM-1S (Quadex)
 - 3. Strong Seal-MS-2C
 - 4. Reliner MSP
 - 5. Permacast-MS-10,000 (AP/M Permaform)
 - 6. Emaco S88C

2.04 CORROSION RESISTANT MANHOLE MATERIALS

- A. The materials to be utilized in the lining of manholes shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the lining products utilized and shall have satisfactory installation record
- B. The materials shall be applied by an approved certified applicator and must meet the manufacturer's recommendations. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- C. Acceptable 100% Solids Epoxy products are:
 - 1. Raven 405 (RLS Solutions)
 - 2. Mainstay DS-5 (Madewell Products Corporation)
 - 3. Standard Epoxy 4553 (Standard Cement Materials, Inc.)
 - 4. or approved equal.
- D. Acceptable Polyurethane product is Spectrashield Liner System:
 - 1. The lining system to be utilized for manhole structures shall be a multi-component stress skin panel liner system as described below:
 - a.

<u>Installation</u>	<u>Liner</u>
Moisture barrier	Modified Polymer
Surfacer	Polyurethane/Polymeric blend foam
Final corrosion barrier	Modified polymer
 - b. Modified polymer shall be sprayable, solvent free, two-component polymeric, moisture/chemical barrier specifically developed for the corrosive wastewater environment.

- E. The Contractor shall have manufacturer's representative present on site during the installation of corrosion resistant barrier.

2.05 BENCH FORMING/REPAIR MATERIALS

- A. Use corrosion resistant concrete containing microsilica admixtures to repair and reform manhole benches and inverts, as specified in Section 03305.

2.06 MANHOLE COVER, FRAME AND INSERTS

- A. See Details on Plan Drawings.
- B. Provide manhole inserts including new dish, gasket and relief valves. Select appropriate watertight inserts to fit walls and frames of manholes.
 - 1. Supply inserts as manufactured by Southwestern Packing and Seals, or an approved equal.
 - 2. Inserts shall be stamped with the words, "Property of (Owner's Name)".
 - 3. Provide a frame-to-manhole seal as manufactured by Cretex, or approved equal.

PART 3 EXECUTION

3.01 PROTECTION

- A. Provide barricades and warning lights and signs for excavations created by manhole or cleanout removal.
- B. Do not allow sand, debris or runoff to enter sewer system.

3.02 EXCAVATION

- A. Excavate in accordance with Section 02227.
- B. Perform work in accordance with OSHA standards. Employ a Trench Safety System as specified in Section 01526 for excavations over 5 feet deep.
- C. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01563.

3.03 BYPASS PUMPING

- A. Install and operate diversion pumping equipment to maintain sewage flow and to prevent backup or overflow in accordance with requirements of the appropriate Section. Obtain approval for diversion pumping equipment and procedures from Engineer.
- B. Design all piping, joints and accessories to withstand twice the maximum system pressure or 50 psi, whichever is greater.

- C. In the event of accidental spill or overflow, immediately stop the overflow and take action to clean up and disinfect spillage. Promptly notify Engineer so that required reporting can be made to the TCEQ and Environmental Protection Agency.

3.04 ABANDONMENT OF CLEANOUTS AND MANHOLES

- A. Abandon cleanouts or manholes designated on Drawing or as directed by the Engineer.
- B. If a manhole is to be abandoned on a rehabilitated line, install a carrier pipe through the structure and fill manhole with cement stabilized sand, compacted to a level 2 feet above top of carrier pipe.
- C. Fill remainder of manhole with selected backfill material to 2 feet below ground level.
- D. Dismantle manhole including frame, to 2 feet below ground level. Fill void to existing ground level with select backfill material compacted to 95% Proctor Density.
- E. If manhole to be abandoned is in a paved street, backfill manhole as described above with cement stabilized sand in lieu of select backfill material.

3.05 MANHOLE WALL CLEANING

- A. The floor and interior walls of the manhole shall be thoroughly cleaned and made free of all foreign materials including dirt, grit, roots, oils, grease, sludge, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants which may affect the performance and adhesion of the coating to the substrate.
 - 1. High pressure water blasting with a minimum of 3500 psi shall be used to clean free all foreign material within the manhole.
 - 2. When grease and oil are present within the manhole, an approved detergent or muriatic acid shall be used integrally with the high pressure cleaning water.
 - 3. All materials resulting from the cleaning of the manhole shall be removed prior to application of the cement based coating.
 - 4. All loose or defective brick, grout, ledges, steps and protruding ledges shall be removed to provide an even surface prior to application of coating.
- B. Prevent any foreign material from entering the adjoining pipes. Remove droppings of foreign and wall sealant materials before they harden on the bottom of the manhole.
- C. No separate pay shall be made for this item. Include cost for sealing in the unit price for manhole liner.
- D. Manufacturer's representative shall be available at all times on site to answer questions and approve manhole preparation work prior to lining.

3.06 MANHOLE WALL SEALING

- A. Seal active leaks in the manhole structure by using a blend of cement powder or hydraulic cement.
- B. Remove loose or defective wall material. Wipe or brush surface clean prior to the application of hydraulic cements.
- C. Drill weep holes at bottom of manhole walls to relieve hydrostatic pressure to stop leaks. Plug pressure relief holes after leaks are stopped using hydraulic cement materials. Lead wool may also be used to plug large leaks.
- D. Repair wide cracks, holes, or disintegrated mortar with quickset mortars. Follow manufacturer's application procedures.
- E. Reshape manhole inverts before wall sealing work. Apply concrete to cleaned manhole benches as specified in Section 03305.
- F. After all active leaks have been stopped, clean and prepare walls for application of selected liner material.
- G. Properly apply the sealing compound to provide the minimum required uniform coating to the wall surface.
- H. Prevent any foreign material from entering the adjoining pipes. Remove droppings of foreign and wall sealant materials before they harden on the bottom of the manhole.
- I. Strictly follow product manufacturer's published technical specifications and recommendations for surface preparation, application and proportioning.

3.07 CEMENTITIOUS LINER

- A. Apply cementitious liner to a thickness of 1-inch using a steel trowel to provide a smooth, even surface. Finish and cure concrete as specified in Section 03305.
- B. Cementitious liner material may be applied using spray application methods. Use steel trowel to provide a smooth, even surface before final set.

3.08 CORROSION RESISTANT LINER (100% EPOXY)

- A. The corrosion resistant barrier shall be spray applied as per the manufacturer's recommendation and shall have an average minimum finished thickness of 80 mils if applied in conjunction with cementitious liner.
- B. Where corrosion resistant barrier is applied directly to manhole wall, upon cleaning and surface preparation, the average minimum finished thickness of 125 mils.
- C. The Contractor shall have manufacturer's representative present on site at all times during the installation of corrosion resistant barrier.

- D. The Contractor shall make provisions in his unit price bid for each structure to maintain dry conditions for the corrosion resistant liner application and subsequent curing as per manufacturer's recommendations.

3.09 CORROSION RESISTANT LINER (POLYURETHANE)

- A. Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment.
- B. Spray equipment shall be specifically designed to accurately ratio and apply the liner system.
- C. Application of multi-component liner system shall be in strict accordance with manufacturer's recommendation. Final installation shall be a minimum of 500 mils. A permanent identification and date of work performed shall be affixed to the structure in a readily visible location.
- D. Provide final written report to owner/engineer detailing the location, date of report, and description of repair.

3.10 FIBERGLASS LINER

- A. A manhole may be rehabilitated using a fiberglass liner if existing manhole has a minimum 45-inch inside diameter and a depth of at least 4-feet.
- B. Clean manhole and remove corbel section until a 45-inch diameter opening is formed. Engineer may direct Contractor as to amount of corbel or wall to be removed. Do not allow debris to fall into sewer lines.
- C. When calculating depth of a fiberglass manhole, allow for a minimum of 18-inches of adjustment rings to be placed between casting bottom and the manhole top. Set adjustment rings in approved grout or mortar.
- D. Cut the bottom of rehabilitation manhole to fit evenly on benches or chip benches out to evenly support base.
- E. Determine exact location of incoming and outgoing service lines in existing manhole and cut accurate openings for a close fit into manhole.
- F. Place the fiberglass liner manhole concentrically into the existing manhole with the openings aligned with existing sewers. Use spacer guides in annular space between existing and rehabilitation manhole. Seal openings with Oakum soaked in sealing gel.
- G. Use quick-set hydraulic cement around inside base of the fiberglass manhole and inside the annular space for a depth of 6-inches.

- H. Fill the remaining annular space with grout after the hydraulic cement at the bottom has dried. Consolidate grout using a method approved by the Engineer.
- I. After the grout has set, install adjustment rings, FRP liner, frame and cover.
- J. Line rings using a one-piece fiberglass reinforced pipe (FRP). Seal pipe to casting and manhole with sealing compound. Grout annular space between the FRP and adjustment ring.

3.11 MANHOLE BENCHES/INVERTS

- A. Remove obstructions and loose materials from benches prior to shaping the invert. Form a smooth, U-shaped invert having a minimum depth of one-half pipe diameter and channel it across the floor of the manhole using a quickset mortar. Control flow to allow sufficient setting time for material used.
- B. Make finished benches smooth and without defects which would allow for accumulation of debris.

3.12 MANHOLE COVERS AND FRAMES

- A. Adjust manhole frames and covers found above or below grade and reset loose frames. Make adjustments with concrete rings or approved materials. Set frames in a full bed of non-shrink grout and adjust to surrounding grade as specified in the pertinent section. Protect bottoms of manhole from debris or soil during adjustment.
- B. Install watertight manhole covers and frames at locations shown on the Drawings or as instructed by Engineer. Use new frames and covers.
- C. For new sanitary sewer manholes subject to loading or differential movement at manhole frames, and for all rehabilitated manholes, install manhole chimney seals to prevent inflow between manhole frames and masonry chimneys. Refer to Section 02603.

3.13 FIELD QUALITY CONTROL

- A. Inform Engineer immediately if materials being used are not producing required results or need modification. Engineer has the right to stop use of any material at any time.

3.14 INSPECTION

- A. After manhole wall sealing or manhole rehabilitation has been completed, visually inspect the manhole in the presence of Engineer. Check for cleanliness and for elimination of active leaks.

- B. At completion of manhole rehabilitation assist Engineer in verifying installation of minimum coating thickness of concrete liner. Test several points on the manhole wall. Repair verification points prior to final acceptance for payment.
- C. During application of corrosion resistant liner, a wet film thickness gauge, meeting ASTM D4414, shall be used. Measurements shall be taken, documented and attested by the Contractor for submission to the Owner.
- D. At completion of manhole rehabilitation, assist Engineer in inspection of installation, sealing and grouting of fiberglass liner.

3.15 TESTING

- A. Refer to Section 02732 for manhole testing requirements.
- B. A vacuum Manhole Tester, in lieu of infiltration test, may be used if criteria and equipment are approved by Engineer.
- C. After the coating product(s) have set in accordance with manufacturer instructions, all surfaces shall be inspected for holidays with high-voltage holiday detection equipment. Reference NACE RPO 188-99 for performing holiday detection. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional coating can be hand applied to the repair area. All touch-up/repair procedures shall follow the coating manufacturer's recommendations. Documentation on areas tested, results and repairs made shall be provided to Owner by Contractor.
- D. Visual inspection shall be made by the Project Engineer and/or Inspector. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Contractor.

3.16 BACKFILL

- A. Backfill and compact soil in area of excavation surrounding manholes in accordance with Section 02227.
- B. In unpaved areas, grade surface at a uniform slop of 1 to 5 from the manhole frame to natural grade. Provide a minimum of 4 inches of topsoil conforming to requirements of Section 02920 and either seed according to Section 02932 or sod according to Section 02935, as required.

END OF SECTION

SECTION 02768

PIPE BURSTING/CRUSHING SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe Bursting/Crushing existing sanitary sewers.

1.02 UNIT PRICES

- A. See Section 01025 – Measurement and Payment for Unit Price procedures.

1.03 DEFINITIONS

- A. Pipe Bursting/crushing: The pipe bursting/crushing process is defined as the reconstruction of existing sanitary sewers by the simultaneous insertion of a liner pipe within the bore of the existing pipe, by breaking and expanding the old pipe.

1.04 SYSTEM DESCRIPTION

- A. The pipe bursting/crushing process involves rehabilitation of deteriorated gravity sewer pipe by installing new pipe material within the enlarged bore created by using a static, hydraulic, or pneumatic hammer molding device, suitably sized to break the old pipe or by using a modified boring knife with a flared plug that crushes the existing sewer pipe. Forward progress of the mole or the knife may be aided by hydraulic equipment or other apparatus. Replacement pipe is either pulled or pushed into the bore.

1.05 QUALITY ASSURANCE

- A. Liner Acceptance: Provide liner material which is homogeneous without defects and manufactured to the standards and dimensions specified. Cause for rejection includes physical defects of the liner, such as concentrated ridges, discoloration, excessive spot roughness, pitting, visible cracks, foreign inclusions, and varying wall thickness.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prevent injury or abrasion to pipe during loading, transportation, and unloading. Do not drop pipe from cars or trucks, nor allow pipe to roll down skids without proper restraining ropes. Use suitable pads, strips, skids, or blocks for each pipe during transportation and while awaiting installation in the field.
- B. Pipe with cuts, gashes, nicks, abrasions, or any such physical damage which may have occurred during shipping, storage, or handling, which are deeper than 10 percent of the wall thickness shall not be used and shall be removed from the construction site.

- C. Use wide belly band slings for lifting and moving pipe. Do not use bare chains in contact with pipe.

1.07 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.
- B. Submit manufacturer's product data with complete information on pipeline materials, physical properties, and dimensions pertinent to this job. Furnish a certificate of compliance with specifications for materials to be supplied.
- C. Submit test reports prepared by an independent testing laboratory certifying that polyethylene pipe conforms to the requirements of ASTM D1248 and ASTM D3350 or that fiberglass reinforced pipe (FRP) pipe conforms to requirements of ASTM D2992 and ASTM D3681, as applicable.
- D. Submit manufacturer's product data on clamps.
- E. Submit video DVD's as specified in Section 02733.

1.08 TESTING

- A. The City may run tests on field samples following applicable ASTM specifications at an independent laboratory to verify the required properties and characteristics of supplied materials. Provide product samples as requested by City Engineer.
- B. The City will pay for tests on liner material which meets specifications requirements. Contractor shall pay for failed tests and retesting of failed materials.

PART 2 PRODUCTS

2.01 PIPE BURSTING/CRUSHING SYSTEMS

- A. The following manufactures/companies have been pre-approved as pipe bursting/crushing systems:
 - 1. McConnell Pipe Crushing System
Houston, Texas
 - 2. Miller Pipeline Corporation (Xpandit System)
Indianapolis, Indiana
 - 3. PIM Corporation (PIM System)
Piscataway, New Jersey
 - 4. Trenchless Replacement Systems (TRS)
Calgary, Canada
 - 5. TT Technologies (Grundocrack Pipe Replacement System)

Aurora, Illinois

2.02 MANUFACTURERS

- A. Liner pipe systems shall be polyethylene or fiberglass reinforced plastic (FRP) products approved by the Owner.
- B. Approved manufacturers for polyethylene liner are Chevron and Phillips or approved equal.
- C. Approved manufacturer for FRP liner is Hobas USA, Inc. or approved equal.

2.03 POLYETHYLENE LINER PIPE AND FITTINGS

- A. Provide polyethylene liner pipe, manufactured of solid wall, high density, high molecular weight, polyethylene compound conforming to ASTM D1248, Type III, Class B, Grade P-34, Category 5, with a PPI rating of PE 3408. Use Polyethylene material with a minimum cell classification of 345434D or E (inner wall of Light color) under ASTM D3350. A higher numbered cell classification limit which gives a desirable higher primary property, according to ASTM D3350, is also acceptable. Dimensions and workmanship shall be in accordance with ASTM F714 and ASTM D2122.
- B. The maximum Standard Dimension Ratio (SDR), the ratio of outside diameter of pipe to wall thickness, is specified below. Select the SDR for the deeper of two manholes in a particular pipeline segment.

Existing Nominal Diameter (Inches)	Minimum Outside Diameter (Inches)	Minimum Wall Thickness (Inches)		
		<15' Deep	> 15 <20' Deep	>20' Deep
		SDR 19	SDR 17	SDR 11
6-8	8.625	0.454	0.507	0.784
10	10.75	0.566	0.632	0.977
12	12.75	0.671	0.750	1.150
15	16.00	0.842	0.941	1.455
18	18.00	0.947	1.059	1.636

- C. Before beginning work, the Contractor shall submit to the Engineer for approval, the vendor's specific technical data with complete physical properties of pipe and pipe dimensions pertinent to this job.

2.04 FRP LINER PIPE AND FITTINGS

- A. Provide liner pipe manufactured in conformance to the requirements of ASTM D3262, Type 1, Liner 2, Grade 3. Liner pipe shall be reinforced plastic mortar pipe manufactured by the centrifugal casting process resulting in a dense, nonporous, corrosion resistant,

consistent, composite structure. FRP pipe shall have a minimum stiffness of 72 psi measured in accordance with ASTM D2412. Pipes with a stiffness greater than 72 psi may be used with approval of Engineer.

- B. Resin systems shall be thermosetting polyester epoxy resin, with or without filler, producing a pipe conforming to requirements of ASTM D3262.
- C. Reinforcing glass fibers shall be commercial grade, E-type glass filaments with binder and sizing compatible with impregnating resins.
- D. Filler shall be sand with a minimum 98 percent silica content and a maximum moisture content of 0.2 percent.
- E. Joints shall be low-profile FRP jacking bell-and-spigot joints with elastomeric sealing gaskets to produce watertight joint. Joints shall conform to the requirements of ASTM D4161.
- F. Dimensions and Tolerances:
 - 1. Pipe outside diameters and tolerances shall be in accordance with ASTM D3262, Cast Iron Pipe Equivalent Outside Diameters and the table below. Supply pipe in nominal lengths of 20 feet, when possible. Where radius curves in existing pipe or limitations in entry pit dimensions restrict pipe length, shorter lengths may be used.
 - 2. The FRP pipe minimum outside diameter and minimum wall thickness shall be as specified in the following table:

Existing Sewer Nominal Diameter (Inches)	Minimum Liner O.D. (Inches)	Minimum Wall Thickness 46 psi Stiffness (Inches)	Minimum Wall Thickness 72 psi Stiffness (Inches)
12	13.45	0.34	0.48
15-18	19.50	0.34	0.48

- 3. Fabricated pipe ends square to pipe axis or minus 0.25, inches, or plus or minus 0.5 percent of nominal diameter, whichever is greater.

- G. Flanges and Fittings: Flanges, elbows, reducers, tees, wyes, and other fittings shall be capable of withstanding operating conditions. Fittings shall be contact-molded or manufactured from mitered sections of pipe jointed by glass fiber reinforced overlays.

2.05 LINER PIPE SEAL AT MANHOLE

- A. The annular space between liner pipe and host sewer at manhole shall be sealed with oakum strips soaked in Scotchseal 5600 as manufactured by 3M Corporation, or equal.
- B. Grout mix shall be non-shrink grout.

2.06 CLAMPS AND GASKETS

- A. Clamps shall be stainless steel, including bolts and lugs as manufactured by JCM Industries, Type 108, or equal. Furnish full circle, universal clamp couplings with a minimum 3/16-inch thick neoprene, grid-type gasket. Select clamps to fit outside diameter of liner pipe. Use minimum clamp (length) as specified in the following table:

<u>Liner Pipe O.D. (Inches)</u>	<u>Minimum (<i>Length</i>) of Clamp (Inches)</u>
8.625	18
10.750 or greater	30

2.07 BEDDING MATERIAL

- A. Provide bedding conforming to requirements of Section 02227 and Section 02252.

PART 3 EXECUTION

3.01 PRE-INSTALLATION PREPARATIONS

- A. Contractor shall submit a work plan to the Engineer for review and acceptance. The work plan shall address the following minimum preparation/steps, unless approved otherwise by the Engineer.
1. Safety - The Contractor shall carry out operations under this Section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space. It shall be the Contractor's responsibility to comply with OSHA Standards and Regulations pertaining to all aspects of the work.
 2. Pre-Installation Television Inspection - It shall be the responsibility of the Contractor to video (TV) inspect the sewer pipe immediately before the pipe bursting/crushing to assure that the existing pipe conditions are acceptable for pipe bursting/crushing. This inspection, as well as the Post-TV inspection after the installation, shall be incidental to the installation of the replacement pipe.
 3. Bypassing Sewage - When required for acceptable completion of the pipe bursting/crushing process, the Contractor shall provide for continuous sewage flow around the section(s) of pipe designated for the installation of replacement pipe. The pump bypass lines shall be of adequate capacity and size to handle the flow in accordance with the applicable section.
 4. Line Obstructions - If Pre-Installation video (TV) inspection reveals an obstruction in the existing sewer (heavy solids, dropped joints, protruding service taps or collapsed pipe) which will prevent completion of the pipe bursting/crushing process, and that cannot be removed by conventional sewer cleaning equipment, then an Obstruction Removal shall be made by the Contractor, with the approval of the Engineer.

5. Sags in Line - If Pre-Installation video (TV) inspection reveals a sag in the existing sewer that is greater than one-half the diameter of the existing pipe, it shall be the Contractor's responsibility to install the replacement pipe to result in an acceptable grade without the sag. The Contractor shall take the necessary measures to eliminate these sags by digging a sag elimination pit and bringing the bottom of the pipe trench to a uniform grade in line with the existing pipe invert or by other measures that shall be acceptable to the Engineer. Elimination of sags in the line shall not be paid separately but shall be included in the unit price bid for pipe bursting/crushing.

3.02 BYPASS PUMPING

- A. Refer to Section 02790 - Divergence Pumping.

3.03 INSERTION OR ACCESS PITS

- A. Locate pits so that the total number is minimized and footage of liner pipe installed in a single pull is maximized. Use excavations at point repair locations for insertion pits, where possible.
- B. Before excavating, check with local utility companies (electric, telephone, gas, cable, and city), and determine the location of utilities in the vicinity of the work area. For damage done to utilities, the resulting repair, temporary service, and other such costs shall be borne by Contractor.
- C. Perform excavation and backfill in accordance with requirements of Section 02227.
- D. Perform work in accordance with OSHA standards. Follow requirements specified in Section 01526 - Trench Safety System.
- E. Install and operate necessary dewatering and surface water control measures in accordance with specifications.

3.04 PIPE INSTALLATION

- A. The Contractor shall submit information, in detail, of the procedure and the steps to be followed for the installation of the pipe bursting/crushing system selected, even if the process is named in the specification. All such instructions and procedures submitted shall be carefully followed during installation. Any proposed changes in installation procedures shall require submittal of revised procedures and acceptance by the Engineer.
 1. Finished Pipe - The installed replacement pipe shall be continuous over the entire length of each pipe segment from manhole to manhole and shall be free from visual defects such as foreign inclusions, concentrated ridges, discoloration, pitting, varying wall thickness, pipe separation and other deformities. Replacement pipe with gashes, nicks, abrasions, or any such physical damage which may have occurred during storage and/or handling, which are larger deeper than 10% of wall thickness shall not be used and shall be removed from the

construction site. The replacement pipe passing through or terminating in a manhole shall be carefully cut out in a shape and manner approved by the Engineer. The invert and benches shall be streamlined and improved for smooth flow. The installed pipe shall meet the leakage requirements of the pressure test specified.

2. Process Limitations - Though the installation process may be licensed or proprietary in nature, the Contractor SHALL NOT change any material, thickness, design values or procedural matters stated or approved in the submittals, without the Engineer's prior knowledge and preapproval. The Contractor shall submit, in writing, full details about component materials, their properties and installation procedures and abide by them fully during the entire course of the project.

All sewer rehabilitation by pipe bursting/crushing systems are being considered structurally equal processes as far as end products required by the City. The minimum required performance criteria, and/or standards, physical/structural properties, chemicals resistance tests, and the replacement pipe thickness as given in this Specification shall be strictly complied. It shall be the responsibility of the Contractor to comply with the specifications in full without any request for any change after the award of the contract. The City reserves the right to accept, reject, or modify any later requests for change at no additional cost to the City or even to the extent of asking credit for the City.

B. Pipe Jointing

1. Polyethylene Pipe - Sections of polyethylene replacement pipe shall be assembled and jointed on the job site above the ground. Jointing shall be accomplished by the heating and butt-fusion system in strict conformance with the manufacturer's printed instructions.

The butt-fusion system for pipe jointing shall be carried out in the field by operators with prior experience in fusing polyethylene pipe with similar equipment using proper jigs and tools per standard procedures outlined by the pipe manufacturer. These joints shall have a smooth, uniform, double rolled back head made while applying the proper melt, pressure and alignment. It shall be the sole responsibility of the Contractor to provide an acceptable butt-fusion joint. All joints shall be made available for inspection by the Engineer before insertion. The replacement pipe shall be joined on the site in appropriate working lengths near the insertion pit. The maximum length of continuous replacement pie which shall be assembled above ground and pulled on the job site at any one time shall be 600 linear feet.

2. Centrifugally Cast Fiberglass Pipe - Sections of centrifugally cast fiberglass pipe shall be manufactured with an integral straight bell, gravity jacking bell-spigot joint. This joint shall be affixed to one end of the pipe by the manufacturer.

An elastomeric gasket, supplied by the manufacturer, shall be placed on the groove of the spigot, just prior to installation. The gasket shall be properly seated, then lubricated per manufacturer’s instruction. All joints shall be made available for inspection by the engineer before insertion. The replacement pipe shall be jointed in or near the insertion pit.

C. Preparation: After completing insertion pit excavation, remove top of existing sanitary sewer line down to the spring line. Connect a Pipe Bursting/Crushing system to the end of liner by use of a suitable pulling head equal to or greater than the outside diameter of liner. Secure pulling head to liner and attach to Pipe Bursting/Crushing system so that liner can be satisfactorily fed and pulled through sanitary sewer main. Prevent ragged edges of existing pipe from scarring liner pipe. Refer to insertion procedures given in ASTM F585. Do not allow sand or other debris to enter the liner.

D. Pulling Liner:

1. The maximum length of continuous liner which may be assembled above ground and pulled at any one time is the length recommended by the manufacturer’s printed instructions.
2. Limit the pulling force exerted on liner so that the forces do not exceed the values indicated below for the device connected to the winch or pulling mechanism.

Polyethylene Liner O.D. (Inches)	Maximum Pulling Force (Tons)
8.625	6.0
10.75	10.0
14.0	17.0
16.0	23.0
18.0	28.0

3.05 FRP LINER PIPE INSTALLATION

A. FRP liner pipes may be pulled into the existing sewer. Insert the pipes, spigot end first, with the bell end trailing. Apply pushing force to pipe wall end inside of bell in accordance with manufacturer’s instruction. Do not apply a jacking load to end of bell. Maximum allowable joint angular deflection shall be 1.0 degree. Keep within safe jacking loads given in the following table:

Outside Diameter (Inches)	Maximum Jacking Load (Tons) For 72 psi Stiffness
13.45	22
17.40	30

3.06 CLAMP INSTALLATION

- A. Where excavation for liner pipe insertion are made between two manholes, cut ends of the liner pipe smooth, square to its axis. Join liner pipes with approximately sized stainless steel universal clamp couplings. Gap between ends of liner pipe shall be butted together with space between ends not exceeding 1 inch.
- B. Bedding shall be stabilized cement sand conforming to requirements of Section 02252 - Cement Stabilized Sand. Bedding shall extend 12" above the clamp/liner pipe.

3.07 FRP COLLAR/CLOSURE

- A. FRP collar closure pieces shall be installed in accordance with manufacturer's recommendations.

3.08 FIELD QUALITY CONTROL

- A. All costs for testing the replacement pipe by a pressure method will be incidental to the installation. Two types of testing shall be required after the replacement pipe has been installed in the existing sanitary sewer main. The first is a low-pressure air test of the replacement pipe before it has been sealed in place at the manholes, and before any service reconnections have been made. The purpose of this test is to check the integrity of the joints that have been made and to verify that the replacement pipe has not been damaged by inserting it into the sanitary sewer. The second test is a service lateral connection test in accordance with the Section 02762 - Sanitary Sewer Service Reconnections. The test shall be done after all service laterals have been made for a particular pipe segment between adjacent manholes. This test shall verify the integrity of the connection at the point where it joins the replacement pipe and existing service line.
- B. Low Pressure Air Test Procedure - Refer to Section 02732 - Acceptance Testing for Sanitary Sewers.

3.09 SEALING LINER MANHOLE

- A. Allow liner pipe to normalize to ambient temperatures as well as recover from imposed stretch before cutting to fit between manholes, sealing at manholes, and manhole invert shaping. Normalization usually takes at least 12 hours for polyethylene.
- B. Cut liner so that it extends 4 inches into manhole. Make a smooth, vertical cut and slope area over top of exposed liner using non-shrink grout.
- C. Seal the annular space between liner and sanitary sewer main at each manhole with a chemical seal and nonshrink grout. Place strips of oakum soaked in sealer in a band to form an effective watertight gasket in the annular space between liner and existing opening in manhole. Make width of the sealing band a minimum of 8 inches or the thickness of the manhole wall, whichever is greater.

- D. Finish seal with a non-shrink grout placed around annular space from inside manhole. Apply grout in a band not less than 6 inches wide.
- E. Reshape and smooth the manhole invert as specified in Section 02764 - Manhole Rehabilitation. Use approved manhole rehabilitation material to form a smooth transition with a reshaped invert and a raised manhole bench to eliminate sharp edges of liner pipe, concrete bench, and channels invert. Build up and smooth invert of manhole to match flow line of new liner.
- F. The replacement pipe in the manhole shall be sealed as specified above before proceeding on to the next manhole section and all manholes shall be individually inspected for replacement pipe cut-offs, benches, and sealing work.
- G. Payment by work described above shall be incidental to the unit price bid for pipe bursting/crushing.

3.10 POST INSTALLATION TELEVISIONING OF COMPLETED WORK

- A. The Contractor shall provide the City a color video DVD taken by a pan and tilt pipe inspection camera that pans 275 degrees and rotates 360 degrees for close up view showing the completed work, including the condition of the restored service connections.
- B. Television inspections, DVS, and reports, etc., shall be in accordance with Section 02733 - Cleaning and Television Inspection. Upon completion of the installation work and testing, the Contractor shall restore/clean the project area affected by his operations. No trash, rubbish, etc., shall be stored at any site, whether the work is in progress or not.

3.11 FINAL CLEANUP

- A. Upon completion of installation work and testing, clean and restore project area affected by the Work. Restoration shall be in accordance with the specifications.

END OF SECTION

SECTION 02769

OBSTRUCTION REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

This section includes clearing the sewer main from obstructions by one for the following methods:

A. Obstruction removal by remote device

1. To remove protruding taps (service lines that protrude greater than 1-inch into the sewer)
2. To remove other obstructions

B. Obstruction removal by excavation

1.02 UNIT PRICES

- A. See Section 01025 – Measurement and Payment for Unit Price procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 OBSTRUCTION REMOVAL BY REMOTE DEVICE

- A. This method of obstruction removal shall be performed prior to rehabilitation. When a T.V. tape of televised sanitary line identifies an obstruction which could cause a non-uniform liner pipe or obstruction during installation of the liner, it shall be removed. The Contractor shall ask the Engineer for approval of obstruction removal with a remote device using one of the following:

1. To remove protruding taps prior to the rehabilitating with a liner, a power driven cutting device shall be utilized. The protruding tap shall be cut so that the protrusion is no greater than 1/4-inch. In the event damage to the existing sewer line or service line occurs, a repair shall be done at the Contractor's expense and only a payment for the remote obstruction removal will be made. If the Contractor is unable to remove the protruding tap by this means, then a point repair may be performed at the Engineer's direction.
2. To remove other obstructions, such as hanging gaskets, fixed debris, stabilized sand, hardened mineral deposits (includes tuberculation in cast or ductile iron pipes), heavy roots, etc., a remote device shall be utilized. The device(s) shall be pulled or driven from manhole to manhole up to a continuous length of 800-feet using a solid steel mandrel, porcupine, root saw, bucket, etc. to remove the obstruction. The device shall be adequately sized to remove the

obstruction to the satisfaction of the Engineer. Damage to the existing sewer line, service line or tap must be repaired by the Contractor and only a payment for remote obstruction removal will be made. The mechanical cleaning method, may be used to remove the obstruction when approved by the Engineer. No separate payment shall be made for utilizing mechanical cleaning method to remove the obstructions. The Contractor shall be paid at the bid unit price for performing obstruction removal (other) irrespective of the method utilized to remove obstruction. Damage to the existing sewer line, service line or tap must be repaired by the Contractor at his expense. The cleaning of the pipe in preparation for rehabilitation is not considered obstruction removal.

3.02 OBSTRUCTION REMOVAL BY EXCAVATION

- A. This method of obstruction removal shall be performed while installing the liner in sanitary sewer. If during the liner insertion operation, a collapsed sewer, off-set joint, or other obstruction is encountered which prevents or blocks the passage or insertion of any liner involved in the rehabilitation process, the Contractor shall notify the Engineer for approval to make an excavation to uncover and remove the obstruction in the following manner:
1. Excavate at the point where there is an obstruction. A trench safety system shall be required for all excavations over 5-feet deep.
 2. Break out the existing sanitary sewer pipe (carrier pipe), etc., as directed by the Engineer. Remove only that amount of material which is causing the obstruction. The amount of "carrier pipe" to be removed shall be minimized. The minimum length of pipe to be removed shall be six (6) feet for all depths.
 3. When the liner is completely in place, it shall be encased with cement stabilized sand as per Class "AA" modified bedding.
 4. When obstruction removal by excavation occurs under a paved area, then backfill shall be cement stabilized sand.
- B. Under such conditions, replacement of the carrier pipe is not required. The existing sewer bedding should not be disturbed by the excavation work. However, if said bedding is disturbed during the obstruction removal procedure, the Contractor shall place cement stabilized sand beneath the liner; the minimum compacted thickness shall be 12-inches.
- C. In the event during the performance of the pre-television inspection of the sanitary sewer line, a protruding or collapsed service prevents the forward progress of the camera, the Contractor shall complete the television inspection via a reverse set up. In the event the television inspection cannot be completed after attempting a reverse set up, the Contractor shall perform obstruction removal (by excavation) and televise the remainder of the line and submit the television inspection videotape to the Engineer for review and evaluation. The Contractor shall await Engineer's review of the pre television inspection videotapes, and is responsible for providing adequate protection to the areas where obstruction removal (by excavation) was performed as

per the specifications. In the event full length rehabilitation is performed, payment for obstruction removal (by excavation) will not be made for obstructions at service connections.

- D. Payment for service reconnection (by excavation) shall be made if the obstruction removal performed is at a service connection and the line is rehabilitated full length (pipe bursting, cured-in-place, etc.). No separate payment for obstruction removal (by excavation) will be made for removing the obstruction at a service connection and subsequent full length rehabilitation is performed. If after a review of the pre-television inspection videotape, the sanitary sewer line is not designated for full length rehabilitation and point repairs are recommended, the Contractor shall repair the section of the pipe that was removed to facilitate completion of television inspection as per Section 02763. In those instances, payment for performing the point repair shall be made and no separate payment shall be made for obstruction removal (by excavation).

END OF SECTION

SECTION 02790

BYPASS PUMPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Use of by-pass pumping to prevent surcharging and maintain un-interrupted flow through sewage collection system while allowing Contractor to provide reliable sewer service to the sanitary sewer users at all times and to isolate sewer line manholes and/or sewer line segments designated for cleaning, abandonment, replacement, rehabilitation, and television inspection operations. Includes installation and operation of bulkheads, plugs, hoses, piping and pumps to maintain sewage flow and prevent backup and overflow.

1.02 UNIT PRICES

- A. Refer to Section 01025-Measurement and Payment for unit price procedures.

PART 2 MATERIALS

2.01 PUMPS

- A. Use electrical powered pumps having a minimum pumping capacity as required.

2.02 PIPING, JOINTS AND ACCESSORIES

- A. All piping, joints and accessories shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi which ever is greater and be leak free.

PART 3 EXECUTION

3.01 PROCEDURES AND METHODS

- A. Prior to beginning sewer cleaning, abandonment, replacement, rehabilitation and television inspection operations demonstrate pumping system is in good working order.
- B. Prior to isolating sewer manhole and/or line segment for beginning work have all materials, equipment and labor necessary to complete sewer on job site.

- C. Locate pumping suction and discharge lines so as not to cause undue interference with the use of streets, private driveways entrances or residences.
- D. All piping, joints and accessories shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi whichever is greater. The Contractor shall utilize rigid pipe in lieu of flexible hoses for piping. Under no circumstances will flexible pipe be allowed to be utilized at the project. The Contractor shall have an additional standby pump for bypass pumping with job site at all times.
- E. Plug off and pump down sewer manhole or line segment in designated area. Maintain sanitary sewer system so that surcharging does not occur.
- F. Complete sewer cleaning, rehabilitation and television inspection operations as quickly as possible.
- G. An experienced operator shall be on site at all times to monitor the operation, adjust pump speed, valves, etc.
- H. Furnish all labor, materials, supervision and equipment necessary for maintaining the pumping system in continuous proper working order for the duration of cleaning, abandonment, replacement, rehabilitation and television inspection operations. Obtain approval of discharge location for diversion pumping system prior to commencing work. Under no condition will raw sewage be allowed to discharge in open ditches, streets or storm sewer systems nor in any way that would create unsanitary conditions or interfere unduly with the use of streets, private driveways entrances or residences. Whenever flows in a sewer line are blocked, plugged or bypassed, sufficient precautions must be taken to protect the sewer lines from damage. Ensure that sewer line cleaning, rehabilitation and television inspection and/or by-pass operations do not cause flooding or damage to public or private property being served by the sewer lines involved in the repair. The Contractor is responsible for having additional stand by pumps in the event of failure of any pumps.
- I. In the event sewage accidentally drains into the drainage system or street, the Contractor shall immediately stop the overflow, notify the Engineer and cleanup and disinfect the spillage to the satisfaction of the Engineer.
 - 1. In the event the sewage is spilled onto public or private property, the Contractor shall wash down, clean up and disinfect the spillage to the private owner's/Engineer's satisfaction.
 - 2. Overflow/spillage shall be reported to the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA) by the Contractor within 24 hours.

- J. When diversion pumping operations are complete, piping shall be drained into the sanitary sewer prior to disassembly.

END OF SECTION

SECTION 02920

TOPSOIL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and placing topsoil for finish grading and for seeding, sodding and planting.

1.02 UNIT PRICES

- A. No separate payment will be made for topsoil. Include payment in Section 02932 - Hydromuch Seeding and Section 02935 - Sodding.
- B. Refer to Section 01025 - Measurement and Payment for unit price procedures.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Topsoil shall be fertile, friable, natural sandy loam surface soil obtained from excavation or borrow operations having the following characteristics:
 - 1. pH value of between 5.5 and 6.5.
 - 2. Liquid limit: topsoil not exceed 50
 - 3. Plasticity index: 10 or less.
 - 4. Gradation: maximum of 40 percent with a passing the #280 sieve.
- B. Topsoil shall be reasonably free of subsoil, clay lumps, weeds, non-soil materials and other litter or contamination. Topsoil shall not contain roots, stumps, and stones larger than 2 inches.
- C. Obtain topsoil from naturally well-drained areas where topsoil occurs at a minimum depth of 4 inches and has similar characteristics to that found at the placement site. Do not obtain topsoil from areas infected with a growth of, or reproductive parts of nut grass or other noxious weeds.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavation and embankment operations have been completed to correct lines and grades.

3.02 TOPSOIL EXCAVATION

- A. Conform to excavation and stockpiling requirements of section 02225 - Roadway Excavation.

3.03 PLACEMENT

- A. For areas to be seeded or sodded, scarify or plow existing material to a minimum depth of 4 inches, or as indicated on the Drawings. Remove any vegetation and foreign inorganic material. Place 4 inches of topsoil on the loosened material and roll lightly with an appropriate lawn roller to consolidate the topsoil.
- B. Increase depth of topsoil to 6 inches when placed over sand bedding and backfill materials specified in Section 02229 - Utility Backfill Material.
- C. For areas to receive bushes or trees, excavate existing material and place topsoil to the depth and dimensions shown on the Drawings.
- D. Remove spilled topsoil from curbs, gutters, and, paved areas and dispose of excess topsoil in accordance with requirements of Section 01564 - Waste Material Disposal.

3.04 PROTECTION

- A. Protect topsoil from wind and water erosion until planting is completed.

END OF SECTION

SECTION 02935

SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restoration of existing lawn areas disturbed by construction shall be by installation of new sod.
- B. Sod is defined as blocks, squares, strips of turf grass, and adhering soil used for vegetative planting. To be placed edge to edge for complete coverage.
- C. Lawn is defined as ground covered with fine textured grass kept neatly mowed.

1.02 UNIT PRICES

- A. No separate payment will be made for work performed under this section. Include the cost of such work for restoration of the existing sod or lawn areas in unit cost for utility and paving items in the Bid Proposal.

1.03 SUBMITTALS

- A. Submittals shall conform to the requirements of Section 01300 - Submittals.

1.04 QUALITY ASSURANCE

- A. Perform sodding only when weather and soil conditions are deemed by Project Engineer to be suitable for proper placement.
- B. Water and fertilize new sod.
- C. Guarantee sod to be growing 30 days after completion.
- D. Maintenance Period:
 - 1. Begin maintenance immediately after each section of grass sod is installed and continue for a 30-day period from date of substantial completion.
 - 2. Resod unacceptable areas.
 - 3. Water, fertilize, control disease and insect pests, mow, edge, replace unacceptable materials, and perform other procedures consistent with good horticultural practice to ensure normal, vigorous and healthy growth. All disease control shall be installed within guidelines set forth by the Structural Pest Control Board of the State of Texas.

- E. Notify Engineer 10 days before end of maintenance period for inspection.

PART 2 PRODUCTS

2.01 SOD

- A. Species: Bermuda (*Cynodon Dactylon*), Buffalo (*Buchloe Dactyloides*), or St. Augustine.
- B. Contents: 95 percent permanent grass suitable to climate in which it is to be placed; not more than 5 percent weeds and undesirable grasses; good texture, free from obnoxious grasses, roots, stones and foreign materials. Block sod is usually a 16" x 16" square.
- C. Size: 16 inch wide strips, uniformly 2 inches thick with clean-cut edges.
- D. Sod is to be supplied and maintained in a healthy condition as evidenced by the grass being a normal green color.

2.02 FERTILIZER

- A. Available nutrient percentage by weight: 12 percent nitrogen, 4 percent phosphoric acid, and 8 percent potash; or 15 percent nitrogen, 5 percent phosphoric acid, and 10 percent potash.

2.03 WEED AND INSECT TREATMENT

- A. Provide acceptable treatment to protect sod from weed and insect infestation. Submit treatment method to the Engineer for approval. All insect and disease control shall be installed within guidelines set forth by the Structural Pest Control Board of the State of Texas.

2.04 WATER

- A. Potable, available on-site through Contractor's water trucks. Do not use private resident's water.

2.05 BANK SAND

- A. Free of clay lumps, roots, grass, salt or other foreign material.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that top soil placement and compaction has been satisfactorily completed. Verify that soil is within allowable range of moisture content.
- B. Topsoil shall be free of weeds and foreign material immediately before sodding.

- C. Do not start work until conditions are satisfactory. Do not start work during inclement or impending inclement weather.
- D. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges or depressions.
- E. Spread 2-inch layer of bank sand over areas to be sodded prior to planting of sod.
- F. Apply fertilizer at a rate of 25 lbs/1000 SF. Apply after raking soil surface and not more than 48 hours prior to laying sod. Mix thoroughly into upper 2 inches of soil. Lightly water to aid in dissipation of fertilizer.

3.02 APPLICATION

- A. Lay sod with closely fitted joints leaving no voids and with ends of sod strips staggered. Sod shall be laid within 24 hours of harvesting.
- B. After sod is laid, irrigate thoroughly to secure 6-inch minimum penetration into soil below sod.
- C. Tamp and roll sod with approved equipment to eliminate minor irregularities and to form close contact with soil bed immediately after planting and watering. Submit type of tamping and rolling equipment to be used to the Engineer for approval, prior to construction.

3.03 MAINTENANCE

- A. Watering:
 - 1. Water lawn areas once a day with minimum 1/2 inch water for the first 3 weeks after area is sodded.
 - 2. After 3-week period, water twice a week with 3/4 inch of water each time unless comparable amount has been provided by rain.
 - 3. Make weekly inspections to determine moisture content of soil unless soil is in frozen condition.
 - 4. Water in the morning to enable soil to absorb maximum amount of water with minimum evaporation.
- B. Mowing:
 - 1. Mow sod at intervals which will keep grass height from exceeding 3-1/2 inches.
 - 2. Set mower blades at 2-1/2 inches.
 - 3. Not remove more than one-half of grass leaf surface.

4. Sodded areas requiring mowing within 1 month after installation, shall be mowed with a light-weight rotary type mower. The sod shall be mowed only when dry and not in a saturated or soft condition.
5. Remove grass clippings during or immediately after mowing.

C. Fertilizer and Pest Control:

1. Evenly spread fertilizer composite at a rate of 40 pounds per 5,000 square feet or as recommended by manufacturer. Fertilizer shall not be placed until 2 weeks after placement of sod.
2. Restore bare or thin areas by topdressing with a mix of 50 percent sharp sand and 50 percent sphagnum peat moss.
3. Apply mixture 1/4 to 1/2 inch thick.
4. Treat areas of heavy weed and insect infestation as recommended by treatment manufacturer.

3.04 CLEANUP

- A. During course of planting, remove excess and waste materials; keep lawn areas clean and take precautions to avoid damage to existing structures, plants, grass and streets.
- B. Remove barriers, signs and all other Contractor material and equipment from project site at termination of establishment period.

END OF SECTION

SECTION 03305

CONCRETE FOR UTILITY CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete work for utility construction or rehabilitation, such as slabs on grade, small vaults, site-cast bases for precast units, cast-in-place manholes, inlets, headwalls and miscellaneous small structures.

1.02 UNIT PRICES

- A. No payment will be made for concrete for utility construction under this Section unless specifically noted in bid documents. Include payment in applicable utility structure section.
- B. Obtain the services of and pay for a certified testing laboratory to prepare design mixes.

1.03 SUBMITTALS

- A. Conform to Section 01300 - Submittals.
- B. Submit proposed mix design and test data for each type and strength of concrete in the Work.
- C. Submit laboratory reports prepared by an independent testing laboratory stating that materials used comply with the requirements of this Section.
- D. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by the Engineer.
- E. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.
- F. When required on Drawings, submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details and other pertinent information.
- G. For waterstops, submit product information sufficient to indicate compliance with specifications, including manufacturer's descriptive literature and specifications, when required on Drawings.

1.04 HANDLING AND STORAGE

- A. Cement: Store cement off of the ground in a well-ventilated weatherproof building.
- B. Aggregate: Prevent mixture of foreign materials with aggregate and preserve gradation of aggregate.
- C. Reinforcing Steel: Store reinforcing steel to protect it from mechanical injury and formation of rust. Protect epoxy-coated steel from damage to the coating.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cementitious Material:
 - 1. Portland Cement: ASTM C150, Type II, unless the use of Type III is authorized by the Engineer; or ASTM C595, Type IP. For concrete in contact with sewage use Type II cement.
 - 2. When aggregates are potentially reactive with alkalis in cement, use cement not exceeding 0.6 percent alkali content in the form of $\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$.
- B. Water: Clean, free from harmful amounts of oils, acids, alkalis or other deleterious substances, and meeting requirements of ASTM C94.
- C. Aggregate:
 - 1. Coarse Aggregate: ASTM C33. Unless otherwise indicated, use the following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of the narrowest dimension between sides of forms, nor larger than 3/4 of minimum clear spacing between reinforcing bars.
 - 2. Fine Aggregate: ASTM C33.
 - 3. Determine the potential reactivity of fine and coarse aggregate in accordance with the Appendix to ASTM C33.
- D. Air Entraining Admixtures: ASTM C260.
- E. Chemical Admixtures:
 - 1. Water Reducers: ASTM C494, Type A.
 - 2. Water Reducing Retarders: ASTM 494, Type D.
 - 3. High Range Water Reducers (Superplasticizers): ASTM C494, Types F and G.

- F. Prohibited Admixtures: Admixtures containing calcium chloride, thiocyanate, or materials that contribute free chloride ions in excess of 0.1 percent by weight of cement.
- G. Reinforcing Steel:
1. Use new billet steel bars conforming to ASTM A615, ASTM A767, or ASTM A775, grade 40 or grade 60, as shown on Drawings. Use deformed bars except where smooth bars are specified. When placed in work, keep steel free of dirt, scale, loose or flaky rust, paint, oil or other harmful materials.
 2. Where shown, use welded wire fabric with wire conforming to ASTM A185 or ASTM A884. Supply the gage and spacing shown, with longitudinal and transverse wires electrically welded together at points of intersection with welds strong enough not to be broken during handling or placing.
 3. Wire: ASTM A82. Use 16-1/2 gage minimum for tie wire, unless otherwise indicated.
- H. Fiber:
1. Polypropylene Fiber:
 - a. Ratio: 1.5 pounds of fiber per cubic yard of concrete.
 - b. Physical Properties:
 - (1). Material: Polypropylene.
 - (2). Length: 3/4 inch
 - (3). Specific Gravity: 0.91.
 - (4). Absorption: None.
 - (5). Tensile Strength: 70-110 Ksi.
 - (6). Modulus of Elasticity: 500 Ksi.
 - (7). Melt Point: 140 degrees F (60 degrees C).
 - (8). Flash Point: 932 degrees F (500 degrees C).
 - (9). Density: 3 pounds/cubic yard.
 - c. Acceptable Manufacturer: W. R. Grace Company, Fibermesh, or approved equal.
 2. Steel Fiber: Comply with applicable provisions of ACI 544 and ASTM A820.

- a. Ratio: 50 to 200 pounds of fiber per cubic yard of concrete.
- b. Physical Properties
 - (1). Material: Steel.
 - (2). Aspect Ratio (for fiber lengths of 0.5 to 2.5 inch, length divided by diameter or equivalent diameter): 30:1 to 100:1.
 - (3). Specific Gravity: 7.8.
 - (4). Tensile Strength: 40-400 ksi.
 - (5). Young's Modulus: 29,000 ksi.
 - (6). Minimum Average Tensile Strength: 50,000 psi.
 - (7). Bending Requirements: Withstand bending around 0.125-inch diameter mandrel to an angle of 90 degrees, at temperatures not less than 60 degrees F, without breaking.
- I. Curing Compounds: Type 2 white-pigmented liquid membrane-forming compounds conforming to ASTM C309.

2.02 FORMWORK MATERIALS

- A. Lumber and Plywood: Seasoned and of good quality, free from loose or unsound knots, knot holes, twists, shakes, decay and other imperfections which would affect strength or impair the finished surface of concrete. Use S4S lumber for facing or sheathing. Forms for bottoms of caps: At least 2-inch (nominal) lumber, or 3/4-inch form plywood backed adequately to prevent misalignment. General use: Provide lumber of 1-inch nominal thickness or form plywood of approved thickness.
- B. Formwork for Exposed Concrete Indicated to Receive Rubbed Finish: Form or form-lining surfaces free of irregularities; plywood of 1/4-inch minimum thickness, preferably oiled at the mill.
- C. Chamfer Strips and Similar Moldings: Redwood, cypress or pine that will not split when nailed and which can be maintained to true line. Use mill-cut molding dressed on all faces.
- D. Form Ties: Metal or fiberglass of approved type with tie holes not larger than 7/8 inch in diameter. Do not use wire ties or snap ties.
- E. Metal Forms: Clean and in good condition, free from dents and rust, grease or other foreign material that tend to disfigure or discolor concrete in a gage and condition capable of supporting concrete and construction loads without significant distortion. Countersink bolt and rivet heads on facing sides. Use only metal forms which present a smooth surface and which line up properly.

2.03 PRODUCTION METHODS

- A. Use either ready-mixed concrete conforming to requirements of ASTM C94, or concrete produced by volumetric batching and continuous mixing in accordance with ASTM C685.

2.04 MEASUREMENT OF MATERIALS

- A. Measure dry materials by weight, except volumetric proportioning may be used when concrete is batched and mixed in accordance with ASTM C685.
- B. Measure water and liquid admixtures by volume.

2.05 DESIGN MIX

- A. Use design mixes prepared by a certified testing laboratory in accordance with ASTM C1077 and conforming to requirements of this section.
- B. Proportion concrete materials based on ACI 211.1 to comply with durability and strength requirements of ACI 318, Chapters 4 and 5, and this specification. Prepare mix design of Class A concrete so minimum cementitious content is 564 pounds per cubic yard. Submit concrete mix designs to the Engineer for review.
- C. Proportioning on the basis of field experience or trial mixtures in accordance with the requirements at Section 5.3 of ACI 318 may be used, if approved by the Engineer.
- D. Classification:

<u>Class</u>	<u>Type</u>	<u>Minimum Compressive Strength (Lbs/sq. in.)</u>		<u>Maximum W/C Ratio (Percent)</u>	<u>Air Content (Inches)</u>	<u>Consistency Range in Slump</u>
		<u>7-Day</u>	<u>28-Day</u>			
A	Structural	3200	4000	0.45	4 ± 1	2 to 4*
B	Pipe Block Fill, Thrust Block	----	2500	----	4 ± 1	5 to 7

* When ASTM C494, Type F or type G admixture is used to increase workability, this range may be 6 to 9.

- E. Add steel or polypropylene fibers only when called for on the Drawings or in another section of these Specifications.
- F. Determine air content in accordance with ASTM C138, ASTM C173 or ASTM C231.

- G. Use of Concrete Classes: Use classes of concrete as indicated on the drawings and other specifications. Use Class B for un-reinforced concrete used for plugging pipes, seal slabs, thrust blocks, trench dams, and concrete fill unless indicated otherwise. Use Class A for all other applications.

2.06 PVC WATERSTOPS

- A. Extrude from virgin polyvinyl chloride elastomer. Use no reclaimed or scrap material. Submit waterstop manufacturer's current test reports and manufacturer's written certification that the material furnished meets or exceeds Corps of Engineers Specification CRD-C572 and other specified requirements.
- B. Flat Strip and Center-Bulb Waterstops: As detailed, and as manufactured by: Kirkhill Rubber Co., Brea, California; Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal acceptable to the Engineer, provided that at no place shall waterstop thickness be less than 3/8 inch.

2.07 RESILIENT WATERSTOP

- A. Resilient waterstop, where called for on the Drawings, shall be either a bentonite or adhesive type material.
- B. Bentonite Waterstop:
 - 1. Material: 75 percent bentonite, mixed with butyl rubber-hydrocarbon containing less than 1.0 percent volatile matter, and free of asbestos fibers or asphaltics.
 - 2. Manufacturer's rated temperature ranges: For application, 5 to 125 degrees F; in service, -40 to 212 degrees F.
 - 3. Cross-sectional dimensions, unexpanded waterstop: 1 inch by 3/4 inch.
 - 4. Provide with adhesive backing capable of producing excellent adhesion to concrete surfaces.
- C. Adhesive Waterstop:
 - 1. Adhesive waterstop shall be at least 2 inches in diameter and shall be Synko-Flex preformed plastic adhesive waterstop by Synko-Flex Products, Inc., or equal. The waterstop shall meet or exceed requirements of Federal Specification SS-S-210A.
 - 2. The adhesive waterstop shall be supplied wrapped completely by a two part protective paper.

3. The adhesive waterstop material shall have independent laboratory tests verifying that the material seals joints in concrete against leakage when subjected to a minimum of 30 psi water pressure for at least 72 hours.
4. Primer, to be used on hardened concrete surfaces, shall be provided by the same manufacturer as the waterstop material.

PART 3 EXECUTION

3.01 FORMS AND SHORING

- A. Provide mortar-tight forms sufficient in strength to prevent bulging between supports. Set and maintain forms to lines designated such that finished dimensions of structures are within the tolerances specified in ACI 117. Construct forms to permit removal without damage to concrete. Forms may be given slight draft to permit ease of removal. Provide adequate cleanout openings. Before placing concrete, remove extraneous matter from within forms.
- B. Install rigid shoring having no excessive settlement or deformation. Use sound timber in shoring centering. Shim to adjust and tighten shoring with hardwood timber wedges.
- C. Design Loads for Horizontal Surfaces of Forms and Shoring: Minimum fluid pressure, 175 pounds per cubic foot; live load, 50 pounds per square foot. Maximum unit stresses: 125 percent of allowable stresses used for form materials and for design of support structures.
- D. Back formwork with a sufficient number of studs and wales to prevent deflection.
- E. Re-oil or lacquer the liner on the job before using. Facing may be constructed of 3/4-inch plywood made with waterproof adhesive backed by adequate studs and wales. In such cases, form lining will not be required.
- F. Unless otherwise indicated, form outside corners and edges with triangular 3/4-inch chamfer strips (measured on sides).
- G. Remove metal form ties to depth of at least 3/4 inch from surface of concrete. Do not burn off ties. Do not use pipe spreaders. Remove spreaders which are separate from forms as concrete is being placed.
- H. Treat facing of forms with approved form coating before concrete is placed. When directed by the Engineer, treat both sides of face forms with coating. Apply coating before reinforcement is placed. Immediately before the concrete is placed, wet surface of forms which will come in contact with concrete.

3.02 PLACING REINFORCEMENT

- A. Place reinforcing steel accurately in accordance with approved Drawings. Secure steel adequately in position in forms to prevent misalignment. Maintain reinforcing steel in

place using approved concrete and hot-dip galvanized metal chairs and spacers. Place reinforcing steel in accordance with CRSI Publication "Placing Reinforcing Bars." Request inspection of reinforcing steel by the Engineer and obtain acceptance before concrete is placed.

- B. Minimum spacing center-to-center of parallel bars: 2-1/2 times nominal bar diameter. Minimum cover measured from surface of concrete to face of reinforcing bar unless shown otherwise on the Drawings: 3 inches for surfaces cast against soil or subgrade, 2 inches for other surfaces.
- C. Detail bars in accordance with ACI 315. Fabricate reinforcing steel in accordance with CRSI Publication MSP-1, "Manual of Standard Practice." Bend reinforcing steel to required shape while steel is cold. Excessive irregularities in bending will be cause for rejection.
- D. Do not splice bars without written approval of the Engineer. Approved bar bending schedules or placing drawings constitute written approval. Splice and development length of bars shall conform to ACI 318, Chapters 7 and 12, and as shown on Drawings. Stagger splices or locate at points of low tensile stress.

3.03 EMBEDDED ITEMS

- A. Install conduit and piping as shown on Drawings. Accurately locate and securely fasten conduit, piping and other embedded items in forms.
- B. Install waterstops as specified in other sections and according to manufacturer's instructions. Securely position waterstops at joints as indicated on Drawings. Protect waterstops from damage or displacement during concrete placing operations.

3.04 BATCHING, MIXING AND DELIVERY OF CONCRETE

- A. Measure, batch, mix, and deliver ready-mixed concrete in accordance with ASTM C94, Sections 8 through 11. Produce ready-mixed concrete using an automatic batching system as described in NRMCA Concrete Plant Standards, Part 2 - Plant Control Systems.
- B. Measure, mix and deliver concrete produced by volumetric batching and continuous mixing in accordance with ASTM C685, Sections 6 though 8.
- C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of the Engineer before adjustment and change of mix proportions.
- D. Ready-mixed concrete delivered to the site shall be accompanied by batch tickets providing the information required by ASTM C94, Section 16. Concrete produced by continuous mixing shall be accompanied by batch tickets providing the information required by ASTM C685, Section 14.

- E. When adverse weather conditions affect quality of concrete, postpone concrete placement. Do not mix concrete when the air temperature is at or below 40 degrees F and falling. Concrete may be mixed when temperature is 35 degrees F and rising. Take temperature readings in the shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until the concrete has cured for a minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.

When concrete temperature is 85 degrees F or above, do not exceed 60 minutes between introduction of cement to the aggregates and discharge. When the weather is such that the concrete temperature would exceed 90 degrees F, employ effective means, such as pre-cooling of aggregates and mixing water, using ice or placing at night, as necessary to maintain concrete temperature, as placed, below 90 degrees F.

- F. Clean, maintain and operate equipment so that it thoroughly mixes material as required.
- G. Hand-mix only when approved by the Engineer.

3.05 PLACING CONCRETE

- A. Give sufficient advance notice to the Engineer (at least 24 hours prior to commencement of Operations) to permit inspection of forms, reinforcing steel, embedded items and other preparations for placing concrete. Place no concrete prior to the Engineer's approval.
- B. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, if necessary to continue after daylight hours, light the site as required. If rainfall occurs after placing operations are started, provide covering to protect the Work.
- C. Use troughs, pipes and chutes lined with approved metal or synthetic material in placing concrete so that concrete ingredients are not separated. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete. Allow no aluminum material to be in contact with concrete.
- D. Limit free fall of concrete to 4 feet. Do not deposit large quantities of concrete at one location so that running or working concrete along forms is required. Do not jar forms after concrete has taken on initial set; do not place any strain on projecting reinforcement or anchor bolts.
- E. Use tremies for placing concrete in walls and similar narrow or restricted locations. Use tremies made in sections, or provide in several lengths, so that outlet may be adjusted to proper height during placing operations.
- F. Place concrete in continuous horizontal layers approximately 12 inches thick. Place each layer while layer below is still plastic.
- G. Compact each layer of concrete with concrete spading implements and mechanical vibrators of approved type and adequate number for the size of placement. When immersion vibrators cannot be used, use form vibrators. Apply vibrators to concrete immediately after depositing. Move the vibrator vertically through the layer of concrete

just placed and several inches into plastic layer below. Do not penetrate or disturb layers previously placed which have partially set. Do not use vibrators to aid lateral flow concrete. Closely supervise consolidation to ensure uniform insertion and duration of immersion.

H. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.06 WATERSTOPS

A. Embed waterstops in concrete across joints as shown. Waterstops shall be continuous for the extent of the joint; make splices necessary to provide such continuity in accordance with manufacturer's instructions. Support and protect waterstops during construction operations; repair or replace waterstops damaged during construction.

B. Install waterstops in concrete on one side of joints, leaving other side exposed until the next pour. When a waterstop will remain exposed for 2 days or more, shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

C. Splicing PVC Waterstops:

1. Splice waterstops by heat-sealing adjacent waterstop sections in accordance with the manufacturer's printed instructions.
2. Butt end-to-end joints of 2 identical waterstop sections may be made in the forms during placement of waterstop material.
3. Prior to placement in formwork, prefabricate all waterstop joints involving more than two ends to be joined together, an angle cut, an alignment change, or the joining of two dissimilar waterstop sections, allowing not less than 24-inch long strips of waterstop material beyond the joint. Upon inspection and approval by the Engineer, install prefabricated waterstop joint assemblies in formwork, and butt-weld ends of the 24-inch strips to the straight-run portions of waterstop in the forms.

D. Setting PVC Waterstops:

1. Correctly position waterstops during installation. Support and anchor waterstops during progress of the work to ensure proper embedment in concrete and to prevent folding over of the waterstop by concrete placement. Locate symmetrical halves of waterstops equally between concrete pours at joints, with center axis coincident with joint openings. Thoroughly work concrete in joint vicinity for maximum density and imperviousness.
2. Where a waterstop in a vertical wall joint does not connect with any other waterstop, and is not intended to be connected to a waterstop in a future concrete placement, terminate the waterstop 6 inches below the top of the wall.

- E. Replacement of Defective Field Joints: Replace waterstop field joints showing evidence of misalignment, offset, porosity, cracks, bubbles, inadequate bond or other defects with products and joints complying the Contract Documents.
- F. Resilient Waterstop:
1. Install resilient waterstop in accordance with manufacturer's instructions and recommendations except as otherwise indicated and specified.
 2. When requested by the Engineer, provide technical assistance by manufacturer's representative in the field at no additional cost to the Owner.
 3. Use resilient waterstop only where complete confinement by concrete is provided; do not use in expansion or contraction joints.
 4. Where resilient waterstop is used in combination with PVC waterstop, lap resilient waterstop over PVC waterstop a minimum of 6 inches and place in contact with the PVC waterstop. Where crossing PVC at right angles, melt PVC ribs to form a smooth joining surface.
 5. At the free top of walls without connecting slabs, stop the resilient waterstop and grooves (where used) 6 inches from the top in vertical wall joints.
 6. Bentonite Waterstop:
 - a. Locate bentonite waterstop as near as possible to the center of the joint and extend continuous around the entire joint. Minimum distance from edge of waterstop to face of member: 5 inches.
 - b. Where thickness of the concrete member to be placed on the bentonite waterstop is less than 12 inches, place waterstop in grooves at least 3/4 inch deep and 1-1/4 inches wide formed or ground into the concrete. Minimum distance from edge of waterstop placed in groove to face of member: 2.5 inches.
 - c. Do not place bentonite waterstop when waterstop material temperature is below 40 degrees F. Waterstop material may be warmed so that it remains above 40 degrees F during placement but means used to warm it shall in no way harm the material or its properties. Do not install waterstop where air temperature falls outside manufacturer's recommended range.
 - d. Place bentonite waterstop only on smooth and uniform surfaces; grind concrete smooth if necessary to produce satisfactory substrate, or bond waterstop to irregular surfaces using an epoxy grout which completely fills voids and irregularities beneath the waterstop material. Prior to installation, wire brush the concrete surface to remove laitance and other substances that may interfere with bonding of epoxy.

- e. In addition to the adhesive backing provided with the waterstop, secure bentonite waterstop in place with concrete nails and washers at 12-inch maximum spacing.
7. Adhesive Waterstop:
- a. Thoroughly clean the concrete surface on which the waterstop is to be placed with a wire brush and coat with primer.
 - b. If the surface is too rough to allow the waterstop to form a complete contact, grind to form an adequately smooth surface.
 - c. Install the waterstop with the top protective paper left in place. Overlap joints between strips a minimum of 1 inch and cover back over with the protective paper.
 - d. Do not remove protective paper until just before final formwork completion. Concrete shall be placed immediately. The time that the waterstop material is uncovered prior to concrete placement shall be minimized and shall not exceed 24 hours.

3.07 CONSTRUCTION JOINTS

A. Definitions:

- 1. Construction joint: Contact surface between plastic (fresh) concrete and concrete that has attained initial set.
- 2. Monolithic: Manner of concrete placement to reduce or eliminate construction joints; joints other than those indicated on Drawings will not be permitted without written approval of the Engineer. Where so approved, make additional construction joints with details equivalent to those indicated for joints in similar locations.

- #### B. Preparation for Construction Joints: Roughen surface of concrete previously placed, leaving some aggregate particles exposed. Remove laitance and loose materials by sandblasting or high-pressure water blasting. Keep surface wet for several hours prior to placing of plastic concrete.

3.08 CURING

- #### A. Comply with ACI 308. Cure by preventing loss of moisture, rapid temperature change and mechanical injury for a period of 7 curing days when Type II or IP cement has been used and for 3 curing days when Type III cement has been used. Start curing as soon as free water has disappeared from the concrete surface after placing and finishing. A curing day is any calendar day in which the temperature is above 50 degrees F for at least 19 hours. Colder days may be counted if air temperature adjacent to concrete is maintained above 50 degrees F. In continued cold weather, when artificial heat is not

provided, removal of forms and shoring may be permitted at the end of calendar days equal to twice the required number of curing days. However, leave soffit forms and shores in place until concrete has reached the specified 28-day strength, unless directed otherwise by the Engineer.

- B. Cure formed surfaces not requiring rub-finished surface by leaving forms in place for the full curing period. Keep wood forms wet during the curing period. Add water as needed for other types of forms. Or, at Contractor's option, forms may be removed after 2 days and curing compound applied.
- C. Rubbed Finish:
 - 1. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging the surface.
 - 2. After rub-finish operations are complete, continue curing formed surfaces by using either approved curing/sealing compounds or moist cotton mats until normal curing period is complete.
- D. Unformed Surfaces: Cure by membrane curing compound method.
 - 1. After concrete has received a final finish and surplus water sheen has disappeared, immediately seal surface with a uniform coating of approved curing compound, applied at the rate of coverage recommended by manufacturer or as directed by the Engineer. Do not apply less than 1 gallon per 180 square feet of area. Provide satisfactory means to properly control and check rate of application of the compound.
 - 2. Thoroughly agitate the compound during use and apply by means of approved mechanical power pressure sprayers equipped with atomizing nozzles. For application on small miscellaneous items, hand-powered spray equipment may be used. Prevent loss of compound between nozzle and concrete surface during spraying operations.
 - 3. Do not apply compound to a dry surface. If concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or if rain falls on a newly coated surface before film has dried sufficiently to resist damage, apply an additional coat of compound at the specified rate of coverage.

3.09 REMOVAL OF FORMS AND SHORING

- A. Remove forms from surfaces requiring rubbing only as rapidly as rubbing operation progresses. Remove forms from vertical surfaces not requiring rub-finish when concrete has aged for the required number of curing days. When curing compound is used, do not remove forms before 2 days after concrete placement,

- B. Leave soffit forms and shores in place until concrete has reached the specified 28-day strength, unless directed otherwise by the Engineer.

3.10 DEFECTIVE WORK

- A. Immediately repair any defective work discovered after forms have been removed. If concrete surface is bulged, uneven, or shows excess honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace the entire section.

3.11 FINISHING

- A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed one part cement to two parts fine aggregate. Repair defects by cutting out unsatisfactory material and replacing with new concrete, securely keyed and bonded to existing concrete. Finish to make junctures between patches and existing concrete as inconspicuous as possible. Use a stiff mixture and thoroughly tamp into place. After each patch has stiffened sufficiently to allow for greatest portion of shrinkage, strike off mortar flush with the surface.
- B. Apply a rubbed finish to exposed surfaces of formed concrete structures as noted on Drawings. After pointing has set sufficiently, wet the surface with a brush and perform first surface rubbing with No. 16 carborundum stone or equal. Rub sufficiently to bring surface to paste, to remove form marks and projections, and to produce a smooth, dense surface. Add cement to form surface paste as necessary. Spread or brush material, which has been ground to paste, uniformly over surface and allow to reset. In preparation for final acceptance, clean surfaces and perform final finish rubbing with No. 30 carborundum stone or equal. After rubbing, allow paste on the surface to reset; then wash surface with clean water. Leave structure with a clean, neat and uniform-appearing finish.
- C. Apply a wood float finish to concrete slabs.

3.12 FIELD QUALITY CONTROL

- A. Testing shall be performed under provisions of Section 01410 - Testing Laboratory Services.
- B. Unless otherwise directed by the Engineer, the following minimum testing of concrete is required. Testing shall be performed by qualified individuals employed by an approved independent testing agency, and conform to the requirements of ASTM C1077.
 - 1. Take concrete samples in accordance with ASTM C172.
 - 2. Make one set of four compression test specimens for each mix design at least once per day and for each 150 cubic yards or fraction thereof. Make, cure and test the specimens in accordance with ASTM C31 and ASTM C39.

3. When taking compression test specimens, test each sample for slump according to ASTM C143, for temperature according to ASTM C1064, for air content according to ASTM C231, and for unit weight according to ASTM C138.
 4. Inspect, sample and test concrete in accordance with ASTM C94, Section 13, 14 and 15, and ACI 311-5R.
- C. Test Cores: Conform to ASTM C42.
- D. Testing High Early Strength Concrete: When Type III cement is used in concrete, the specified 7-day and 28-day compressive strengths shall be applicable at 3 and 7 days, respectively.
- E. If 7-day or 3-day test strengths (as applicable for type of cement being used) fail to meet established strength requirements, extended curing or resumed curing on those portions of structure represented by test specimens may be required. If additional curing fails to produce the required strength, strengthening or replacement of portions of structure which fail to develop required strength may be required by the Engineer, at no additional cost to the Owner.

3.13 PROTECTION

- A. Protect concrete against damage until final acceptance by the Owner.
- B. Protect fresh concrete from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic, and whenever such precipitation is imminent or occurring.
- C. Do not backfill around concrete structures or subject them to design loadings until all components of the structure needed to resist the loading are complete and have reached the specified 28-day compressive strength, except as authorized otherwise by the Engineer.

END OF SECTION

APPENDIX

GEOTECHNICAL REPORT

GEOTECHNICAL REPORT

1. The following report is provided as information to Bidders.
2. In the design and preparation of Contract Documents for this Project, the Owner and the Engineer have relied upon the information in the geotechnical report of investigation and analysis of soils and subsurface conditions of the construction site.
3. The Owner and Engineer shall not be held responsible for the accuracy of completeness of any information or data in the report.
4. Bidder shall have full responsibility for interpretation of the report and use of the information for his bidding and construction purposes.
5. Bidder may perform such additional soils investigation as he deems appropriate.



GEOTECHNICAL ENGINEERING STUDY

FOR

**GALVESTON COUNTY W.C.I.D. #1
SANITARY SEWER REHABILITATION
DICKINSON, TEXAS**

Project No. AHA15-036-00
July 15, 2015

Mr. Kerry Lackey, P.E.
HDR Engineering, Inc.
4635 Southwest Freeway, Suite 1000
Houston, Texas 77584

**RE: Geotechnical Engineering Study
Galveston County W.C.I.D. #1
Sanitary Sewer Rehabilitation
Dickinson, Texas**

Dear Mr. Lackey:

Raba-Kistner Consultants Inc. (RKCI) is pleased to submit this report of our Geotechnical Engineering Study for the above-referenced project. This study was performed in accordance with **RKCI** Proposal No. PHA15-023-00 dated March 9, 2015 and was authorized by the HDR Engineering, Inc. "Geotech Subconsultant Agreement", dated March 31, 2015. The purpose of this study was to provide trenching, bedding, and backfill requirements for new force main piping, to perform laboratory testing on selected soil samples to classify and characterize subsurface conditions and to prepare an engineering report presenting geotechnical recommendations related to sanitary sewer rehabilitation.

We appreciate the opportunity to be of professional service to you on this project. Should you have any questions about the information presented in this report, please call. We look forward to assisting HDR Engineering, Inc. (CLIENT) during the construction phase of the project by conducting the construction materials engineering and testing services (quality assurance program).

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

Niran Brown
Alireza Mohsini
Graduate Engineer

jes

AM/JDB/dar

Attachments

Copies Submitted: Above (3), Electronic (1)

John D. Brown

John D. Brown, P.E.

Manager, Geotechnical Services

7-15-2015



GEOTECHNICAL ENGINEERING STUDY

For

**GALVESTON COUNTY W.C.I.D. #1
SANITARY SEWER REHABILITATION
DICKINSON, TEXAS**

Prepared for

HDR ENGINEERING, INC.
Houston, TX

Prepared by

RABA-KISTNER CONSULTANTS, INC.
Houston, Texas

PROJECT NO. AHA15-036-00

July 15, 2015

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July 15, 2015

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ATTACHMENTS

Boring Location Map
Lateral Earth Pressure Diagrams
Log of Borings
Key to Terms and Symbols
Results of Soil Sample Analyses
Important Information about Your Geotechnical Engineering Report

INTRODUCTION

Raba-Kistner Consultants Inc. (RKCI) has completed the authorized subsurface exploration and construction recommendations for the proposed rehabilitation of approximately 7,950 linear feet of 8-inch sanitary sewer by pipe bursting located in Galveston County Water Conservation and Improvement District (W.C.I.D.) No. 1, in Dickinson, Texas. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendations for new sanitary sewer force main construction.

PROJECT DESCRIPTION

We understand that the project will consist of the rehabilitation of approximately 7,950 LF of 8-inch sanitary sewer by pipe bursting. The project also includes installation of eight (8) new 4-ft diameter manholes and rehabilitation of sixteen (16) existing sanitary sewer manholes. Installation of new sanitary sewer pipe by cut and cover methods could also be required.

LIMITATIONS

This engineering report has been prepared in accordance with accepted Geotechnical Engineering practices in the Houston metropolitan area by geotechnical firms completing similar work under similar circumstances and is meant for the use of HDR Engineering, Inc. (CLIENT) and its representatives for design purposes. This report may not contain sufficient information for purposes of other parties or for final design of the project. This report is not intended for use in determining construction means and methods.

The recommendations presented in this report are based on the data obtained from 2 soil borings drilled during this study and our understanding of the project information provided to us. If the information described in this report is incorrect, altered, or if new information is available, we should be retained to review and modify our recommendations.

This report may not reflect the actual variations of the subsurface conditions across the subject site. The nature and extent of variations across the subject site may not become evident until construction commences. The construction process itself may also alter subsurface conditions. If variations appear evident at the time of construction, it may be necessary to reevaluate our recommendations after performing on-site observations and tests to establish the engineering impact of the variations.

The scope of our Geotechnical Engineering Study does not include an environmental assessment of the air, soil, rock, or water conditions either on or adjacent to the site. No environmental opinions are presented in this report.

BORINGS AND LABORATORY TESTS

Subsurface conditions at the site were evaluated by drilling two, 15 ft deep borings (B-1 and B-2). Boring locations are shown on the Boring Location Map, Figure 1. The boring locations are approximate and were located in the field by an **RKCI** representative based on a site plan provided by the CLIENT, and by measuring distances from existing references using tape, angles, pacing, etc. Latitude-longitude at the boring locations was estimated using Google Earth imagery dated October 3, 2014. The coordinates are shown on the Boring Location Map and on the boring logs.

The borings were completed using truck mounted drilling equipment utilizing straight flight auger drilling techniques. At completion of drilling and after obtaining water level readings, the cuttings from drilling activities were used to backfill the open boreholes.

During drilling operations, the following soil samples were collected:

Type of Sample	Number Collected
Relatively Undisturbed Shelby Tube (ST)	11
Grab Sample	1

The ST samples were obtained in general accordance with accepted standard practices. Representative portions of the samples were sealed in containers to reduce moisture loss, labeled, packaged, and transported to our laboratory for subsequent testing and classification.

Laboratory tests were performed in general accordance with ASTM standards. The geotechnical engineering properties of the strata were evaluated by the laboratory tests tabulated in the following table:

Type of Test	Number Conducted
Natural Moisture Content	12
Atterberg Limits	4
Percent Passing Sieve #200	2
Unconfined Compression	2

The results of all laboratory tests are presented in graphical and numerical form on the boring logs presented on Figures 2 and 3. A key to terms and symbols used on the logs is presented on Figure 4. The results of soil sample analyses are presented on Figure 5 for ease of reference.

Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the request of the Client.

GENERAL SITE CONDITIONS

SITE DESCRIPTION

Galveston County W.C.I.D. No. 1 is located in Dickinson, Texas. The project area is bounded by FM 1266 to the West, California Avenue to the east, 23rd Street to the north, and the Dickinson city limits to the south (Key Map 659 VZ, 660 SW). At the time of our study, the project sites were relatively flat and grass-covered, and were situated within the street right-of-way approximately 10 ft west of the curb.

GEOLOGY

The Bureau of Economic Geology, Geologic Atlas of Texas, Houston Sheet (Revised 1982) shows the subject site to be located on the Beaumont Formation. The Beaumont Formation is the youngest coast-parallelizing Pleistocene unit in the Texas Gulf Coast. Most of the Beaumont Formation was deposited as an overlapping group of fluvial or deltaic plains by ancestors of modern streams now draining into the Gulf of Mexico. The Beaumont formation is comprised of clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds; formation thickness is +/- 100 ft.

In general vicinity of the project site, the soils are dominantly clay and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity; geologic units include interdistributary muds, abandoned channel-fill muds, and overbank fluvial muds.

STRATIGRAPHY

The subsurface stratigraphy at this site is relatively uniform and consists of cohesive, highly plastic, and firm to very stiff consistency, dark gray to gray to yellowish brown, fat clay (CH). Sand seams, clay stones, and calcareous and ferrous nodules were noted within the clay matrix at varying depths within the stratum I soils. Slickensided substructure was also noted from a depth range of 6-ft to 8-ft in boring B-2. Measured moisture contents range from 20 to 33 percent. Measured plasticity indices (PI) range from 42 to 54. Based on grain size analyses, the percentage of fines (percent passing a No. 200 sieve) ranges from 92 to 93 percent. Based on unconfined compression test results, undrained cohesion values range from 0.39 to 0.56 tsf. Dry unit weight values ranging from 90 to 93 pcf were recorded on the tested samples.

GROUNDWATER

The borings were drilled using dry-auger techniques in an attempt to measure depth-to-water in the open boreholes. Free water was not encountered in the borings at the time of our field activities. The

borings remained dry during the field exploration phase and were abandoned by backfilling with soil cuttings.

It should be noted that depth-to-water levels may fluctuate at any given time due to seasonal variations in rainfall and surface runoff, especially during extended periods of heavy rainfall or dry weather. Surface runoff may be controlled using temporary earthen berms or swales and conventional sump-and-pump dewatering methods.

GEOTECHNICAL RECOMMENDATIONS

The following sections provide our geotechnical recommendations for excavation, trenching and shoring, bedding and backfill, and groundwater control.

EXCAVATION, TRENCHING, AND SHORING

Excavations that exceed 5-ft depth at the project site will require safe side-slopes or adequate retention systems to protect workers from cave-ins. The current Occupational Safety and Health Administration (OSHA) Standards (29 CFR, Part 1926, Subpart P) include provisions for the design of slopes and benched trench excavations in single or multiple-layer soil stratigraphy less than 20-ft deep, in lieu of bracing and shoring. The regulations specify maximum slope declivities contingent on the soil type: Type A, Type B, or Type C.

Excavations to install the proposed water line are anticipated to encounter very firm to very stiff, but mostly stiff to very stiff, cohesive fat clay. The cohesive soils that comprise a majority of the project borings would be classified as "Type C" due to average values of undrained cohesion (generally between 0.5 to 1.0 tsf, with one unconfined test result below 0.5 tsf) and the presence of slickensided substructure from a depth range of 6-ft to 8-ft in boring B-2. A configuration of sloping and benching systems based upon OSHA guidelines for short-term conditions (less than 24 hrs) is presented below.

Maximum Allowable Side Slopes

SOIL TYPE	MAXIMUM ALLOWABLE SLOPE (H:V)
TYPE C	1.5:1 (34°)

When there are signs of distress or if water seepage is evident, the entire excavation must have side-slopes of 2.0(H):1.0(V) or flatter. A trench shield (box), if used as temporary retention system, should be designed by the contractor to withstand lateral loads imposed by the specific soil conditions.

Another option is to excavate vertically and shore temporarily with bracing or a trench shield (box). These support systems must be designed to withstand the soil pressures corresponding to the soil types as shown on the boring logs or as encountered during construction. In all cases, excavations should, as a minimum, conform to OSHA guidelines. The trench box, if used as temporary retention system, should be designed by the contractor to withstand lateral loads imposed by the specific soil conditions.

For trench box (es) or shields, there must be sufficient space between the excavation face and the shield to allow shield installation and removal; usually a space on the order of 3 to 6 inches. However, we recommend that trench boxes not be utilized in such a manner that the face of the excavation is greater than 12 inches from the trench box.

To avoid surcharging the excavation walls, stockpiling of excavated materials immediately adjacent to the excavation wall should be prohibited. We recommend that stockpile materials be placed away from the excavation with a minimum distance of 6-ft from the excavation crest. In addition, the stockpile should not be placed higher than 4-ft. Construction equipment working near the trench may also induce excessive surcharge loads. We recommend shoring the trench in areas adjacent to working equipment. Experienced personnel who can assess the performance of the retention system being used should monitor all excavations and retaining structures on a continuous basis.

The Contractor designated "Competent Person" should review our recommendations and determine the appropriate safe slopes on the job site at the time of construction.

Critical Height

Cuts in clays will stand with vertical slopes for a short period of time before failure occurs. *However, changes in the shear strength of the clay with time and stress release resulting from the excavation can lead to progressive deterioration of stability.* This process can be rapid in stiff, fissured clays and slower in softer clays.

Bearing Pressures

The stability of an excavation bottom is dependent on the excavation geometry, soil strength parameters of the bearing soils, and most importantly the location of groundwater. Excavations within cohesive soils are not susceptible to a reduction in effective stress conditions due to the relatively short period of time excavations are open. That is, the stress conditions within cohesive soils generally do not move from an undrained (short-term) to drained (long-term) condition. As such, the bottom stability of excavations within cohesive soils is controlled by the shear strength of the bearing soils. Bottom stability within cohesionless soils situated below the groundwater table is controlled through dewatering, if applicable.

It is important to note that the above discussion does not consider layered soil profiles. For example, a charged sand layer that lies below a clay layer will cause significant seepage pressures on the bottom of an excavation within the overlying clay layer, especially as the excavation approaches the sand layer. When encountered, these areas must be considered on a case-by-case basis by the Geotechnical Engineer-of-Record.

UTILITY TRENCH BEDDING AND BACKFILL

Bedding and backfill recommendations for the proposed water line replacement should be in accordance with the *City of Houston Standard Construction Specifications* section 02317 and 02320.

Bedding

Bedding is the material used along the bottom of the trench that provides uniform support for the buried pipe. Bedding may be compacted or uncompacted, depending on the recommendations of the design engineer. Bedding that is uncompacted allows the pipe to sink into the bedding soil allowing for a more uniform distribution of stress on the bottom of the pipe.

Under installed conditions, the vertical load on a pipe is distributed over its width and the reaction is distributed in accordance with the type of bedding. When the pipe strength used in design has been determined by controlled laboratory testing, a factor must be applied that relates the in-place supporting strength to that obtained in the lab. We recommend the pipe designer use a bedding factor to account for the width of the soil reaction at the bottom of the pipe.

Foundation

The bottoms of trench excavations should expose strong competent soils and should be dry and free of loose, soft, or disturbed soil. If fill soils are encountered at the base of trench excavations, their competency should be verified through probing and density testing. Soft, wet, weak, or deleterious materials should be over-excavated to expose strong competent soils.

At locations where soft or weak soils extend for some depth, overexcavation to stronger soils may prove infeasible and/or uneconomical. In the event of these areas are encountered, we recommend that the bottom of the trench excavation be over-excavated by 1 to 2 feet, and replaced with an open-graded aggregate that will allow for drainage of water, as well as provide a stable working platform. The City of Houston specifications require a non-woven geotextile fabric be placed along the bottom of the overexcavated area before backfilling.

Materials

The bedding materials should be selected to ensure the most uniform contact between the pipe and the foundation as possible. Granular soils such as bank run sand, concrete sand, gem sand, pea gravel, crushed limestone, or cement treated sand may be used as the bedding material. It is essential that bedding materials are placed (i.e., thickness of layer and compactive effort) in conformance with City of Houston Specification Section 02320 with respect to soil type and compactive effort.

Backfill

We recommend backfill materials and placement be in accordance with *City of Houston Standard Specification* Section 02317 – Excavation and Backfill for Utilities. In addition, backfill for trenches should not be started until the waterline or sewerline is properly bedded in accordance with the above recommendations. Materials removed from the trench excavations will generally be suitable as backfill above the bedding, provided they are not saturated and do not contain organic matter, debris, or other deleterious material.

To reduce potential settlements of the ground surface resulting from consolidation of the trench backfill, we recommend that trench backfill be placed in 6-in. thick loose lifts and compacted to at least 95 percent of the maximum dry density as determined by ASTM D 698. Material types allowed by the City of Houston include Class I, II, and III embedment materials and cement treated sand. We further recommend that utility trenches that cross or encroach upon the proposed roadways be backfilled with cement treated sand to within 18-in. of pavement subgrade, followed by select fill placed and compacted as per City of Houston requirements.

GROUND WATER CONTROL

Construction dewatering and excavation stability are the contractor's responsibility. Our excavation comments and suggestions contained in this report are for informational purposes only. These comments may be used to review the contractor's proposed excavation procedures.

Water seepage or surface runoff within cohesive soils can typically be handled by pumping from sumps. The static groundwater table, based on the water level measurements obtained during drilling operations, appears to be below a depth of 15-ft.

The condition of the bearing surface should be carefully monitored during construction to check for possible bottom heave or other instabilities. Undercutting may be employed to achieve competent bearing conditions. In such cases, grade adjustments can be made by placing lean concrete, or backfilling to grade with cement-stabilized sand (one bag of cement per cubic yard of sand). If precast sections are used, we recommend using cement-stabilized sand for the bedding.

Control of groundwater should be performed in a manner that the soil strength at the pipe bedding depth be preserved throughout the construction. Dewatering should not cause instability of the excavation nor damage any existing structures.

SUBGRADE PREPARATION FOR PAVEMENT POINT REPAIR

We understand that point repair of existing pavement will be required at various locations along the sewer line alignment. However, stabilization of exposed subgrade in a small area may become impractical. We recommend the following subgrade preparation options for point repair in lieu of lime stabilization.

Cement-Stabilized Sand

A minimum 12-inch thick cement stabilized sand compacted to at least 95% of the maximum standard Proctor dry density as per ASTM D 698. Cement should be Type 1 Portland cement with at least one sack of cement per cubic yard of sand.

Select Cohesive Fill

A minimum 24-inch thick select (low plasticity) cohesive soil, free of organic or other deleterious material, with a Plasticity Index between 7 and 20 percent. Select fill should be compacted to at least 95% of the maximum standard Proctor dry density as per ASTM D 698, and within two percentage points of the optimum moisture content.

CONSTRUCTION RELATED SERVICES

CONSTRUCTION MATERIALS TESTING AND OBSERVATION SERVICES

As presented in the attachment to this report, *Important Information About Your Geotechnical Engineering Report*, subsurface conditions can vary across a project site. The conditions described in this report are based on interpolations derived from a limited number of data points. Variations will be encountered during construction, and only the geotechnical design engineer will be able to determine if these conditions are different than those assumed for design.

Construction problems resulting from variations or anomalies in subsurface conditions are among the most prevalent on construction projects and often lead to delays, changes, cost overruns, and disputes. These variations and anomalies can best be addressed if the geotechnical engineer of record, **RKCI**, is retained to perform construction observation and testing services during the construction of the project. This is because:

- **RKCI** has an intimate understanding of the geotechnical engineering report's findings and recommendations. **RKCI** understands how the report should be interpreted and can provide such interpretations on site, on the CLIENT's behalf.
- **RKCI** knows what subsurface conditions are anticipated at the site.
- **RKCI** is familiar with the goals of the CLIENT and project design professionals, having worked with them in the development of the geotechnical workscope. This enables **RKCI** to suggest remedial measures (when needed) which help meet the CLIENT's and the design teams' requirements.
- **RKCI** has a vested interest in client satisfaction, and thus assigns qualified personnel whose principal concern is client satisfaction. This concern is exhibited by the manner in which contractors' work is tested, evaluated and reported, and in selection of alternative approaches when such may become necessary.
- **RKCI** cannot be held accountable for problems which result due to misinterpretation of our findings or recommendations when we are not on hand to provide the interpretation which is required.

BUDGETING FOR CONSTRUCTION TESTING

Appropriate budgets need to be developed for the required construction testing and observation activities. At the appropriate time before construction, we advise that **RKCI** and the project designers meet and jointly develop the testing budgets, as well as review the testing specifications as it pertains to this project.

Once the construction testing budget and scope of work are finalized, we encourage a preconstruction meeting with the selected contractor to review the scope of work to make sure it is consistent with the construction means and methods proposed by the contractor. **RKCI** looks forward to the opportunity to provide continued support on this project, and would welcome the opportunity to meet with the Project Team to develop both a scope and budget for these services.

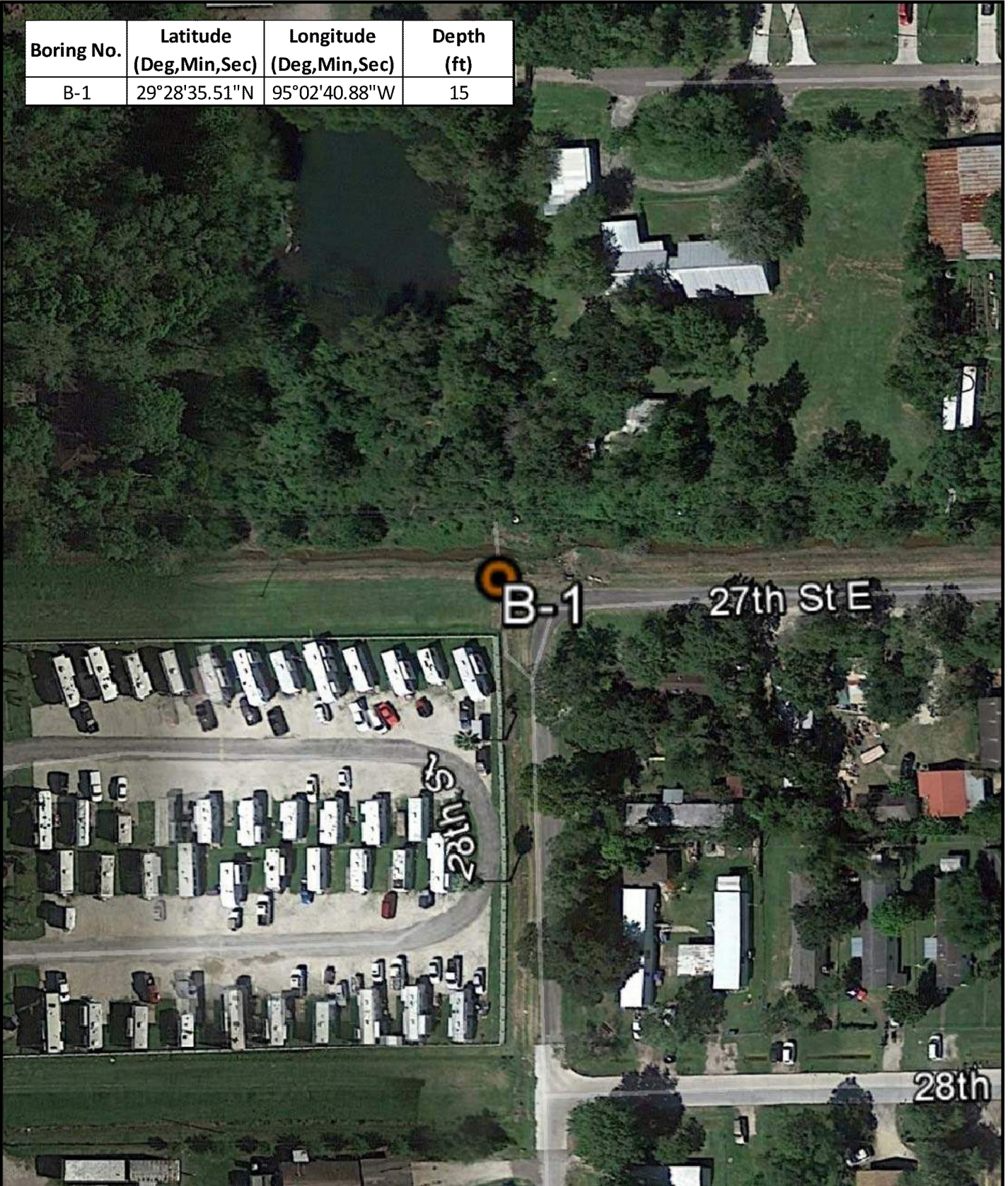
* * * * *

The following figures are attached and complete this report:

- | | |
|--------------|---------------------------------|
| Figure 1 | Boring Location Map |
| Figures 2 an | Logs of Borings |
| Figure | Key to Terms and Symbols |
| Figure 5 | Results of Soil Sample Analyses |

ATTACHMENTS

Boring No.	Latitude (Deg,Min,Sec)	Longitude (Deg,Min,Sec)	Depth (ft)
B-1	29°28'35.51"N	95°02'40.88"W	15



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 Facilities • Infrastructure

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BORING LOCATION MAP

GALVESTON COUNTY W.C.I.D. #1
 SANITARY SEWER REHABILITATION
 DICKINSON, GALVESTON COUNTY, TEXAS

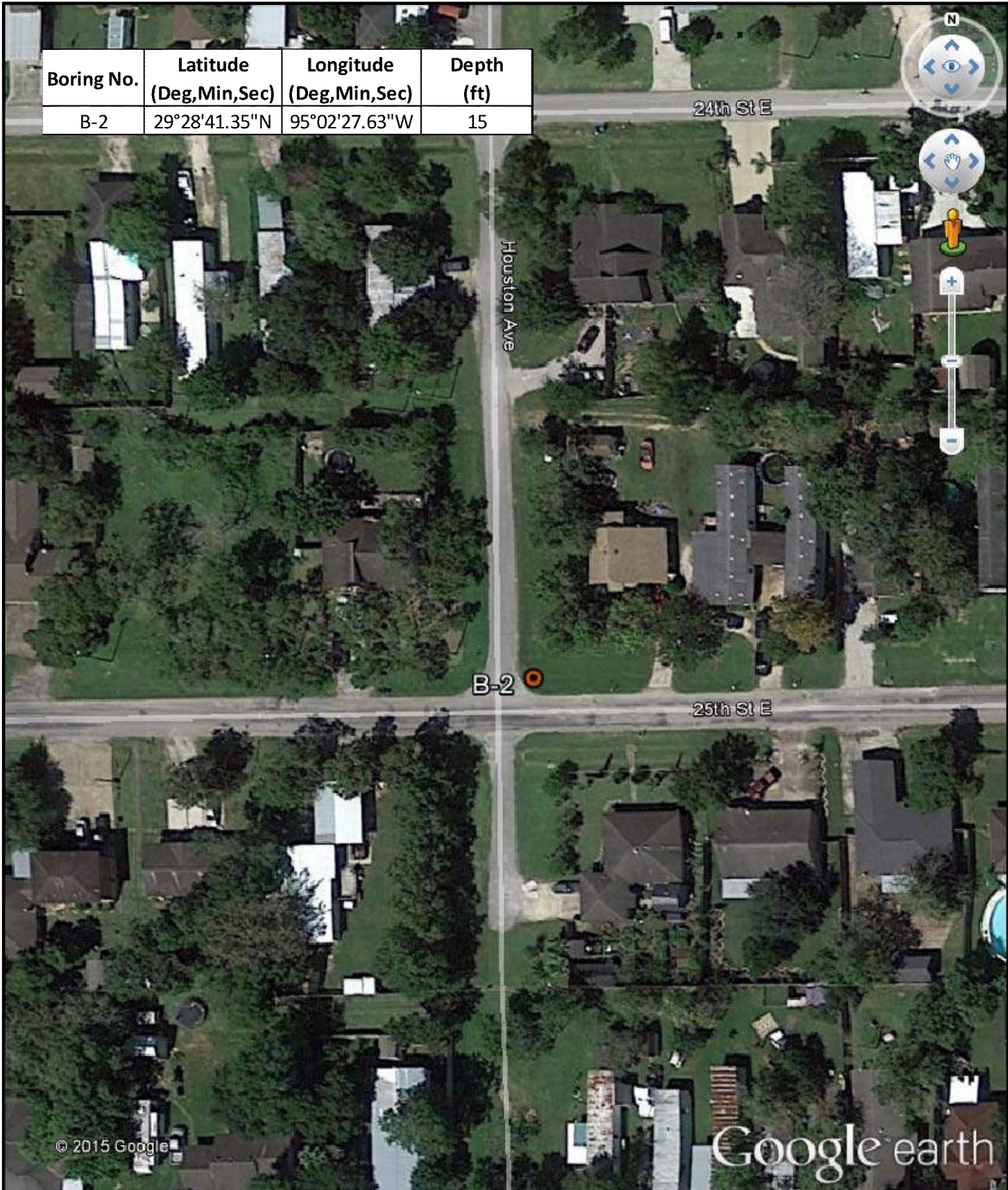
REVISIONS:		
No.	DATE	DESCRIPTION

PROJECT No.:
 AHA15-036-00

ISSUE DATE: 07/15/15
 DRAWN BY: SAH
 CHECKED BY: JDB
 REVIEWED BY: JDB

**FIGURE
 1a**

Boring No.	Latitude (Deg,Min,Sec)	Longitude (Deg,Min,Sec)	Depth (ft)
B-2	29°28'41.35"N	95°02'27.63"W	15



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BORING LOCATION MAP

GALVESTON COUNTY W.C.I.D. #1
 SANITARY SEWER REHABILITATION
 DICKINSON, GALVESTON COUNTY, TEXAS

REVISIONS:		
No.	DATE	DESCRIPTION

PROJECT No.:		
ISSUE DATE:	05/18/15	
DRAWN BY:	SAH	
CHECKED BY:	JDB	
REVIEWED BY:	JDB	
FIGURE		1b

LOG OF BORING NO. B-1
 WCID #1 - Sanitary Sewer Rehabilitation
 Dickinson, Texas



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.47621; W 95.04462

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	% -200			
						0.5	1.0	1.5			2.0	2.5	3.0
			SURFACE ELEVATION: Existing grade, ft										
			FAT CLAY (CH), stiff to very stiff, dark gray -w/ clay stones to 4 ft										
5			-gray and yellowish brown below 4 ft -w/ sand seams from 4 ft to 6 ft								42	93	
			-w/ ferrous nodules from 6 ft to 15 ft										
			-firm, w/ clay stones from 8 ft to 10 ft								53		
10				90									
15			Boring terminated at a depth of about 15 ft										

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 15.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA15-036-00
DATE DRILLED: 5/11/2015	DATE MEASURED: 5/11/2015	FIGURE: 2

LOG OF BORING NO. B-2
 WCID #1 - Sanitary Sewer Rehabilitation
 Dickinson, Texas



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.47810; W 95.04107

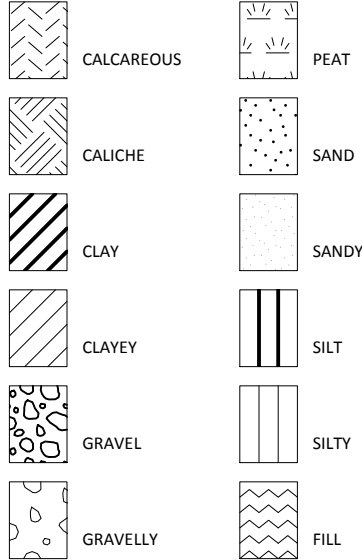
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	% -200			
						0.5	1.0	1.5			2.0	2.5	3.0
			SURFACE ELEVATION: Existing grade, ft										
			FAT CLAY (CH), stiff, dark gray -w/ calcareous nodules to 4 ft									50	92
5			-gray and yellowish brown below 4 ft										
			-w/ slickensides from 6 ft to 8 ft -w/ clay stones below 6 ft		93								
10													
15			Boring terminated at a depth of about 15 ft									54	
DEPTH DRILLED: 15.0 ft			DEPTH TO WATER: Dry			PROJ. No.: AHA15-036-00							
DATE DRILLED: 5/11/2015			DATE MEASURED: 5/11/2015			FIGURE: 3							

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

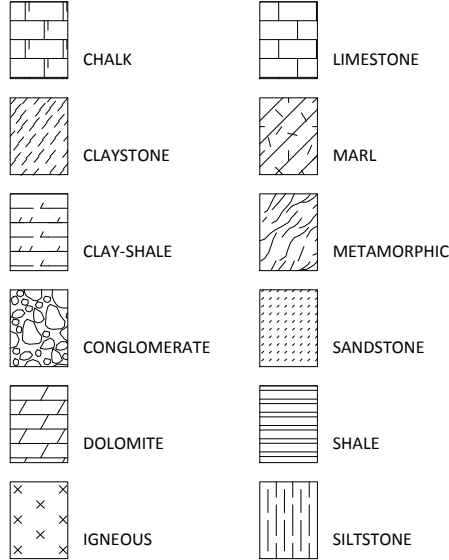
KEY TO TERMS AND SYMBOLS

MATERIAL TYPES

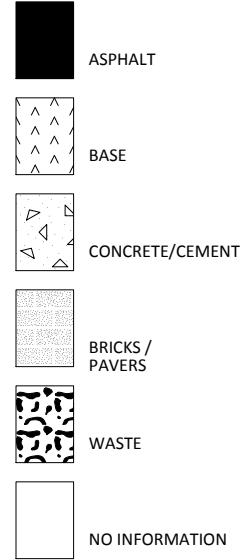
SOIL TERMS



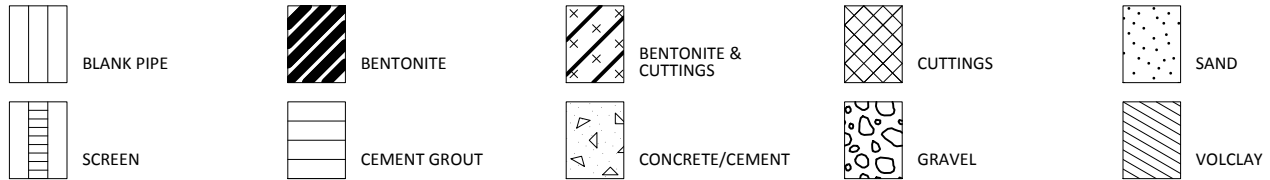
ROCK TERMS



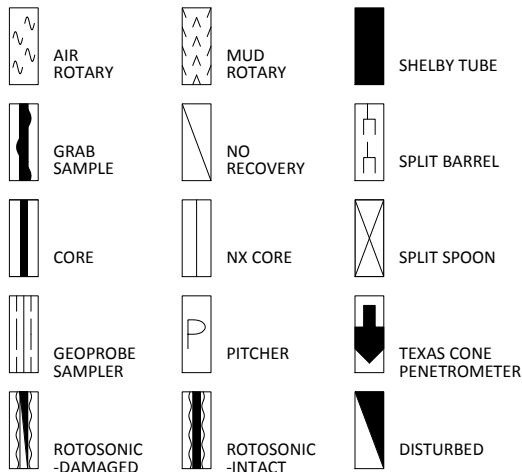
OTHER



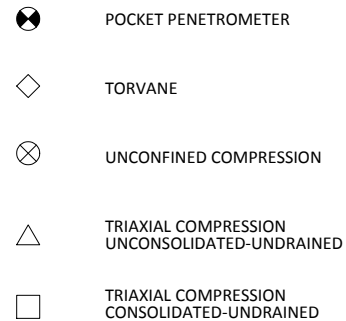
WELL CONSTRUCTION AND PLUGGING MATERIALS



SAMPLE TYPES



STRENGTH TEST TYPES



NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

PROJECT NO. AHA15-036-00

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

Terms used in this report to describe soils with regard to their consistency or conditions are in general accordance with the discussion presented in Article 45 of SOILS MECHANICS IN ENGINEERING PRACTICE, Terzaghi and Peck, John Wiley & Sons, Inc., 1967, using the most reliable information available from the field and laboratory investigations. Terms used for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in American Society for Testing and Materials D2487-06 and D2488-00, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics; 2005.

The depths shown on the boring logs are not exact, and have been estimated to the nearest half-foot. Depth measurements may be presented in a manner that implies greater precision in depth measurement, i.e 6.71 meters. The reader should understand and interpret this information only within the stated half-foot tolerance on depth measurements.

RELATIVE DENSITY

COHESIVE STRENGTH

PLASTICITY

<u>Penetration Resistance Blows per ft</u>	<u>Relative Density</u>	<u>Resistance Blows per ft</u>	<u>Consistency</u>	<u>Cohesion TSF</u>	<u>Plasticity Index</u>	<u>Degree of Plasticity</u>
0 - 4	Very Loose	0 - 2	Very Soft	0 - 0.125	0 - 5	None
4 - 10	Loose	2 - 4	Soft	0.125 - 0.25	5 - 10	Low
10 - 30	Medium Dense	4 - 8	Firm	0.25 - 0.5	10 - 20	Moderate
30 - 50	Dense	8 - 15	Stiff	0.5 - 1.0	20 - 40	Plastic
> 50	Very Dense	15 - 30	Very Stiff	1.0 - 2.0	> 40	Highly Plastic
		> 30	Hard	> 2.0		

ABBREVIATIONS

B = Benzene	Qam, Qas, Qal = Quaternary Alluvium	Kef = Eagle Ford Shale
T = Toluene	Qat = Low Terrace Deposits	Kbu = Buda Limestone
E = Ethylbenzene	Qbc = Beaumont Formation	Kdr = Del Rio Clay
X = Total Xylenes	Qt = Fluvial Terrace Deposits	Kft = Fort Terrett Member
BTEX = Total BTEX	Qao = Seymour Formation	Kgt = Georgetown Formation
TPH = Total Petroleum Hydrocarbons	Qle = Leona Formation	Kep = Person Formation
ND = Not Detected	Q-Tu = Uvalde Gravel	Kek = Kainer Formation
NA = Not Analyzed	Ewi = Wilcox Formation	Kes = Escondido Formation
NR = Not Recorded/No Recovery	Emi = Midway Group	Kew = Walnut Formation
OVA = Organic Vapor Analyzer	Mc = Catahoula Formation	Kgr = Glen Rose Formation
ppm = Parts Per Million	EI = Laredo Formation	Kgru = Upper Glen Rose Formation
	Kknm = Navarro Group and Marlbrook Marl	Kgrl = Lower Glen Rose Formation
	Kpg = Pecan Gap Chalk	Kh = Hensell Sand
	Kau = Austin Chalk	

PROJECT NO. AHA15-036-00

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

SAMPLING METHODS

RELATIVELY UNDISTURBED SAMPLING

Cohesive soil samples are to be collected using three-inch thin-walled tubes in general accordance with the Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D1587) and granular soil samples are to be collected using two-inch split-barrel samplers in general accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586). Cohesive soil samples may be extruded on-site when appropriate handling and storage techniques maintain sample integrity and moisture content.

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-in.-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARREL SAMPLER DRIVING RECORD

<u>Blows Per Foot</u>	<u>Description</u>
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: WCID #1 - Sanitary Sewer Rehabilitation
Dickinson, Texas

FILE NAME: AHA15-036-00.GPJ

5/18/2015

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-1	0.0 to 2.0		23							1.25	TV
	2.0 to 4.0		23	63	21	42	CH		93	1.00	TV
	4.0 to 6.0		20							1.75	TV
	6.0 to 8.0		27	74	21	53				1.00	TV
	8.0 to 10.0		30					90		0.39	UC
	13.0 to 15.0		23							0.70	TV
B-2	0.0 to 2.0		26	70	20	50	CH		92		
	2.0 to 4.0		33							0.70	TV
	4.0 to 6.0		31							0.65	TV
	6.0 to 8.0		29					93		0.56	UC
	8.0 to 10.0		21							0.65	TV
	13.0 to 15.0		30	77	23	54				0.75	TV

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial
CU = Consolidated Undrained Triaxial

PROJECT NO. AHA15-036-00

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your GBC-Member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910

Telephone: 301/565-2733 Facsimile: 301/589-2017

e-mail: info@geoprofessional.org www.geoprofessional.org

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CONSULTANTS • ENVIRONMENTAL • FACILITIES • INFRASTRUCTURE

▶ **San Antonio, TX**

Austin, TX

Dallas , TX

McAllen, TX

Brownsville, TX

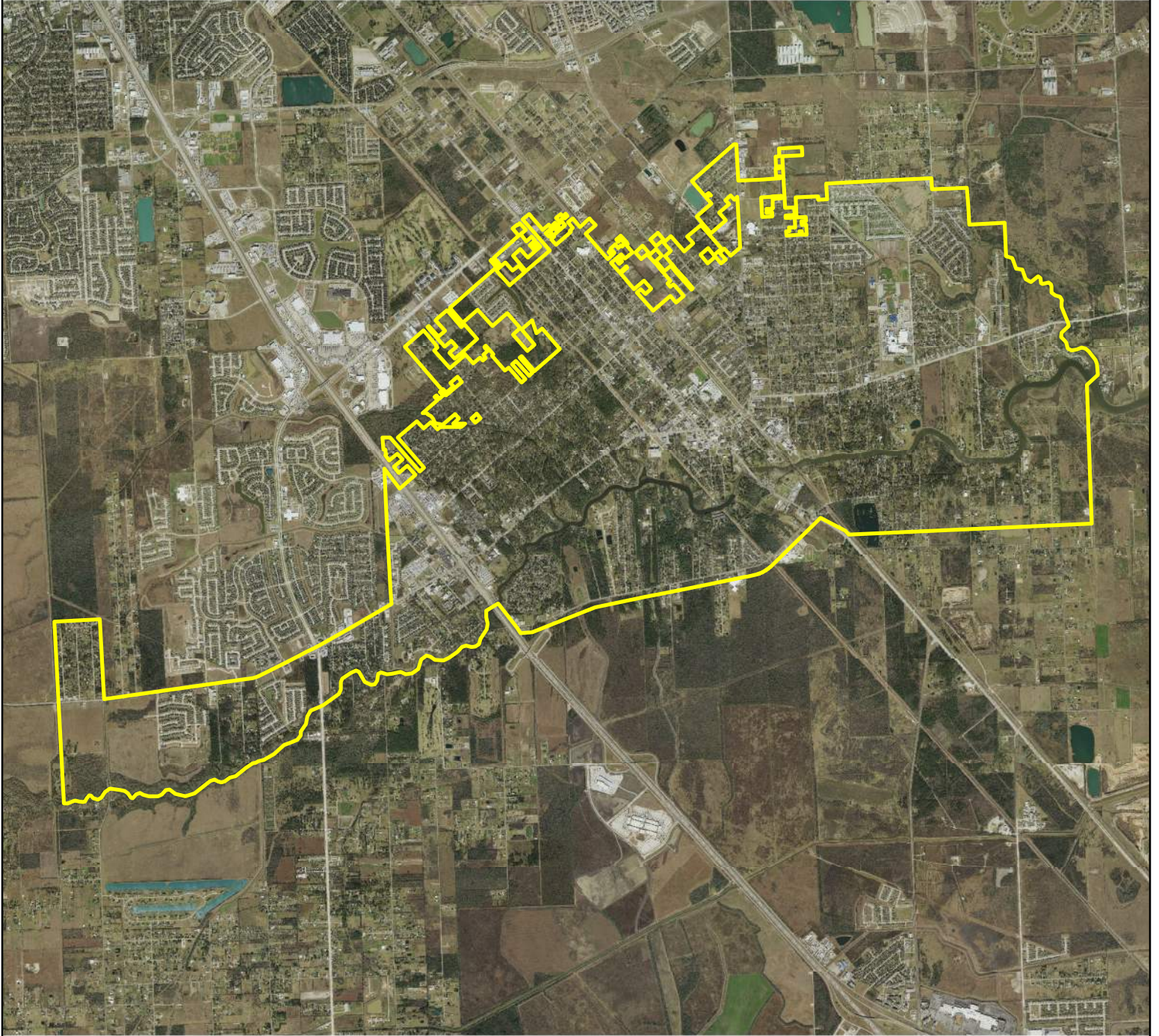
El Paso, TX

Mexico

Corpus Christi , TX

Houston, TX

Salt Lake City, UT



**CDBG
PACKET**

Notice to Contractors

List of Exhibits:

- A. **Exhibit I – Quarterly Employment Data Report** – This report **must** be completed five (5) days after the preconstruction meeting.
- B. **Exhibit II – “Equal Employment Opportunity is the Law” (EEO) Poster** – This poster **must** be posted at the job site in an area visible to all workers.
- C. **Exhibit III – Payroll and Certification form** – This form is due within five (5) working days after the end of the weekly payroll period. (Note: If you elect to use your own printed payroll form, the Statement of Compliance form should accompany your payroll form).
- D. **Exhibit IV– Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees** – This form should be completed by the General Contractor and Subcontractor, and should accompany the first payroll form.
- E. **Exhibit V – Notice to Employees Poster** – This poster, along with wage rates **must** be posed at the job site in an area visible to all workers.
- F. **Exhibit VI – U.S. Department of Labor Wage Decision** – This wage decision is required by HUD on all federally-funded projects. The Davis-Bacon Act requires that workers receive no less than the prevailing wages being paid for similar work in the locality.
- G. **Exhibit VII – Employment and Minority Business Plan** – As specified in Parts IV and V of the HUD Specifications, all prime Contractors are required to submit a completed Plan detailing employment, as well as economic opportunities for minority and women-owned businesses. This Plan is due within five (5) working days after being notified as the apparent low bidder. Failure to submit this Plan will render your bid non-responsive.
- H. **Exhibit VIII – Certification for Contracts, Grants, Loans and Cooperative Agreements** – This form **must** be completed five (5) days after the preconstruction meeting.
- I. **Exhibit IX – Certification Regarding Debarment** – This form **must** be completed for each subcontractor and returned within five (5) working days after the preconstruction meeting.
- J. **Exhibit X – Subcontractor Profile** – This form **must** be completed for each subcontractor and returned within five (5) working days after the preconstruction meeting.

Exhibit I

Quarterly Employment Data Report

Galveston County WCID #1 1911 FM 517 East, Dickinson, TX 77539 PHONE: 281-337-1576 FAX: 281-534-4672																
Project Name		Contractor's Business Name, Address, Phone No.					Contract No.			Contractor's Fed. I.D. No.			Contractor's Status () Prime () Subcontractor () Lower Tier			
Type of Contract () Construction () Service () Supply		Legal Status () Proprietorship () Partnership () Joint Venture () Corporation		Contract Amount		Covered Workforce Area(s) () Houston SMSA () Houston SMSA Plus Outside Area(s)		Current Employment Goals Minority: _____ Female: _____		Source of Funding () Federal () Nonfederal		Reporting Period: From: _____ To: _____		Data Report No.		
All Employees						Minority Group Employees										
				Male				Female				Totals		Percent		
EEO Categories		Total Male & Female	Male	Female	Black (not of Hispanic Origin)	Hispanic	Asian or Pacific Islanders	American Indian or Alaskan Natives	Black (not of Hispanic Origin)	Hispanic	Asian or Pacific Islanders	American Indian or Alaskan Natives	Minority	Female	Minority	Female
Officials, Managers and Supervisors																
Professionals																
Technicians																
Sales Workers																
Office and Clerical																
Craftsmen (Skilled)																
Operatives (Semi-skilled)																
Laborers (Unskilled)																
Service Workers																
Apprentices																
Totals																
Company Official's Signature and Title						Date Signed		Name and Title of Individual Completing Report				Page _____ of _____				

Exhibit II

“Equal Employment Opportunity is the Law” (EEO) Poster

Equal Employment Opportunity is **THE LAW**

Private Employers, State and Local Governments, Educational Institutions, Employment Agencies and Labor Organizations

Applicants to and employees of most private employers, state and local governments, educational institutions, employment agencies and labor organizations are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Title VII of the Civil Rights Act of 1964, as amended, protects applicants and employees from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment, on the basis of race, color, religion, sex (including pregnancy), or national origin. Religious discrimination includes failing to reasonably accommodate an employee's religious practices where the accommodation does not impose undue hardship.

DISABILITY

Title I and Title V of the Americans with Disabilities Act of 1990, as amended, protect qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship.

AGE

The Age Discrimination in Employment Act of 1967, as amended, protects applicants and employees 40 years of age or older from discrimination based on age in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment.

SEX (WAGES)

In addition to sex discrimination prohibited by Title VII of the Civil Rights Act, as amended, the Equal Pay Act of 1963, as amended, prohibits sex discrimination in the payment of wages to women and men performing substantially equal work, in jobs that require equal skill, effort, and responsibility, under similar working conditions, in the same establishment.

GENETICS

Title II of the Genetic Information Nondiscrimination Act of 2008 protects applicants and employees from discrimination based on genetic information in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. GINA also restricts employers' acquisition of genetic information and strictly limits disclosure of genetic information. Genetic information includes information about genetic tests of applicants, employees, or their family members; the manifestation of diseases or disorders in family members (family medical history); and requests for or receipt of genetic services by applicants, employees, or their family members.

RETALIATION

All of these Federal laws prohibit covered entities from retaliating against a person who files a charge of discrimination, participates in a discrimination proceeding, or otherwise opposes an unlawful employment practice.

WHAT TO DO IF YOU BELIEVE DISCRIMINATION HAS OCCURRED

There are strict time limits for filing charges of employment discrimination. To preserve the ability of EEOC to act on your behalf and to protect your right to file a private lawsuit, should you ultimately need to, you should contact EEOC promptly when discrimination is suspected:

The U.S. Equal Employment Opportunity Commission (EEOC), 1-800-669-4000 (toll-free) or 1-800-669-6820 (toll-free TTY number for individuals with hearing impairments). EEOC field office information is available at www.eeoc.gov or in most telephone directories in the U.S. Government or Federal Government section. Additional information about EEOC, including information about charge filing, is available at www.eeoc.gov.

Employers Holding Federal Contracts or Subcontracts

Applicants to and employees of companies with a Federal government contract or subcontract are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits job discrimination on the basis of race, color, religion, sex or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

DISABLED, RECENTLY SEPARATED, OTHER PROTECTED, AND ARMED FORCES SERVICE MEDAL VETERANS

The Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits job discrimination and requires affirmative action to employ and advance in employment disabled veterans, recently separated veterans (within

three years of discharge or release from active duty), other protected veterans (veterans who served during a war or in a campaign or expedition for which a campaign badge has been authorized), and Armed Forces service medal veterans (veterans who, while on active duty, participated in a U.S. military operation for which an Armed Forces service medal was awarded).

RETALIATION

Retaliation is prohibited against a person who files a complaint of discrimination, participates in an OFCCP proceeding, or otherwise opposes discrimination under these Federal laws.

Any person who believes a contractor has violated its nondiscrimination or affirmative action obligations under the authorities above should contact immediately:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (toll-free) or (202) 693-1337 (TTY). OFCCP may also be contacted by e-mail at OFCCP-Public@dol.gov, or by calling an OFCCP regional or district office, listed in most telephone directories under U.S. Government, Department of Labor.

Programs or Activities Receiving Federal Financial Assistance

RACE, COLOR, NATIONAL ORIGIN, SEX

In addition to the protections of Title VII of the Civil Rights Act of 1964, as amended, Title VI of the Civil Rights Act of 1964, as amended, prohibits discrimination on the basis of race, color or national origin in programs or activities receiving Federal financial assistance. Employment discrimination is covered by Title VI if the primary objective of the financial assistance is provision of employment, or where employment discrimination causes or may cause discrimination in providing services under such programs. Title IX of the Education Amendments of 1972 prohibits employment discrimination on the basis of sex in educational programs or activities which receive Federal financial assistance.

INDIVIDUALS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973, as amended, prohibits employment discrimination on the basis of disability in any program or activity which receives Federal financial assistance. Discrimination is prohibited in all aspects of employment against persons with disabilities who, with or without reasonable accommodation, can perform the essential functions of the job.

If you believe you have been discriminated against in a program of any institution which receives Federal financial assistance, you should immediately contact the Federal agency providing such assistance.

La Igualdad de Oportunidades en el Empleo es

LA LEY

Empleadores privados, autoridades locales y estatales, instituciones educativas, agencias de empleo y organizaciones laborales

Los solicitantes de empleo y los empleados de la mayoría de los empleadores privados, autoridades locales y estatales, instituciones educativas, agencias de empleo y organizaciones laborales están protegidos conforme a la ley federal contra la discriminación por cualquiera de los siguientes motivos:

RAZA, COLOR, RELIGIÓN, SEXO, ORIGEN NACIONAL

El Título VII de la Ley de Derechos Civiles de 1964, y sus enmiendas, protege a los solicitantes de empleo y a los empleados contra la discriminación en la contratación, ascenso, despido, sueldo, beneficios adicionales, capacitación laboral, clasificación, referencia, y otros aspectos del empleo, debido a la raza, color, religión, sexo (incluido el embarazo) u origen nacional. La discriminación religiosa incluye el no realizar los arreglos razonables para las prácticas religiosas de un empleado, cuando tales arreglos no impongan una dificultad indebida.

DISCAPACIDAD

El Título I y el Título V de la Ley de Estadounidenses con Discapacidades de 1990, y sus enmiendas, protegen a los individuos que califiquen contra la discriminación por una discapacidad en la contratación, ascenso, despido, sueldo, beneficios adicionales, capacitación laboral, clasificación, referencia, y otros aspectos del empleo. La discriminación por discapacidad incluye el no realizar los arreglos razonables para las limitaciones mentales o físicas conocidas de un individuo con una discapacidad quien solicite empleo o sea empleado, salvo que implique una dificultad indebida.

EDAD

La Ley Contra la Discriminación por Edad en el Empleo de 1967, y sus enmiendas, protege a los solicitantes de empleo y a los empleados que tengan 40 años de edad o más contra la discriminación por la edad en la contratación, ascenso, despido, sueldo, beneficios adicionales, capacitación laboral, clasificación, referencia, y otros aspectos del empleo.

SEXO (SALARIOS)

Adicionalmente a la prohibición de la discriminación por sexo estipulada en el Título VII de la Ley de Derechos Civiles, y sus enmiendas, la Ley de Igualdad Salarial de 1963, y sus enmiendas, prohíbe la discriminación por sexo en el pago de salarios a los hombres y mujeres que realicen un trabajo sustancialmente similar, en empleos que requieran iguales destrezas, esfuerzos y responsabilidades, bajo condiciones laborales similares, en el mismo establecimiento.

GENÉTICA

El Título II de la Ley contra la Discriminación por Información Genética de 2008 (GINA) protege a los solicitantes de empleo y a los empleados contra la discriminación con basada en información genética, en la contratación, ascenso, despido, sueldo, beneficios adicionales, capacitación laboral, clasificación, referencia, y otros aspectos del empleo. GINA también restringe la adquisición de la información genética por parte de los empleadores y limita estrictamente la divulgación de la información genética. La información genética incluye la información sobre las pruebas genéticas de los solicitantes de empleo, los empleados o sus familiares; la manifestación de enfermedades o desordenes en los familiares (historial médico familiar); y las solicitudes o recibo de servicios genéticos por los solicitantes de empleo, los empleados o sus familiares.

REPRESALIA

Todas estas leyes federales prohíben a las entidades cubiertas tomar represalias contra una persona que presente un cargo de discriminación, participe en un procedimiento de discriminación o se oponga a una práctica laboral ilegal.

QUÉ DEBE HACER SI CONSIDERA QUE HA OCURRIDO UNA DISCRIMINACIÓN

Hay límites estrictos de tiempo para presentar cargos de discriminación en el empleo. Para conservar la capacidad del EEOC de actuar en su nombre y para proteger su derecho de presentar una demanda privada, en caso de que en última instancia lo necesite, usted debe comunicarse con el EEOC de manera oportuna cuando sospeche de la discriminación:

La Comisión para la Igualdad de Oportunidades en el Empleo de los EE.UU. (EEOC), 1-800-669-4000 (número gratuito) o 1-800-669-6820 (número TTY gratuito para las personas con dificultades auditivas). La información de las oficinas de campo del EEOC está disponible en www.eeoc.gov o en la mayoría de los directorios telefónicos en la sección de Gobierno de los EE.UU. o Gobierno Federal. Puede encontrar información adicional sobre el EEOC, incluida la información sobre la presentación de cargos, en www.eeoc.gov.

Empleadores que tengan contratos o subcontratos federales

Los solicitantes de empleo y los empleados de compañías con un contrato o subcontrato gubernamental federal están protegidos conforme a las leyes federales contra la discriminación por los siguientes motivos:

RAZA, COLOR, RELIGIÓN, SEXO, ORIGEN NACIONAL

La Orden Ejecutiva 11246, y sus enmiendas, prohíbe la discriminación en el trabajo por motivo de raza, color, religión, sexo u origen nacional, y exige la aplicación de acción afirmativa para garantizar la igualdad en las oportunidades en todos los aspectos del empleo.

INDIVIDUOS CON DISCAPACIDADES

La Sección 503 de la Ley de Rehabilitación de 1973, y sus enmiendas, protege a los individuos que califiquen contra la discriminación por una discapacidad en la contratación, ascenso, despido, sueldo, beneficios adicionales, capacitación laboral, clasificación, referencia, y otros aspectos del empleo. La discriminación por discapacidad incluye el no realizar los arreglos razonables para las limitaciones mentales o físicas conocidas de un individuo con una discapacidad quien solicite empleo o sea empleado, salvo que implique una dificultad indebida. La Sección 503 también exige que los contratistas federales tomen las acciones afirmativas para emplear y ascender en el empleo a individuos calificados con discapacidades en todos los niveles laborales, incluido el nivel ejecutivo.

VETERANOS CON MEDALLAS DEL SERVICIO DE LAS FUERZAS ARMADAS Y VETERANOS DISCAPACITADOS, SEPARADOS RECIENTEMENTE Y DE OTRO ESTATUS PROTEGIDO

La Ley de Asistencia a la Readaptación de los Veteranos de Vietnam de 1974, y sus enmiendas, 38 U.S.C. 4212, prohíbe la discriminación laboral y exige la acción afirmativa para emplear y ascender en el empleo a veteranos discapacitados, veteranos separados

del servicio recientemente (dentro de los tres años dados de baja del servicio activo), otros veteranos protegidos (quienes hayan prestado el servicio militar en una guerra o en una campaña o expedición para la cual se haya autorizado una insignia de campaña), y los veteranos con medallas del Servicio de las Fuerzas Armadas (veteranos quienes, mientras se encontraban en el servicio activo, participaron en una operación militar de EE.UU. para la cual se les otorgó una medalla del Servicio de las Fuerzas Armadas).

REPRESALIA

Se prohíben las represalias contra una persona que presente un cargo de discriminación, participe en un procedimiento de la Oficina de Programas de Cumplimiento de Contratos Federales (OFCCP), o quien se oponga a la discriminación de conformidad con estas leyes federales.

Toda persona quien considere que un contratista ha incumplido sus obligaciones antidiscriminatorias o de acción afirmativa conforme a las autoridades antes indicadas, debe contactar de inmediato a:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (número gratuito) o (202) 693-1337 (número TTY). También puede contactar a la OFCCP por el correo electrónico OFCCP-Public@dol.gov, o llamando a una oficina distrital o regional de la OFCCP, la cual puede encontrar en la mayoría de los directorios telefónicos en la sección U.S. Government (Gobierno de los EE.UU.), Department of Labor (Departamento del Trabajo).

Programas o actividades que reciban asistencia financiera federal

RAZA, COLOR, ORIGEN NACIONAL, SEXO

Adicionalmente a las protecciones del Título VII de la Ley de Derechos Civiles de 1964, y sus enmiendas, el Título VI de la Ley de Derechos Civiles de 1964, y sus enmiendas, prohíbe la discriminación por raza, color u origen nacional en los programas o actividades que reciban asistencia financiera federal. La discriminación en el empleo está cubierta por el Título VI si el objetivo principal de la asistencia financiera es la provisión del empleo, o donde la discriminación laboral cause o pueda causar una discriminación en la provisión de los servicios conforme a tales programas. El Título IX de las Enmiendas en la Educación de 1972 prohíbe la discriminación en el empleo por motivo del sexo en las actividades o programas educativos que reciban asistencia financiera federal.

INDIVIDUOS CON DISCAPACIDADES

La Sección 504 de la Ley de Rehabilitación de 1973, y sus enmiendas, prohíbe la discriminación en el empleo por una discapacidad, en cualquier programa o actividad que reciba asistencia financiera federal. Se prohíbe la discriminación en todos los aspectos del empleo contra las personas con discapacidades quienes, con o sin arreglos razonables, puedan realizar las funciones esenciales del trabajo.

Si usted considera que ha sido discriminado en un programa de alguna institución que reciba asistencia financiera federal, debe contactar inmediatamente a la agencia federal que proporciona dicha asistencia.

EXHIBIT III

Payroll and Certification Form

&

Statement of Compliance Form

STATEMENT OF COMPLIANCE

Date: _____

Project No. _____

County _____

I, _____, do hereby state;
(Name of signatory party) (Title)

(1) That I pay or supervise the payment of the persons employed by _____, on the _____ that during the payroll period commencing on the ____ day of ____ 20____ and ending the ____ day of ____ 20____ all persons employed on said project have been paid in full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ Contractor or Subcontractor from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 CFR Subtitle A);

(A) FEDERAL

issued by the Secretary of Labor under the Copeland Act as amended (48 Stat. 948.63 Stat.108.72 Stat. 967;76 State 357; 40 USC 276c)

(B) STATE

or as defined in the Ohio Revised Code, Chapter 4115, and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(A) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS OR PROGRAMS

In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(B) WHERE FRINGE BENEFITS ARE PAID IN CASH

Each laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in Section 4(c) below.

(C) EXCEPTIONS

Exceptions (Craft)	Explanation
Remarks	
Name and Title	Signature

The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution. See Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

EXHIBIT IV

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

**CERTIFICATE FROM CONTRACTOR APPOINTING OFFICER OR EMPLOYEE
TO SUPERVISE PAYMENT OF EMPLOYEES**

Project Name _____ Date _____

Location _____ Project No. _____

(I) (We) hereby certify that (I am) (we are) (the prime contractor) (a subcontractor) for

_____ (specify "General Construction", "Plumbing", "Roofing", etc.)

in connection with the construction of the above-mentioned Project, and that (I) (we) have appointed * _____

whose signature appears below, to supervise the payment of (my) (our) employees beginning _____, 20____; that he/she is in a position to have full knowledge of the facts set forth in the payroll documents and in the statement of compliance required by the so-called Kick-Back Statute which he/she is to execute with (my) (our) full authority and approval until such time as (I) (we) submit to the Fort Bend County Community Development Department a new certificate appointing some other person for the purposes hereinabove stated.

* _____
(Identifying Signature of Appointee)

Attest (if required) _____
(Name of Firm or Corporation)

(Signature)

By: _____
(Signature)

(Title)

(Title)

NOTE: This certificate must be executed by an authorized officer of a corporation, by a member of a partnership, or the sole owner, and shall be executed prior to and be submitted with the first payroll. Should the appointee be changed, a new certificate must accompany the first payroll for which the new appointee executes a statement of compliance required by the Kick-Back Statute.

EXHIBIT V

Notice to Employees Poster

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



For additional information:

1-866-4-USWAGE
(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

EXHIBIT VI

U.S. Department of Labor Wage Decision

General Decision Number: TX150094 08/21/2015 TX94

Superseded General Decision Number: TX20140094

State: Texas

Construction Type: Heavy

County: Galveston County in Texas.

HEAVY CONSTRUCTION PROJECTS Including Water and Sewer Lines
(Does Not Include Flood Control)

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is 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 \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	08/21/2015

* SFTX0669-001 04/01/2015

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	\$ 27.43	17.12

SUTX2005-021 08/05/2005

HEAVY Including Water and Sewer Lines (Excluding Flood Control)

	Rates	Fringes
Carpenter.....	\$ 14.38	
Cement mason/concrete finisher.....	\$ 11.37	1.13
Electrician.....	\$ 18.40	1.34
FORM BUILDER/FORM SETTER.....	\$ 13.35	1.17
IRONWORKER, REINFORCING.....	\$ 11.29	
Laborers:		
Common.....	\$ 10.70	
Landscape.....	\$ 7.35	
Mason Tender Cement.....	\$ 9.96	
Pipelayer.....	\$ 10.07	
PIPEFITTER.....	\$ 17.00	0.04

Power equipment operators:

Excavator.....	\$ 16.74	
Backhoe.....	\$ 13.25	
Bulldozer.....	\$ 14.00	
Crane.....	\$ 14.91	0.58
Front End Loader.....	\$ 11.75	0.92
Grader.....	\$ 12.20	1.48
Tractor.....	\$ 12.38	1.51

TRUCK DRIVER.....	\$ 12.28	0.98

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

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all

rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION

EXHIBIT VII

EMPLOYMENT AND MINORITY BUSINESS PLAN

Instructions: As specified in Parts IV and V of the HUD Specifications, all prime Contractors are required to submit a completed Plan detailing employment, as well as economic opportunities for minority and women-owned business. It is due within five (5) working days after being notified as the apparent low bidder. Failure to submit this Plan will render your bid as non-responsive.

I. Contract Information

Name of Contract: _____

Job Number: _____

Project Number: _____

Contract Amount: \$ _____

II. Contractor Information

Name of Contractor: _____

Address: _____

Contact Person: _____

Telephone Number/FAX: _____ / _____

Contractor's Federal Tax I.D. Number: _____

Names of three (3) Corporate Officers (if applicable):

1. _____

2. _____

3. _____

Number of Employees: _____

III. Employment Projections

(Indicate the number of employees who will have to be hired {by job categories} for this contact, including goals for hiring within the project area, minority, and female employees.)

PROJECT GOALS				
JOB CATEGORY	Total Needed To Be Hired	Area Residents	Minorities	Women
1. Laborers				
2. Mechanics				
3. Apprentices/Trainees				
4. Professionals/Managers/ Clerical				

Definitions:

1. Laborers include occupations (hourly workers) engaging in manual work requiring no special training; i.e., laborers, gardeners.
2. Mechanics include occupations requiring a high level skill, including occupations requiring a combination of basic scientific knowledge and manual skills; i.e., carpenters, electricians, cement masons, and draftsmen.
3. Apprentices/Trainees include persons engaging in a training program to learn a trade or craft.
4. Professionals/Managers/Clerical include occupations requiring the exercise of college background, policy making, and clerical work, respectively.

IV. Minority Business Projections

(Indicate the total number of subcontracts by category (i.e., plumbing, electrical, concrete, etc.) which will be needed to complete this contract, including proposed use of minority and women-owned business(es), and project area firms with estimated contract amounts.)

GOALS (Check (√) One)				
SUBCONTRACTS (By Category)	Minority	Women	Project Area	Estimated Contract Amount
1.				
2.				
3.				
4.				
5.				
6.				
TOTALS				

For definitions of minority and women-owned businesses, including project area firms, please see Parts IV and V of the HUD Specifications.

(For those areas checked (√) above, indicate the information requested below. Please identify the appropriate entry; i.e., subcontracts 1-6.)

Name of Subcontractor	Address	Contact	Phone Number
1.			
2.			
3.			
4.			
5.			
6.			

I do declare and affirm that the contents of the foregoing are true and correct, and will furnish, upon request, documentation which will attest to its accuracy.

President/Owner

Date

EXHIBIT VIII

**Certification for Contracts, Grants, Loans
and Cooperative Agreements**

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, sub grants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making for entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Executed this _____ date of _____, 20__.

By _____
(Signature)

(Typed or printed name)

(Title, if any)

Covered Action: COMMUNITY DEVELOPMENT BLOCK GRANT
(Type and identity of program, project or activity)

EXHIBIT IX

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND OTHER RESPONSIBILITY MATTER FOR PRIMARY COVERED TRANSACTIONS

NAME OF CONTRACTOR

1. The prospective primary participant certifies to the best of its knowledge and belief that it and its principals:
 - (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph 1(b) of this certification; and
 - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Signature of Contractor

Date

EXHIBIT X

GALVESTON COUNTY COMMUNITY DEVELOPMENT DEPARTMENT

SUBCONTRACTOR PROFILE

Project Name: _____

Name of Contractor: _____

Name of Subcontractor: _____

Federal Tax I.D. Number: _____

Type of Business:

Sole Proprietor

Partnership

Corporation

Name(s) of Principle Owner(s):

Address: _____

Phone: _____

FAX: _____

Estimated Amount of Contract: _____

Type of Contract: Construction Supply Service

Woman Owned Yes No

Minority Owned Yes No

African-American Mexican-American Asian-American Indian

Date: _____

For Office Use Only

_____ *Minority Verification*

Publication/Source

_____ *Contractor Eligibility Verification*

Publication/Source

HUD SPECIFICATIONS

PART I

Civil Rights

Title VI of the Civil Rights Act of 1964, as well as, Section 109 of the Community Development Act of 1974, require that no person in the United States shall on the ground of race, color, national origin or sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with community development funds made available pursuant to these Acts. For purposes of this Part "program or activity" is defined as any function conducted by an identifiable administrative unit of the recipient, or private Contractor receiving community development funds or loans from the recipient. "Funded in whole or in part with community development funds" means that community development funds in any amount in the form of grants or proceeds from HUD guaranteed loans have been transferred by the recipient or a subrecipient to an identifiable administrative unit and disbursed in a program or activity. A Contractor may not, under any program or activity to which the regulations of this Part may apply directly or through contractual or other arrangements, on the grounds of race, color, national origin, or sex:

- (1) Deny any facilities, services, financial aid or other benefits provided under the program or activity;
- (2) Provide any facilities, services, financial aid or other benefits which are different, or are provided in a different form from that provided to others under the program or activity;
- (3) Subject to segregated or separate treatment in any facility in, or in any matter of process related to receipt of any service or benefit under the program or activity;
- (4) Restrict in any way access to, or in the enjoyment of any advantage or privilege enjoyed by others in connection with facilities, services, financial aid or other benefits under the program or activity;
- (5) Treat an individual differently from others in determining whether the individual satisfies any admission, enrollment, eligibility, membership, or other requirement or condition which the individual must meet in order to provided any facilities, services or other benefit provided under the program or activity; and
- (6) Deny an opportunity to participate in a program or activity as an employee.

PART II

Equal Employment Opportunity Clause

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

- (1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age, or handicapped condition. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, national origin, age, or handicapped condition; such action shall include, but not limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, national origin, age, or handicapped condition.
- (3) The Contractor will send to each labor union or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The Contractor will furnish all information and reports including, but not limited to the Galveston County Community Development Department Quarterly Employment Data Report required by Executive Order 11246 of September 24, 1965, and by rules regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his or her books, records, and accounts by the administering agency (See EXHIBIT I).
- (6) In the event of the Contractor's non-compliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and

remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- (7) The Contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each Subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

PART III

Affirmative Action

Standard Federal Equal Employment Opportunity Construction Contract Specifications
(Executive Order 11246)

- (1) As used in these specifications:
- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

- (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participated or community identification).
- (2) Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- (3) If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
- (4) The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goal set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction Contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
- (5) Neither the provisions of any collective bargaining agreement, nor failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or

women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

- (6) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- (7) The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each individual. If such individual was sent to the union hiring hall for referral as not referred back to the Contractor by the union, or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employee at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contractors and suppliers, including circulation of solicitations to minority and female construction Contractors and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- (8) Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a Contractor association, joint Contractor-union, Contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
- (9) A single goal for minorities and separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for

example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

- (10) The Contractor shall not use the goal and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- (11) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- (12) The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- (13) The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specification, so as to achieve maximum results from its efforts to ensure equal opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
- (14) The Contractor shall designate a responsible official to monitor all employment related activity o ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
- (15) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Notice of Requirements for Affirmative Action To Ensure Equal Employment Opportunity
(Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work in each trade on all construction work in the covered area, are as follows:

TIMETABLES

Goals for Minority Participation
for each Trade: 27.3%

Goals for Female Participation
for each Trade: 6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulation in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the Subcontractor; employer identification number of Subcontractor; estimated dollar amount of the subcontract; estimated starting date of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is Galveston County, Texas.

(43 CFR 49254, Oct. 20, 1978; 43 FR 51401, Nov. 3, 1978, as amended at 45 FR 65977, Oct. 3, 1980)

PART IV

Employment Opportunities for Businesses and Lower Income Persons

1. The work to be performed under this contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible, opportunities for training and employment be given to lower income residents of the project area and contracts of work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.
2. The parties to this contract will comply with provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.
3. The Contractor will send to each labor organization or representative of workers with which he or she has a collective bargaining agreement or other contract or understanding, if any, a notice advising the said labor organization or workers' representative of the Contractor's commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.
4. The Contractor will include this Section 3 clause in every subcontract for work in connection with the project and will, at the direction of the applicant for or recipient of Federal financial assistance, take appropriate action pursuant to the subcontract upon a finding that the Subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135. The Contractor will not subcontract with any Subcontractor where it has notice or knowledge that the latter has been found in violation of regulations under 24 CFR Part 135 and will not let any subcontract unless the Subcontractor has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.
5. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the U.S. Department of Housing and Urban Development issued thereunder prior to the execution of the contract, shall be a condition of the Federal financial assistance, provided to the project, binding upon the applicant or recipient for such assistance, its successors, and assigns. Failure to fulfill these requirements shall subject the applicant or recipient, its Contractors and Subcontractors, its successors, and assigns to those sanctions specified by the grant or loan agreement or contract through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

Further, each Contractor or Subcontractor undertaking work on a Section 3 covered project shall assure that to the greatest extent feasible, contracts for work to be performed in connection with the project are awarded to business concerns located within the Section 3 covered project area or business concerns owned in substantial part by persons residing in the Section 3 covered area, in accordance with 24 CFR Part 135.

All prime Contractors shall submit their Employment and Minority Business Plan for approval by the Galveston County Community Development Department (See Exhibit VII).

PART V

Contracting with Small and Minority Firms, Women's Business Enterprise and Labor Surplus Area Firms

It is national policy to award a fair share of contracts to small and minority business firms, as well as women-owned firms. Accordingly, affirmative steps must be taken by Contractors to assure that small, minority, or women-owned businesses are utilized when possible as sources of supplies, equipment, construction and services, especially from labor surplus areas. Affirmative steps shall include taking the following good faith efforts:

A. Good Faith Efforts

- (1) Including qualified small, minority, women-owned businesses on solicitation lists;
- (2) Assuring that small, minority, or women-owned businesses are solicited whenever they are potential sources;
- (3) When economically feasible, dividing total requirements into smaller tasks or quantities so as to permit maximum small, minority, or women-owned businesses participation;
- (4) Where the requirement permits, establishing delivery schedules which will encourage participation by small, minority, or women-owned businesses;
- (5) Using the services and assistance of the Small Business Administration, the Office of Minority Business Enterprise of the Department of Commerce, and the Community Services Administration; and also including, but not limited to, the Houston Citizen's Chamber of Commerce, Houston Hispanic Chamber of Commerce, Minority Contractor's Association of Houston, and the Houston Business Council;

- (6) Advertising in a general circulation or minority focus media concerning contracting opportunities;
- (7) Providing adequate information about plans, specifications, and requirements;
- (8) Assisting with bonding, lines of credit, or insurance as required by the contract; and
- (9) If any subcontracts are to be let, the Contractor will include the provisions of paragraphs (1) through (9) in every subcontract or purchase order.

B. Minority Business Definition

For purposes of these requirements, a minority business enterprise represents a firm owned and controlled by one or more minorities or women (51% or more), and meet the following criteria:

- (1) Minority groups members who are Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans, and any other minorities or individuals found to be disadvantaged by the Small Business Administration (SBA);
- (2) Must be an independent business;
- (3) Ownership and control by minorities or women shall be real, substantial, and continuing and shall go beyond proforma ownership of the term as reflected in its ownership documents; and
- (4) Must be a small business as defined by SBA.

C. Submission Requirements

- (1) Contractors are required to submit a completed Employment and Minority Business Plan form (See Exhibit VII); and
- (2) Contractors are also required to submit, when necessary, all pertinent information related to minority or women-owned business, including but not limited to ownership documents, business references, stock certificates, and other pertinent documents.

PART VI

Federal Labor Standards Provisions
(Reprint from U.S. Department of Housing and Urban Development
Publication HUD-4010 (2-84) (HB 1344.1))

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

- A. 1. (i) **Minimum Wages.** All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also regular contributions made or costs incurred for more than a weekly period (but less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR Part 5.5(a)(1)(ii) and the Davis Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- (ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (1) Except with respect to helpers as defined in 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (2) The classification is utilized in the area by the construction industry; and
 - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and
 - (4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.
- (b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate) a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C., 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designees within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140).
- (c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator, for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

- (d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(b) or (c) of this paragraph, shall be paid to all workers performing work on the classification under this contract from the first day on which work is performed in the classification.
 - (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB control Number 1215-0140.)
2. **Withholding.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, application, or owner take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) **Payrolls and basic records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development to the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1 (b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1 (b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of their registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)
- (ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee of the agency is a party to the contract, but if the agency is not such a party to the contract, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall be set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

- (b) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5(a)(3)(i) and that such information is correct and complete;
 - (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;
 - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph A.3(ii)(b) of this section.
- (d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph A.3(1) of this section available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD, or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR part 5.12.

4. (i) **Apprentices and trainees.** Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U. S. Department of Labor, Employment and Training Administration, bureau of Apprenticeship and Training, or with a State apprenticeship Agency recognized by the bureau, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate as specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by

formal certification by the U. S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contract will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.
- (iv) **Helpers.** Helpers will be permitted to work on a project if the helper classification is specified on an applicable wage determination or is approved pursuant to the conformance procedure set forth in §5.5(a)(1)(ii). The allowable ratio of helpers to journeymen employed by the contractor or subcontractor on the job site shall not be greater than two (2) helpers for every three (3) journeymen (In other words, not more than forty (40) percent of the total number of journeymen and helpers in each contractor's or in each subcontractor's own work employed on the job site.) Any worker listed on a payroll at a helper wage rate, who is not a helper as defined in 29 CFR 5.2(n)(4), shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any helper performing work on the job site in excess of the ratio permitted shall be paid not less than the applicable journeyman's (or laborer's where appropriate) wage rate on the wage determination for the work actually performed.

5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.
6. **Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may, by appropriate instructions, require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.
7. **Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contract (or any of its subcontractors) and HUD or its designee, the U. S. Department of Labor, or the employees or their representatives.
10.
 - (i) **Certification of eligibility.** By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.
 - (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.
 - (iii) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

B. **Contract Work Hours and Safety Standards Act.** As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty (40) hours in such a workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half (1 1/2) times the basic rate of pay for all hours worked in excess of forty (40) hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph 1 of this event of this section, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for the liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph 1 of this section, in the sum of ten (10) dollars for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section.
3. **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this section.
4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph 1 through 4 of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

SOLICITATION PROVISIONS

Grantees soliciting bids or requesting proposals for contracts for the construction, alteration, or repair of any public building or public work project subject to the prohibitions described in this notice shall include in their solicitations the following provisions:

Restrictions on Public Buildings and Public Works Projects Certification

- A. **Definitions.** The definitions pertaining to this provision are those that are set forth in the clause entitled "Restrictions on Public Works Projects." (Set out under "Contract Clauses" below.)
- B. **Certification.** Except as provided in paragraph (C) of this provision, by submission of its bid or proposal, the offeror certifies that it -
 - 1. Is not a Contractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR) (see paragraph (H) of this provision);
 - 2. Has not or will not enter into any subcontract with a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR, and
 - 3. Will not provide any product of a country included on the list of foreign countries that discriminate against U.S. firms published by the USTR.
- C. **Inability to certify.** An offeror unable to certify in accordance with paragraph (B) of this provision shall submit with its offer a written explanation fully describing the reasons for its inability to make the certification.
- D. **Applicability of 18 U.S.C. 1001.** The certification in paragraph (B) of this provision concerns a matter within the jurisdiction of an agency of the United States, and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 U.S. C. 1001.
- E. **Notice.** The offeror shall provide immediate written notice to the Contracting Officer, if at any time before the contract award, the offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- F. **Restrictions on Contract Award.** Unless a waiver to these restrictions is granted by the Secretary of Housing and Urban Development, no contract will be awarded to an offeror (1) who is owned or controlled by a citizen or national of a foreign

- country included on the list of foreign countries that discriminate against U.S. firms published by the USTR, (2) whose subcontractors are owned or controlled by citizens or nationals of a foreign country on the USTR list or, (3) who incorporates any product of a foreign country on the USTR list in the public works project.
- G. Recordkeeping. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (B) of this provision. The knowledge and information of an offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- H. USTR List. The USTR published an initial list in the Federal Register on December 30, 1987 (53 FR 49244), which identified one country - Japan. The USTR can add countries to the list, and remove countries from it, in accordance with Section 109 (C) of PUB. L. 100-202.

CONTRACT CLAUSES

Grantees or subgrantee recipients entering into contracts for construction, alteration, or repair of any public building or public work project subject to the prohibitions described in this notice shall include the following provisions in all such contracts:

Restrictions on Public Buildings and Public Works Projects

- A. Definitions. "component", as used in this clause, means those articles, materials, and supplies incorporated directly into the product. "Contractor or subcontractor of a foreign country", as used in this clause, means any Contractor or subcontractor that is a citizen or national of a foreign country or is controlled directly or indirectly by citizens or nationals of a foreign country. A Contractor or subcontractor shall be considered to be a citizen or national of a foreign country, or controlled directly or indirectly by citizens or nationals of a foreign country -
1. If 50 percent (50%) or more of the Contractor or subcontractor is owned by a citizen or a national of the foreign country;
 2. If the title to 50 percent (50%) or more of the stock of the Contractor or subcontractor is held subject to trust or fiduciary obligation in favor of citizens or nationals of the foreign country;
 3. If 50 percent (50%) or more of the voting power in the Contractor or subcontractor is vested in or exercisable on behalf of a citizen or national of the foreign country;

4. In the case of a partnership, if any general partner is a citizen of the foreign country;
 5. In the case of a corporation, if its president or other chief executive officer or the chairman of its board of directors is a citizen of the foreign country or the majority of any number of its directors necessary to constitute a quorum are citizens of the foreign country or the corporation is organized under the laws of the foreign country or any subdivision, territory, or possession thereof; or
 6. In the case of a contractor or subcontractor who is a joint venture, if any participant firm is a citizen or national of a foreign country or meets any of the criteria in subparagraphs (A) (1) through (5) of this clause. "Product", as used in this clause, means construction materials; i.e., articles, materials and supplies brought to the construction site for incorporation into the public works project, including permanently affixed equipment, instruments, utilities, electronic or other devices, but not including vehicles or construction equipment. In determining the origin of a product, (insert name of grantee), will consider a product as produced in a foreign country if it has been assembled or manufactured in the foreign country, or if the cost of the components mined, produced, or manufactured in the foreign country exceed 50 percent (50%) of the cost of all its components.
- B. Restrictions. The Contractor shall not (1) knowingly enter into any subcontract under this contract with a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the United States Trade Representative (see paragraph (C) of this clause), or (2) supply any product under this contract of a country included on the list of foreign countries that discriminate against U.S. firms published by the USTR.
- C. USTR List. The USTR published an initial list in the Federal Register on December 30, 1987 (53 FR 49244), which identified one country - Japan. The USTR can add other countries to the list, or remove countries from it, in accordance with Section 109 (C) of PUB. L. 100-202.
- D. Certification. The Contractor may rely upon the certification of a prospective subcontractor that it is not a subcontractor of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR and that products supplied by such subcontractor for use on the Federal public works project under this contract are not products of a foreign country included on the list of foreign countries that discriminate against U.S. firms published by the USTR, unless such Contractor has knowledge that the certification is erroneous.

- E. Subcontracts. The Contractor shall incorporate this clause, modified only for the purpose of properly identifying the parties, in all subcontracts. This paragraph (E) shall also be incorporated in all subcontracts.

SPECIAL FEDERAL PROVISIONS

1. Contractors will maintain all records pertaining to the project for three (3) years after receiving final payment and after all other pending matters have been closed.
2. Contractors securing a contract in excess of \$100,000 will not expend such funds by making use of subcontracting with facilities included on the Environmental Protection Agency List of Violating Facilities as per Section 306 of the Clean Air Act, Section 508 of the Clean Water Act, Executive Order 11738, and Environmental Protection Agency Regulations 40 CFR 15.