CONTRACT DOCUMENTS
& SPECIFICATIONS

2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS

CAPITAL IMPROVEMENTS
PROJECT: S-32

CITY OF MANOR
EST. 1872
TEXAS

CITY OF MANOR, TEXAS

NOVEMBER 2020

Jaeco
JAY ENGINEERING, A DIVISION OF GBA
Texas Engineering Firm #4242

JAECO JOB NO. : 100-083-20

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CITY OF MANOR
EST. 1872
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NOVEMBER 2020

Prepared By:

Jaeco
JAY ENGINEERING, A DIVISION OF GBA
Texas Engineering Firm #4242

STATE OF TEXAS
SAMUEL D. KIGER
89353
LICENSED PROFESSIONAL ENGINEER
11-5-20

JAECO Job No: 100-083-20

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CITY OF MANOR, TEXAS
INVITATION TO BID

The City of Manor, Texas hereby invites the submission of sealed bids for the 2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS. This project consists of replacement of existing wastewater collection lines including services, replacement of wastewater manholes, repair of pavment as needed and other appurtenant work.

Sealed bids will be received at Manor City Hall, 105 East Eggleston Street, Manor, Texas until 10:00 A.M. on Wednesday, January 27, 2021. At such time and place, bids will be publicly opened and read aloud.

Bids shall be clearly identified on the lower left corner of the envelope with “2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS.” Bids received after the named closing date and time will be returned unopened.

Construction plans, bid documents, questions and addendum will be processed through CIVCAST. Email: skiger@gbateam.com or contact Samuel Kiger, P.E. at (512) 259-3882 ext. 4010 with any questions.

A 5% Bid Bond, 100% Performance and Payment Bonds, and Insurance requirements are reuired. Bidders shall comply with all bid requirements and specifications as defined by Jay Engineering.

The City of Manor reserves the right to reject any or all bids, and to waive any and all technicalities or formalities.

INSTRUCTIONS TO BIDDERS

SEALED PROPOSALS addressed to the CITY OF MANOR (hereinafter named the "Owner") for completion of the 2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS (“Project”) will be received at Manor City Hall, until10:00 A.M., Wednesday, January 27, 2021 and then be publicly opened and read aloud at that time and place.

The Owner may not accept this bid until it has received from the bidder a completed, signed, and notarized TEC Form 1295 complete with a certificate number assigned by the Texas Ethics Commission (“TEC”), pursuant to Texas Government Code § 2252.908 and the rules promulgated thereunder by the TEC. The undersigned understands that failure to provide said form complete with a certificate number assigned by the TEC will result in a non-conforming bid and will prohibit the Owner from considering this bid for acceptance.

Envelopes containing sealed proposals shall be clearly marked on the outside with the name and address of the bidder and the words:

2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS
CITY OF MANOR, TEXAS
TO BE OPENED AT 10:00 A.M., WEDNESDAY, JANUARY 27, 2021

The Contractor's Proposal form, provided separately, contains spaces which to enter prices, or a computer-generated form, for BASE BID Items. Bidders must enter a price for all Items. Award of a construction contract will be based on the most favorable combination of BASE BID prices.

Each proposal shall be legibly printed in ink, or replaced with a computer-generated form, and attached to the Contractor's Proposal form provided. No alterations in proposals, or in the printed forms therefor, or erasures, interpolations, or otherwise will be acceptable unless signed or initialed by the bidder. No alteration in any proposal, or in the form on which it is submitted shall be made by any person after the proposal has been submitted by the bidder. Any and all addenda to the contract documents on which a proposal is based shall be acknowledged by the bidder's signature in the space provided on the proposal.

The bidder shall state all unit prices in written words, as well as in figures, and in case of a difference between written words and in figures, the written words shall be deemed correct.

1. PROPOSAL GUARANTEE: Each proposal shall be accompanied by a cashier's check or a certified check drawn on an acceptable bank, or an acceptable bid bond, in an amount not less than five percent (5%) of the total amount of the bid. The proposal guarantee shall be made payable without condition to Owner and the amount of the said proposal guarantee may be retained by the Owner as liquidated damages if the proposal covered thereby is accepted and a contract based thereon is awarded and the bidder should fail to enter into a contract in the form prescribed within ten (10) days after such award is made by the Owner.

2. WITHDRAWAL OF BID: No bidder may withdraw his proposal for a period of forty-five (45) days after the day of the bid opening. A bidder may withdraw his proposal at any time prior to the expiration of the period during which proposals may be submitted, by a written request signed in the same manner and by the same person who signed the proposal.

3. RETURN OF PROPOSAL GUARANTEE: The proposal guarantee of each unsuccessful bidder will be returned when his proposal is rejected. The proposal guarantee of the bidder to whom a contract is awarded will be returned when the successful bidder executes a contract and files a satisfactory

bond. The proposal guarantee of the second lowest responsible bidder will be returned when the successful bidder executes a contract and files a satisfactory bond, which period shall not exceed forty-five (45) days from the day of the bid opening.

4. EXECUTION OF AGREEMENT: Bidders shall note the Agreement bound herein, and all provisions thereof. The successful bidder, upon notice of award of a contract for construction of the Project, will be required to execute the Agreement as bound herein.

5. ACCEPTANCE AND REJECTION OF BIDS: The Owner reserves the right to accept the bid which, in its judgment, is the lowest and best bid; to reject any or all bids; and to waive irregularities or formalities in any bid. Bids received after the specified time of closing will be returned unopened.

6. SIGNATURE OF BIDDERS: Each bidder shall sign his proposal using his usual signature and giving his full business address. Bids by partnerships shall be signed with the partnership name followed by the signature and designation of one of the partners or other authorized representatives. Bids by corporations shall be signed with the name of the corporation followed by the signature and designation of the president, secretary, or other person authorized to bind the corporation. The names of all persons signing should also be typed or printed below the word "President", "Secretary", "Agent", or other designation. When requested by the Owner, satisfactory evidence of the authority of the person signing shall be furnished.

7. INTERPRETATION OF CONTRACT DOCUMENTS: If any person who contemplates submitting a bid is in doubt as to the true meaning of any part of these specifications or other proposed contract documents he may submit to the Engineer (Jay Engineering Company, Inc., P.O. Box 1220, Leander, TX 78646) a written request for an interpretation thereof prior to 72 hours before the opening of bids. The person submitting the request will be responsible for its prompt delivery. Interpretation of the proposed contract documents will be made only by addendum. A copy of each addendum will be mailed or delivered to each person obtaining a set of contract documents. The Owner will not be responsible for any other explanations or interpretations of the proposed contract documents.

8. TIME FOR COMPLETION: The Contractor will be expected to start work upon issuance of a written work order by the Owner or Notice to Proceed by the Engineer and shall complete all work thereunder within the following times:

   Base Bid – NINETY (90) calendar days

   See Special Conditions for sequencing of the work. The time allowed is deemed sufficient for completion of the work considering materials availability, weather, and the work scope, but if weather conditions prevent proper and safe prosecution of the work, additional time will be allowed if justified and documented. Contractor must demonstrate continuous progress in the work if weather allows.

9. QUALIFICATIONS OF BIDDERS: Bidders that have not recently performed work for the Owner, or that otherwise have no local performance record, must be prepared to submit qualification data within 48 hours after the scheduled opening of bids. If requested, bidders must submit satisfactory evidence that they have a practical knowledge of the particular work bid upon and that they have adequate plant, appropriate technical expertise, and the necessary financial resources to complete the proposed work. Specific submittal data shall include:

   a) A current financial statement.

   b) The name, address, and telephone of bidder’s surety.

c) The name, address, and telephone of financial references, including banks and trade accounts. Bank and financial reference authorizations may be required.

d) A complete listing of projects completed within the past two years and a complete listing of projects in progress. The listing shall include for each project the location, amount of contract and the name, address and telephone of the project owner and engineer.

Each bidder must thereby show that former work performed by him has been handled in such a manner that there are no just or proper claims pending against such work. No bid submitted by a bidder who is engaged in any work which would impair his ability to finance the work covered by such bid or to provide suitable equipment for its proper prosecution and completion, will be accepted. Bidders are expected to inform themselves regarding all local and site conditions pertaining to the work they will be doing.

10. TEC FORM 1295: Provision of Texas Ethics Commission Form 1295 ("TEC Form 1295") by Bidders: Effective January 1, 2016, pursuant to Texas Government Code § 2252.908 (the "Interested Party Disclosure Act" or the "Act"), the Owner may not award the contract to a bidder unless the bidder has provided to the Owner a completed, signed and notarized TEC Form 1295 which has been assigned a certificate number Owner nor its consultants have the ability to verify the information included in a TEC Form 1295, and neither have an by the Texas Ethics Commission (the "TEC"). Pursuant to the rules prescribed by the TEC, the TEC Form 1295 must be completed online through the TEC's website, assigned a certificate number, printed, signed and notarized, and provided to the Owner. The TEC Form 1295 may accompany 31R9PR bid or may be submitted separately, but must be provided to the Owner prior to the award of the contract. For purposes of completing the TEC Form 1295, the entity's name is **CITY OF MANOR**; the contract ID number is **100-070-20**; and the description of goods and services is **COTTONWOOD CREEK WASTEWATER COLLECTION SYSTEM IMPROVEMENTS**. Neither the Owner nor its consultants have the ability to verify the information included in a TEC Form 1295, and neither have an obligation nor undertake responsibility for advising any bidder with respect to the proper completion of the TEC Form 1295.

11. RULES AND REGULATIONS: The bidder's attention is directed to the fact that all applicable Federal and State Laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over the work to be performed and services to be provided shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though written herein.

12. BONDS: Coincident with the execution of the contract, the contractor shall furnish good and sufficient surety bond in the full amount of the contract sum, guaranteeing the faithful performance of all the covenants, stipulations and agreements of the contract, the payment of all bills and obligations arising from the execution of the contract, which bills or obligations might or will in any manner become a claim against the Owner, and guaranteeing the work included in this contract against faulty materials or workmanship for one (1) year after the date of completion of contract and acceptance by the Owner. All provisions of the bonds shall be complete and in full accordance with Statutory requirements. The bonds shall be executed with the proper sureties through a company licensed and qualified to operate in the State and approved by the Owner. Bonds shall be signed by an agent resident in State and date of bond shall be the date of execution of the contract. If at any time during the continuance of the contract the surety of the Contractor's bond becomes irresponsible, the Owner shall have the right to require additional and sufficient sureties which the Contractor shall furnish to the satisfaction of the Owner within ten (10) days after notice to do so. In default thereof the contract may be suspended, and all payments or money due the Contractor withheld.

13. INSURANCE: The Contractor, and his subcontractors shall, when performing construction work under his supervision at the Project site, carry insurance as follows for the duration of such work:

a) Statutory Workers Compensation.

b) Comprehensive General Liability Insurance with minimum Bodily Injury limits of $500,000 for each person and $1,000,000 for each occurrence including coverage on same for independent contractors.

c) Property Damage Insurance with minimum limits of $300,000 for each occurrence including same coverage limits for independent contractors.

d) Automobile Liability Insurance for all owner, non-owned, and hired vehicles with minimum limits for Bodily Injury of $250,000 for each person and $500,000 for each occurrence and Property Damage minimum limits of $100,000 for each occurrence. Contractor shall require subcontractors to provide Automobile Insurance with same minimum limits.

Contractor shall not commence work at site under this contract until he has obtained all required insurance and until such insurance has been approved by the Owner. Certificates must be furnished within 72 hours of Notice of Award. The Contractor shall not allow any sub-contractors to commence work until all the insurance required has been obtained and approved. Approval of the insurance by the Owner and Engineer shall not relieve or decrease the liability of the Contractor hereunder.

The required insurance must be written by a company licensed to do business in Texas at the time the policy is issued. In addition, the company must be acceptable to the Owner.

The Contractor shall not cause any insurance to be canceled nor permit any insurance to lapse. All insurance certificates shall include a clause to the effect that the policy shall not be canceled or reduced, restricted or limited until ten (10) days after the Owner has received written notice as evidenced by return receipts of registered or certified letter. Certificates of insurance shall contain transcripts from the proper office of the Insurer, evidencing in particular those operations to which the insurance applies, the expiration date and the above-mentioned notice of cancellation clause.

All liability policies carried under these contracts shall also include the CITY OF MANOR, TEXAS as an additional insured.

For insurance purposes, the title of ownership of equipment and materials shall remain with the Contractor until final acceptance.

14. BUILDERS RISK INSURANCE: The Contractor shall maintain Builder's Risk Insurance (fire and extended coverage) on a 100% completed value basis on the insurable portions of the Project for the benefit of the Owner, the Contractor and all sub-contractors, as their interest may appear.

15. SALES TAX: The Contractor must posses an individual Texas Sales and Use Tax permit. The successful Contractor will be required to furnish a Separation of Costs document to the Owner. The Owner will then furnish an exemption certificate to the Contractor.

CONTRACTOR'S PROPOSAL

TO THE

CITY OF MANOR, TEXAS

FOR THE

2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS

Date:_____, 2021

Proposal of _____(hereinafter called "Bidder") a (proprietorship)(corporation) organized and doing business under the laws of the state of _____ to the City of Manor, Texas (hereinafter called "City" or "Owner"):

GENTLEMEN:

The Bidder, in compliance with your advertisement and Instructions to Bidders for construction of the – 2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS ("Project"); having examined the drawings and technical specifications with related documents, the site of the proposed work, and being familiar with all the conditions and requirements for construction of the proposed Project, including the availability of labor, materials and equipment for proper prosecution of the work, hereby proposes to furnish all labor, materials, plant and equipment to construct the Project in strict accordance with the Contract Documents and Specifications, within the time set forth herein and at the price(s) stated in the following Exhibit A. The stated prices are sufficient to cover all expenses incurred in performing the work required under the Contract Documents of which this Proposal is a part.

Bidder acknowledges receipt of the following Addenda, as evidenced by the authorized signature(s) following:

ADDENDUM NO. _____ BY: _____

ADDENDUM NO. _____ BY: _____

ADDENDUM NO. _____ BY: _____

PROPOSAL (cont'd)

Bidder hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" from the Owner and to fully complete the work within following times:

Base Bid – NINETY (90) calendar days

Upon receipt of a written notice to the acceptance of this bid, Bidder will execute the formal contract Agreement within ten (10) days and shall deliver the Surety Bonds and Insurance Certificate as required by the Instructions to Bidders.

Bid security as required by the Instructions to Bidders in the sum of _____
($ _____) is hereto attached.

The bid security is to become the property of the Owner in the event the Proposal is accepted by the Owner and the Agreement and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully Submitted,

By _____

Title _____

(Corporate Seal,
if applicable)

_____
Business Name

_____

_____
Address

_____
Telephone

MANOR - 2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS
EXHIBIT A (BID SCHEDULE)

ITEM NO.	DESCRIPTION AND UNIT PRICE	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
	STREETS AND SITE WORK				
1	Silt Fence	LF	1,475		$ -
2	Trench Safety Plan	LS	1		$ -
3	Asphalt Repair	LF	958		$ -
4	Concrete Driveway Repair	LF	231		$ -
5	Sidewalk Replacement	LF	254		$ -
6	ADA Handrail Replacement	LF	20		$ -
7	Gravel Driveway repair	LF	17		$ -
8	Remove & Reinstall Existing Mailbox (mailbox on cedar post)	EA	3		$ -
9	Remove & Reinstall Streetsign	EA	1		$ -
10	Traffic Control	LS	1		$ -
11	Bypass Pumping	LS	1		$ -
12	Single Wastewater Service (Short Side)	EA	8		$ -
13	Restoration and Revegetation of disturbed areas	LS	1		$ -
14	Connection to existing manhole	EA	6		$ -
15	12" WW Line (0 - 10') Including removal & disposal of existing 8" WW Line	LF	120		$ -
16	12" WW Line (10' - 12') Including removal & disposal of existing 8" WW Line	LF	565		$ -
17	12" WW Line (12' - 14') Including removal & disposal of existing 8" WW Line	LF	400		$ -
18	12" WW Line (14' - 16') Including removal & disposal of existing 8" WW Line	LF	420		$ -
19	8" WW Line (10' - 12') Including removal & disposal of existing 8" WW Line	LF	435		$ -
20	8" WW Line (12' - 14') Including removal & disposal of existing 8" WW Line	LF	228		$ -
21	8" WW Line (14' - 16') Including removal & disposal of existing 8" WW Line	LF	0		$ -
22	WW manhole with Coating (10' - 12') Including removal and disposal of existing manhole	EA	1		$ -
23	WW manhole with Coating (12' - 14') Including removal and disposal of existing manhole	EA	1		$ -
24	Coat Existing manhole	VF	69		$ -
25	18" RCP Replacement	LF	35		$ -
26	18" RCP Headwall	EA	2		$ -
27	6'x2' Concrete Box Culvert Replacement	LF	10		$ -
28	6'x2' Concrete Box Culvert Wing Walls	EA	1		$ -
	BASED BID TOTAL =				**$ -**

ALTERNATE 1

A1	WW manhole (0 - 10') Including removal and disposal of existing manhole	EA	1	$ -
A2	WW manhole (10' - 12') Including removal and disposal of existing manhole	EA	2	$ -
A3	WW manhole (12' - 14') Including removal and disposal of existing manhole	EA	2	$ -
A4	WW manhole (14' - 16') Including removal and disposal of existing manhole	EA	1	$ -

ALTERNATE 1 TOTAL =	**$ -**

AGREEMENT

STATE OF TEXAS)(

COUNTY OF TRAVIS)(

THIS AGREEMENT, made and entered into this 18th day of February AD 2021, by and between the City of Manor, Texas, a home-rule city and municipal corporation, with principal offices located at 105 E. Eggleston St., Manor, Texas 78653, hereinafter termed OWNER, or CITY and Guerra Underground, LLC, a Limited Liability Corporation with principal offices located at 9810 FM 969, Austin, Texas 78724, hereinafter termed CONTRACTOR.

WITNESSETH: That for and in consideration of the mutual terms, conditions, and covenants of this Agreement and the accompanying documents between Owner and Contractor and for and in consideration of payments as set forth therein, Contractor hereby agrees with the said Owner to commence and complete the following Project:

2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS
FOR THE CITY OF MANOR, TEXAS

for all base bid work and all extra work in connection therewith, under the terms as stated in the Contract Documents and at CONTRACTOR's own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to construct and complete 2020 WASTEWATER COLLECTION SYSTEM IMPROVEMENTS (the "Project" or "Work"), in accordance with the Contractor's Proposal, Instructions to Bidders, Special Provisions, Supplementary Conditions, General Conditions, Performance bond, Payment bond, Drawings, Plans and Technical Specifications and other drawings and printed or written explanatory matter thereof, and the addenda therefore, as prepared by Jay Engineering, a Division of GBA herein entitled the ENGINEER, and approved by the OWNER, all of which are made a part hereof and collectively evidence and constitute the entire contract (the "Contract Documents").

The CONTRACTOR hereby agrees to commence work within **ten (10)** days after the date written notice to do so shall have been given to him, and to substantially complete all work within **Ninety (90) calendar days** after the date specified in the written Notice To Proceed.

Waiver of any breach of this Agreement shall not constitute waiver of any subsequent breach.

The OWNER agrees to pay the CONTRACTOR, for satisfactory performance of this Agreement, in current funds the price or prices shown in the Contractor's Proposal, which forms a part of this contract, such payments to be subject to proper completion of the contract, in the total amount of $418,097.00, (Four Hundred Eighteen Thousand Ninety-Seven Dollars), subject to proper additions and deductions (the "Contract Amount"), all as provided in the General Conditions of this Agreement. The financial obligations of the City under this Agreement shall be paid from current funds and shall be subject to funds being appropriated and budgeted in sufficient amounts to satisfy such obligations.

Although drawn by the OWNER, both parties hereto expressly agree and assert that in the event of any dispute over its meaning or application, this Agreement shall be interpreted reasonably and fairly, and neither more strongly for nor against either party.

The CONTRACTOR agrees that time is of the essence on this contract and that for each calendar day of delay beyond the time established for completion of the work specified and contracted for, the Owner may withhold permanently from the CONTRATOR'S compensation the sum of **Five Hundred Dollars ($500.00)** as stipulated liquidated damages for delay.

In accordance with Chapter 2270, Texas Government Code, the CITY may not enter into a contract with a company for goods and services unless the contract contains a written verification from the company that it: (a) does not boycott Israel; and (2) will not boycott Israel during the term of the contract. The signatory executing this contract on behalf of the company verifies that CONTRACTOR does not boycott Israel and will not boycott Israel during the term of this Agreement.

"To the extent this Agreement constitutes a governmental contract within the meaning of Section 2252.151 of the Texas Government Code, as amended, solely for purposes of compliance with Chapter 2252 of the Texas Government Code, and except to the extent otherwise required by applicable federal law, CONTRACTOR represents that CONTRACTOR nor any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of CONTRACTOR is a company listed by the Texas Comptroller of Public Accounts under Sections 2270.0201, or 2252.153 of the Texas Government Code."

IN WITNESS WHEREOF, both parties have caused this Agreement to be signed in their respective corporate names by duly authorized representatives, and the parties hereby bind themselves, their successors and assigns for the faithful and full performance of the terms and provisions hereof.

EXECUTED on the latest date of the signatories indicated below

OWNER	CONTRACTOR
By: _____	By: _____
Title: Mayor, City of Manor	Title: _____
Printed Name. Dr. Larry Wallace Jr.	Printed Name:_____
Date Signed:_____	Date Signed:_____
ATTEST:	ATTEST:
_____ City Secretary, City of Manor	_____

PERFORMANCE BOND

(Sample Form)

STATE OF TEXAS)(

COUNTY OF)(

KNOW ALL MEN BY THESE PRESENTS: That _____, of the City of _____County of _____, and State of _____, as Principal, and _____authorized under the laws of the State of Texas to act as Surety on bonds for principals, are held and firmly bound unto City of Manor, Texas (Owner) as Obligee in the penal sum of _____Dollars ($ _____) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal has entered into a written Agreement with the Owner, dated the _____ _____ day of _____, 20 ___, for construction of 2020 Wastewater Collection System Improvements (Project) in accordance with Plans and Specifications prepared by Jay Engineering, a Division of GBA which contract is hereby referred to and made in part hereof as fully and to the same extent as if copied at length herein.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall promptly and faithfully perform said Contract and said in all respects duly and faithfully observe and perform all and singular the covenants, conditions and agreements in and by said contract agreed and covenanted by the Principal to be observed and performed, and according to the true intent and meaning of said Contract and the Plans and Specifications hereto annexed, then this obligation shall be void; otherwise, to remain in full force and effect;

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Article 5160 of the Revised Civil Statutes of Texas, as amended and all liabilities on this bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in anywise effect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work to be performed thereunder.

Whenever Principal shall be, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

1. Complete the Contract in accordance with its terms and conditions, or

2. Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety, jointly of the lowest responsible bidder, arrange for a contract between such bidder and Owner, and made available as Work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

PERFORMANCE BOND (cont'd)
(Sample Form)

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20 ___.

Principal	Surety
By _____	By _____
Title _____	Title _____
Address _____	Address _____
_____	_____
_____	_____

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

_____

_____

Bond Number: _____

PAYMENT BOND
(Sample Form)

STATE OF TEXAS)(

COUNTY OF)(

KNOW ALL MEN BY THESE PRESENTS: That _____, of the City of _____County of _____, and State of _____, as Principal, and _____authorized under the laws of the State of Texas to act as Surety on bonds for principals, are held and firmly bound unto City of Manor, Texas (Owner), hereinafter called the Obligee, in the penal sum of _____Dollars ($ _____) for the payment of which sum, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal has entered into a written Contract with the Owner, dated the _____ day of _____, 20 ___, for construction of 2020 Wastewater Collection System Improvements (Project) which contract is hereby referred to and made in part hereof as fully and to the same extent as if copied at length herein.

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

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Article 5160 of the Revised Civil Statutes of Texas, as amended and all liabilities on this bond to all claimants shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in anywise effect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20 ___.

_____	_____
Principal	Surety
By _____	By _____
Title _____	Title _____
Address _____	Address _____
_____	_____

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

_____

Bond Number: _____

CERTIFICATE OF INSURANCE

(Sample Form)

THIS IS TO CERTIFY THAT INSURANCE POLICY(IES) LISTED BELOW ARE ISSUED TO THE NAMED INSURED

NAME OF INSURED:

ADDRESS

TYPE OF INSURANCE	POLICY NUMBER	POLICY PERIOD	LIMITS OF LIABILITY		
				EACH OCCURANCE	AGGREGATE
GENERAL LIABILITY COMPREHENSIVE NONCOMPREHENSIVE PROTECTIVE LIABILITY PRODUCT/COMPLETED OPERATION CONTRACTURAL LIABILITY PERSONAL INJURY BROAD FORM P.D.			Bodily Injury Property Damage	$ $	$ $
			Bodily Injury and Property Damage (Combined Single Limit)	$	$
			Applies to Products/Completed Operations Hazard		$ (Personal Injury)
AUTOMOTIVE LIABILITY COMPREHENSIVE NONCOMPREHENSIVE			Bodily Injury (Each Person) Bodily Injury (Each Occurrence)	$ $	
			Property Damage	$	
			Bodily Injury and Property Damage – (Combined Single Limit)	$	
EXCESS LIABILITY UMBRELLA FORM			Bodily Injury and Property Damage – (Combined Single Limit)	$	
WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY			Statutory	$	
AUTOMOBILE PHYSICAL DAMAGE (SPECIFY)					
OTHER					

ADDITIONAL INSURED:

NAME AND ADDRESS OF AGENCY:

Countersigned by _____

Authorized Representative

SEPARATION OF COSTS

Pursuant to the Instructions to Bidders, the proposal of the undersigned that has been submitted for performing this contract in full is hereby segregated as follows:

The amount of this bid that is charged for Skill and labor is:		$_____
The amount of this bid that is charged for materials and tangible personal property (not less than the actual cost of such materials) is		$ _____
	TOTAL	$ _____

_____
Contractor Signature

(Note: This form to be completed only by lowest responsible bidder after he has been selected)

GENERAL CONDITIONS OF THE AGREEMENT

1. OWNER: Whenever the word OWNER, City, or the expression Party of the First Part, or First Party, are used in this contract, it shall be understood as referring to the City of Manor, Texas.

2. CONTRACTOR: Whenever the word Contractor, or the expression Party of the Second Part, or Second Party is used, it shall be understood to mean the person, persons, co-partnership or corporation, to wit:_____ who ha__ agreed to perform the work embraced in this contract, or to his or their legal representatives.

3. CITY'S REPRESENTATIVE. Whenever the words "City's Representative" or "Representative" are used, it shall mean and be understood as referring to the City Manager or his delegate, who shall act as City's agent. The City's Representative may inspect and issue instructions but shall not directly supervise the Contractor.

4. ENGINEER: Whenever the word Engineer is used in this contract with reference to the preparation of plans, specifications and contract documents, it shall be understood as referring to the firm of Jay Engineering, a Division of GBA, Consulting Engineers, Leander, Texas, Engineer for the Owner. Whenever the word ENGINEER is used in this contract with reference to the construction of this project, it shall be understood as referring to Resident Engineer or such other ENGINEER or Inspector as may be authorized by said OWNER to act in any particular capacity.

5. INTERPRETATION OF PHRASES: Whenever the words "Directed", "Required", "Permitted", "Designated", "Considered Necessary", "Prescribed", or words of like importance are used, it shall be understood that the direction, requirements, permission, order, designation or prescription, of the ENGINEER is intended and, similarly, the words "Approval", "Acceptable", "Satisfactory", or words of like importance shall mean approved by or acceptable or satisfactory to the ENGINEER.

   Whenever in the specifications or drawings accompanying this agreement, the terms or description of various qualities relative to finish, workmanship, or other qualities of similar kind which cannot, from their nature, be specifically and clearly described and specified, but are necessarily described in general terms, then, in all such cases, any question of the fulfillment of said specifications shall be decided by the ENGINEER, and said work shall be done in accordance with his interpretations of the meaning of the words, terms or clauses defining the character of the work.

6. PROJECT: The term "Project" shall mean and include all that is required to obtain a final product that is acceptable to the City. The term "work" shall have like meaning.

7. SUBSTANTIALLY COMPLETED: The term "Substantially Completed" or "Substantially Complete" means that in the opinion of the City's Representative the Project, including all systems and improvements, is in a condition to serve its intended purpose but still may require minor miscellaneous work and adjustment. Final payment of the Agreement Price, including retainage, however, shall be withheld until Final Completion and acceptance of the work by the City. Acceptance by the City shall not impair or waive any warranty obligation of Contractor.

8. WORK: The term "work" as used in this Agreement shall mean and include all that is required herein to obtain a final product that is acceptable to the City. The Work is defined in the Plans & Specifications and Contract Documents, and must be constructed in conformance with the Plans & Specifications and the Contract Documents.

9. CONTRACT DOCUMENTS: The Contract Documents and their priority shall be as follows:

   Addendum to the Contract Documents
   Special Conditions
   Supplementary Conditions
   General Conditions
   Plans and Technical Specifications
   Agreement
   Any instructions to Bidders and any other notices to Bidders or Contractor
   Performance bond, Payment bond, Bid bond, Special bond, and Insurance
   Contractor's Proposal

   All work shall be done and all materials furnished in strict conformity with Contract Documents.

10. KEEPING OF PLANS AND SPECIFICATIONS ACCESSIBLE: The CONTRACTOR shall be furnished digital copies of all plans, profiles and specifications and shall keep one hard copy of the same constantly accessible on the work site.

11. RIGHT OF ENTRY: The OWNER reserves the right to enter the property or location on which the works herein contracted for are to be constructed or installed, by such agent or agents as it may elect, for the purpose of supervising and inspecting the work, or for the purpose of constructing or installing such collateral work as said OWNER may desire.

12. QUANTITIES AND MEASUREMENTS: No extra or customary measurements of any kind will be allowed, but the actual length, area, solid contents, number and weight only shall be considered, unless otherwise specifically provided.

13. LINE AND GRADE, STAKING: All layout and construction staking shall be done by the CONTRACTOR from control points shown on the drawings. All grades, forms and lines shall be approved by the OWNER'S representative before the respective work is begun.

14. ENGINEER AND INSPECTION: It is agreed by the CONTRACTOR that the OWNER shall be and is hereby authorized to appoint from time to time such ENGINEERS and Inspectors as the said OWNER may deem proper, to inspect the material furnished and the work done under this Agreement, and to see that the said material is furnished, and said work is done in accordance with the specifications therefor. The CONTRACTOR shall furnish all reasonable aid and assistance required by the ENGINEERS or Inspectors for the proper inspection and examination of the work and all parts of the same. The CONTRACTOR shall furnish all reasonable aid and assistance required by the ENGINEER or Inspectors as appointed, when the same are consistent with the obligations of this Agreement and the accompanying specifications provided, however, should the CONTRACTOR object to any order by any subordinate ENGINEER or inspector, the CONTRACTOR may within six (6) days make written appeal to the ENGINEER for his decision.

15. DISCREPANCIES AND OMISSIONS: It is further agreed that it is the intent of this contract that all work must be done and all material must be furnished in accordance with the generally accepted practice, and in the event of any discrepancies between the plans and specifications, or otherwise, or in the event of any doubt as to the meaning and intent of any portion of the contract, specifications or plans, the ENGINEER shall define which is intended to apply to the work.

16. ADEQUACY OF DESIGN: It is understood that the OWNER has selected the ENGINEER named in this Agreement to prepare the plans and specifications, and all Supplements thereto; and agreed that the OWNER will be responsible for the adequacy of the design, sufficiency of the plans and specifications, and the safety of the structure, provided the CONTRACTOR has complied with said plans and specifications, all modifications thereof, and additions and alterations thereto, approved by the ENGINEER. The burden of proof shall be upon the

CONTRACTOR to show that he has complied with this contract, said plans, specifications, and all modifications thereof, and all additions and alterations thereto.

17. LOSSES FROM NATURAL CAUSES: All loss or damage arising out of the nature of work to be done, or from the action of the elements or from any unforeseen circumstances in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the work shall be sustained and borne by the CONTRACTOR at his own cost and expense.

18. ESTIMATED QUANTITIES: This agreement, including the specifications, plans and estimates, is intended to show clearly all work to be done and material to be furnished hereunder. The estimated quantities of the various classes of work to be done and material to be furnished under this contract at unit prices are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat from these estimates, and that where the basis for payment under this contract is the unit price method, payment shall be for the actual amount of such work done and material furnished.

    Where payment is based on the unit price method, the CONTRACTOR agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this contract and the estimated quantities contemplated and contained in the proposal; provided, however, that in case the actual quantity of any "Major Item" should become as much as 25% more than, or 25% less than the estimated or contemplated quantity for such items, then either party to this Agreement, upon demand, shall be entitled to a revised consideration of the unit price for the work.

    A "Major Item" shall be construed to be any individual bid item incurred in the proposal that has a total cost equal to or greater than five (5%) percent of the total contract cost, computed on the basis of the final Contract Price.

19. CHANGES AND ALTERATIONS: The CONTRACTOR further agrees that the OWNER may make such changes and alterations as the OWNER may see fit, in the line, grade, form dimensions, plans or materials for the work herein contemplated, or any part thereof, either before or after the beginning of the construction, without affecting the validity of this contract and the accompanying bond.

    If such changes or alterations diminish the quantity of the work to be done, they shall not constitute the basis for a claim for damages, or anticipated profits on the work that may be dispensed with. If they increase the amount of work, and the increased work can fairly be classified under the specifications, such increase shall be paid for according to the quantity actually done and at the unit price established for such work under this contract; otherwise such additional work shall be paid for as provided in Paragraph 20 below.

20. EXTRA WORK: The term "Extra Work" as used in this contract shall be understood to mean and include all work that may be required by the OWNER to be done by the CONTRACTOR to accomplish any change, alteration or addition to the work shown upon the plans, or reasonably implied by the specifications, and not covered by the CONTRACTOR'S PROPOSAL, except as provided under Changes and Alterations in Paragraph 19 herein above.

    It is agreed that the CONTRACTOR shall perform all extra work when presented with a Written Work Order signed by the ENGINEER; subject, however, to the right of the CONTRACTOR to require a written confirmation to pay the CONTRACTOR for performing said Extra Work. The cost for Extra Work shall be determined by Method (A) - By agreed unit prices: or Method (B) - By

agreed lump sum; or Method (C) the "actual field cost" of the work, plus fifteen (15) percent, if neither Method (A) nor Method (B) be commenced.

In the event said Extra Work be performed and paid for under Method (C), then the provisions of this paragraph shall apply and the "actual field cost" is hereby defined to include the cost of all workmen, such as foreman, timekeepers, mechanics and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment, for the time actually employed or used on such Extra Work, plus actual transportation charges necessarily incurred, if the kind of equipment or machinery be not already on the job, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work, including Social Security, and other payroll taxes, and a ratable proportion of premiums on Construction and Maintenance Bonds, Public Liability and Property Damage and Workman's Compensation, and all other insurance as may be required by any law or ordinance, or directed by the OWNER. The ENGINEER may direct the form in which accounts of the "actual field cost" shall be kept and may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used, otherwise these matters shall be determined by the CONTRACTOR.

Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using 90 percentage of the latest schedule of Equipment Ownership Expense adopted by the Associated General Contractors of America. Where practicable the terms and prices for the use of machinery and equipment shall be incorporated in the Written Extra Work Order. The fifteen (15%) percent of the "actual field cost" to be paid the CONTRACTOR shall compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the "actual field cost" as herein defined, save that where the CONTRACTOR'S Camp or Field Office must be maintained primarily on account of such Extra Work, then the cost to maintain and operate the same shall be included in the "actual field cost".

No claim for Extra Work of any kind will be allowed unless ordered in writing by the OWNER. Notice is hereby given that all change orders must be executed in writing before the work is started; any extra work performed otherwise will be at the CONTRACTOR'S risk. In case any orders or instructions, whether oral or written, appear to the CONTRACTOR to involve Extra Work for which he should receive compensation, he shall make written request to the ENGINEER for written order authorizing such Extra Work. Should a difference of opinion arise as to what does or does not constitute Extra Work, or as to the payment therefore, and the OWNER insists upon its performance, the CONTRACTOR shall proceed with the work after making written request for written order and shall keep an accurate account of the "actual field cost" thereof, as provided under Method (C).

21. PRELIMINARY APPROVAL: No ENGINEER, supervisor or inspector shall have any power to waive the obligations of this contract for the furnishing by the CONTRACTOR of good material, and of his performing good work as herein described, and in full accordance with the plans and specifications. No failure or omission of any ENGINEER, supervisor or inspector to condemn any defective work or material shall release the CONTRACTOR from his obligations to at once tear out, remove and properly replace the same at any time prior to final acceptance upon the discovery of said defective work, or material; provided, however that the OWNER, his assistant or inspector, shall upon request of the CONTRACTOR, inspect and accept or reject any material furnished, and in event the material has been once accepted by the OWNER, his assistant or inspector, such acceptance shall be binding on the OWNER, unless it can be clearly shown that such material furnished does not meet the specifications for this work.

Any questioned work may be ordered taken up or removed for re-examination, by the ENGINEER, prior to final acceptance, and if found not in accordance with the specifications for said work, all expense of removing, re-examination and replacement shall be borne by the

CONTRACTOR; otherwise the expense thus incurred shall be allowed as Extra Work, and shall be paid for by the OWNER.

22. DEFECTS AND THEIR REMEDIES: It is further agreed that if the work or any part thereof, or any material brought on the ground for use in the work or selected for the same, shall be deemed by the ENGINEER as unsuitable or not in conformity with the specifications, the CONTRACTOR shall, after receipt of written notice thereof from the ENGINEER, forthwith remove such material and re-build or otherwise remedy such work so that it shall be in full accordance with this contract.

23. TIME AND ORDER OF COMPLETION: It is the meaning and intent of this contract, except as otherwise provided for in the Supplementary and Special Conditions and Technical Specifications, that the CONTRACTOR shall be allowed to prosecute his work at such times and seasons, in such order of precedence, and in such manner as shall be most conducive to economy of construction, provided however, that the order and time of prosecution shall be such that the work shall be substantially completed as a whole and in part, in accordance with this contract, plans and specifications and within the time of completion hereafter designated; provided, also, that when the OWNER is having other work done, either by contract or by his own force, the ENGINEER may direct the time and manner of constructing the work done under this contract, so that conflict will be avoided and the construction of the various works being done for the OWNER shall be harmonized.

    The CONTRACTOR further agrees that he will commence work within **ten (10)** days after the date of the written Notice to Proceed and will progress therewith so that the work shall be substantially completed in accordance with the terms of the Contract Documents.

24. EXTENSION OF TIME: Should the CONTRACTOR be unduly delayed in the completion of the work by any cause which the ENGINEER shall decide justifies the delay, then an extension of time will be allowed for completing the work, sufficient to compensate for the delay, the amount of the extension to be determined by the ENGINEER; provided, however, that the CONTRACTOR shall give the ENGINEER notice in writing within ten (10) days of the cause of such delay.

25. HINDRANCES AND DELAYS: No charge shall be made by the CONTRACTOR for hindrances or delays from any cause (except where the work is stopped by order of the OWNER) during the progress of any portion or the work embraced in this contract. In case said work shall be stopped by the act of the OWNER, then such expense as in the judgment of the ENGINEER is caused by such stopping of said work shall be paid by the OWNER to the CONTRACTOR.

26. PRICE FOR WORK: In consideration of the furnishing of all the necessary labor, equipment and material, and the completion of all work by the CONTRACTOR, and on the completion of all work and the delivery of all material embraced in this contract in full conformity with the specifications and stipulations herein contained, the OWNER agrees to pay the CONTRACTOR the prices set forth in the Proposal hereto attached, which has been made a part of this contract; and the CONTRACTOR hereby agrees to receive such prices in full for furnishing all material and all labor required for the aforesaid work, also for all expense incurred by him, and for well and truly performing the same and the whole thereof in the manner and according to this Agreement, the attached specifications and requirements of the ENGINEER.

27. PARTIAL PAYMENT: The CONTRACTOR shall submit a written statement showing as completely as practicable the total value of the work he has accomplished up to and including the last day of the preceding month (said statement shall include the value of all sound materials delivered to the job site and for which invoices are furnished to the ENGINEER on or before the third day of each month). The ENGINEER shall then prepare a statement for partial payment to the CONTRACTOR and submit the statement to the OWNER on or before the tenth day of each month. The OWNER shall then pay the CONTRACTOR on or before the 25th day of the current month the total amount of the ENGINEER'S statement (provided the CONTRACTOR has timely

submitted his statement to the ENGINEER) less **five (5) percent** of the amount thereof, which **five** percent shall be retained until final payment, and further less all previous payments, and further less all further sums that may be retained by the OWNER under the terms of this Agreement and the other Contract Documents. It is understood, however, that in case the whole work be near to completion and some unexpected and unusual delay occur due to no fault or neglect on the part of the CONTRACTOR, the OWNER may - upon written recommendation of the ENGINEER - pay a reasonable and equitable portion of the retained percentage to the CONTRACTOR; or, the CONTRACTOR at the OWNER'S option, may be relieved of the obligation to fully complete the work, and thereupon, the CONTRACTOR shall receive payment of the balance due him under the contract subject only to the conditions stated in paragraph 26 hereof.

28. FINAL COMPLETION AND ACCEPTANCE: Within fifteen (15) days after the CONTRACTOR has given the ENGINEER written notice that the work has been completed, or substantially completed, the ENGINEER and the OWNER shall inspect the work and within said time, if the work is found to be completed in accordance with the Plans and Specifications, the OWNER will issue to the CONTRACTOR a Certificate of Completion.

29. FINAL PAYMENT: Upon the issuance of the Certificate of Completion, the ENGINEER shall proceed to make final measurements and prepare final statement of the value of all work performed and materials furnished under the terms of the Agreement and shall certify same to the OWNER, who shall pay to the CONTRACTOR on or before the 30th day after the date of the Certificate of Completion the balance due the CONTRACTOR under the terms of this Agreement, provided he has fully performed his contractual obligations under the terms of this contract; and said payment shall become due in any event upon said performance by the CONTRACTOR.

30. DELAYED PAYMENTS: Should the OWNER fail to make payment to the CONTRACTOR of the sum named in any partial or final statement, when payment is due, or should the ENGINEER fail to issue any statement on or before the date above provided, then the OWNER shall pay to the CONTRACTOR in addition to the sum shown as due by such statement, interest thereon at the rate of ten (10) percent per annum from date due as provided in Paragraphs 27 and 29, until fully paid, which shall fully liquidate any injury to the CONTRACTOR growing out of such delay in payment.

31. ENGINEER'S AUTHORITY AND DUTY: The ENGINEER shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The ENGINEER'S estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the ENGINEER shall be a condition precedent to the right of the CONTRACTOR to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

    The ENGINEER shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the CONTRACTOR UNDER THIS CONTRACT AND OTHER Contractors performing work for the OWNER shall be adjusted and determined by the ENGINEER.

32. CONTRACTOR'S DUTY: The CONTRACTOR shall give personal attention to the faithful prosecution and completion of this work and shall be present either in person or by duly authorized representative on the site of the work continually during its progress. He shall maintain an office on or adjacent to the site of the work.

33. CONTRACTOR'S AGENT: The CONTRACTOR during his absence from the work shall keep a competent superintendent or manager upon the work, fully authorized to act for him in his absence, and to receive such orders as may be given for the proper continuance of the work. Notice to do any work, to alter work, to cease work which the CONTRACTOR is obligated to do, or concerning any imperfections in work or any material furnished when given to the superintendent or manager of the CONTRACTOR in charge of any operation of the work in the absence of the CONTRACTOR, provided any notice given under this paragraph shall be in writing.

34. CHARACTER OF WORKERS: The CONTRACTOR agrees to employ only orderly, competent and skillful workers to do the work; and that whenever the ENGINEER shall inform him in writing that any workers on the site are, in his opinion, incompetent, unfaithful or disorderly, such workers shall be discharged from the work and shall not again be employed on the same without the OWNER'S written consent.

35. CONSTRUCTION PLANT: The CONTRACTOR shall provide all labor, tools, equipment, machinery and material necessary in the prosecution and completion of this contract where it is not otherwise specifically provided that the OWNER shall furnish the same, and it is also understood that the OWNER shall not be held responsible for the care, preservation, conservation, or protection of any material, tools, or machinery or any part of the work until it is finally completed and accepted. It should also be understood that the OWNER will not loan plant tools or equipment to the CONTRACTOR.

36. RIGHT OF ENGINEER TO MODIFY METHODS AND EQUIPMENT: If at any time the methods or equipment used by the CONTRACTOR are found to be inadequate to secure the quality of work or the rate of progress required under this contract, the ENGINEER may order the CONTRACTOR in writing to increase their safety or improve their character and efficiency, and the CONTRACTOR shall comply with such order. If at any time the working force of the CONTRACTOR is inadequate for securing the progress herein specified, the CONTRACTOR shall, if so ordered in writing increase his force or equipment, or both to such an extent as to give reasonable assurance of compliance with the schedule of progress.

37. SANITATION: Necessary sanitary conveniences for the use of laborers on the work, properly secluded from public observation, shall be installed and maintained by the CONTRACTOR in such a manner and at such points as shall be approved by the ENGINEER, and their use shall be strictly enforced.

38. CONTRACTOR'S BUILDINGS: The building of structure or other forms of protection will be permitted only at such places as the OWNER shall approve and the sanitary conditions of the grounds on or about such structures shall at all times be maintained in a manner satisfactory to the OWNER.

39. PROTECTION AGAINST ACCIDENT TO EMPLOYEES AND THE PUBLIC: CONTRACTOR assumes the sole responsibility for the safety and protection of the premises, adjoining property, employees, pedestrians, vehicles, vehicle operators, and other persons and shall provide and maintain suitable signs, barricades and at night shall also maintain warning lights, as will effectively warn pedestrians and vehicular traffic of any obstruction and safeguard the public and the work from injury or damage.

    The CONTRACTOR shall be liable for and shall indemnify and save harmless the ENGINEER, The OWNER, its agents and employees from any and all claims for damages on account of his failure to fully protect the premises, vehicular traffic, all adjoining property, employees and other persons.

40. PROTECTION OF ADJOINING PROPERTY: The CONTRACTOR shall take proper means to protect the adjacent or adjoining property or properties in any way encountered and which might

be injured or seriously affected by any process of construction, to be undertaken by this agreement, from any damages or injury by reason of said process or construction.

The CONTRACTOR shall be liable for and shall indemnify and save harmless the OWNER, its agents and employees from any and all claims for damages on account of his failure to fully protect the premises, all adjoining property, employees and other persons.

41. PROTECTION AGAINST CLAIMS OF SUB-CONTRACTORS, LABORERS, MATERIALMEN AND FURNISHERS OF MACHINERY, EQUIPMENT AND SUPPLIES: The CONTRACTOR agrees that he will indemnify and save the OWNER harmless from all claims growing out of the lawful demands of sub-contractors, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools and all supplies, including commissary, incurred in the furtherance of the performance of this contract. When so desired by the OWNER, the CONTRACTOR shall furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged or waived. If the CONTRACTOR fails to do so, then the OWNER may at the option of the CONTRACTOR either pay unpaid bills, of which the OWNER has written notice, direct, or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to liquidate any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payments to the CONTRACTOR shall be resumed in full, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligation upon the OWNER by either the CONTRACTOR or his SURETY.

42. PROTECTION AGAINST ROYALTIES OR PATENTED INVENTION: The CONTRACTOR shall protect and save harmless the OWNER from all and every demand for damages, royalties or fees on any patented invention used by him in connection with the work done or material furnished under this contract; provided, however, that if any patented material, machinery, appliance or invention is clearly specified in this contract, then, and in that event, the cost of procuring the rights of use and the legal release or indemnity shall be borne and paid by the OWNER, direct, unless such cost is determined and directed to be included in the bid price at the time the proposal is submitted.

43. LAWS AND ORDINANCES: The CONTRACTOR shall at all times observe and comply with all Federal, State and Local laws, ordinances and regulations, which in any manner affect the contract of the work, shall be responsible for obtaining all necessary permits such as building, plumbing, fire, tree, creek and etc. as required for the work, and shall indemnify and save harmless the OWNER against any claim arising from the violation of any such laws and ordinances, whether by the CONTRACTOR or his employees. In case the OWNER is a body politic and corporate, the law from which it derives its powers, insofar as the same regulates the objects for which, or the manner in which, or the conditions under which, the OWNER may enter into contract, shall be controlling, and shall be considered as part of this Contract, to the same effect as though embodied herein.

44. LIQUIDATED DAMAGES FOR DELAY: And the CONTRACTOR agrees that time is of the essence of this contract, and that for each day of delay beyond the date stated in the Proposal for the completion of the work herein specified and contracted for, the OWNER may withhold permanently from the CONTRACTOR'S total compensation the sum or amount stated in the Proposal and Supplementary Conditions as stipulated liquidated damages for such delay.

45. ASSIGNMENT AND SUBLETTING: The CONTRACTOR further agrees that he will retain personal control and will give his personal attention to the fulfillment of this contract and that he will not assign by Power of Attorney, or otherwise, nor sublet said contract without the written consent of the OWNER, and that no part or feature of the work will be sublet to anyone objectionable to the OWNER. The CONTRACTOR further agrees that the subletting of any portion or feature of the work, or materials required in the performance of this contract, shall not

relieve the CONTRACTOR from his full obligations to the OWNER, as provided by this Agreement.

46. ABANDONMENT BY CONTRACTOR: In case the CONTRACTOR should abandon and fail or refuse to resume work within ten (10) days after written notification from the OWNER, or the ENGINEER, or if the CONTRACTOR fails to comply with the orders of the ENGINEER, when such orders are consistent with this Contract, or with this Agreement, or with the Specifications hereto attached, then, and in that case, the Surety on the bond shall be notified in writing and directed to complete the work, and a copy of said notice shall be delivered to the CONTRACTOR.

    After receiving said notice of abandonment the CONTRACTOR shall not remove from the work any machinery, equipment, tools, materials or supplies then on the job, but the same, together with any materials and equipment under contract for the work, may be held for use on the work by the OWNER or the SURETY on the construction bond, or another contractor, in completion of the work; and the CONTRACTOR shall not receive any rental or credit therefor, (except when used in connection with Extra Work, where credit shall be allowed as provided for under paragraph 20, Extra Work); it being understood that the use of such equipment and materials will ultimately reduce the cost to complete the work and be reflected in the final settlement.

    In case the Surety should fail to commence compliance with the notice for completion hereinbefore provided for, within ten (10) days after service of such notice, then the OWNER may provide for completion of the work in either of the following elective manners:

    a) The OWNER may thereupon employ such force of workers and use of machinery, equipment, tools, materials and supplies as said OWNER may deem necessary to complete the work and charge the expense of such labor, machinery, equipment, tools, materials and supplies to said CONTRACTOR, and the expense so charged shall be deducted and paid by the OWNER out of such moneys as may be due, or that may thereafter at any time become due to the CONTRACTOR under any provision of the Agreement. In case such expense is less than the sum which would have been payable under this contract, if the same has been completed by the CONTRACTOR, then said CONTRACTOR shall receive the difference. In case such expense is greater than the sum which would have been payable under this contract, if the same had been completed by said CONTRACTOR, then the CONTRACTOR and/or his SURETY shall pay the amount of such expenses to the OWNER: or

    b) The OWNER under sealed bids, after five (5) days notice published one or more times in a newspaper having a general circulation in the area of the location of the work, may let the contract for the completion of the work under substantially the same terms and conditions which are provided in this contract. In case of any increase in cost to the OWNER under the new contract as compared to what would have been the cost under this contract, such increase shall be charged to the CONTRACTOR and the SURETY shall be and remain bound therefore. However, should the cost to complete any such new contract prove to be less than what would have been the SURETY shall be credited therewith.

    When the work shall have been substantially completed, the CONTRACTOR and his Surety shall be so notified and Certificates of Completion and Acceptance, as provided in Paragraph 28 herein above, shall be issued. A complete itemized statement of the contract accounts, certified to and by the ENGINEER as being correct, shall then be prepared and delivered to the CONTRACTOR and his Surety, whereupon the CONTRACTOR and/or his Surety, or the OWNER as the case may be, shall pay the balance due as reflected by said statement, within fifteen (15) days after the date of such Certificate of Completion.

    In the event the statement of accounts shows that the cost to complete the work is less than that which would have been the cost to the OWNER had the work been completed by the

CONTRACTOR under the terms of this contract; or when the CONTRACTOR and/or his Surety shall pay the balance shown to be due by them to the OWNER, then all machinery, equipment, tools, materials or supplies left on the site of the work shall be turned over to the CONTRACTOR and/or his Surety. Should the cost to complete the work exceed the contract price, and the CONTRACTOR and/or his Surety fail to pay the amount due the OWNER within the time designated hereinabove, and there remains any machinery, equipment, tools, materials or supplies on the site of the work, notice thereof, together with an itemized list of such equipment and materials, shall be mailed to the CONTRACTOR and his Surety at the respective addresses designated in this contract; provided, however, that actual written notice given in any manner will satisfy this condition. After mailing, or other giving of such notice, such property shall be held at the risk of the CONTRACTOR and his Surety subject only to the duty of the OWNER to exercise ordinary care to protect such property. After fifteen (15) days from the date of said notice, the OWNER may sell such machinery, equipment, tools, materials or supplies and apply the net sum derived from which sale to the credit of the CONTRACTOR and his Surety. Such sale may be made at either public or private sale, with or without notice, as the OWNER may elect. The OWNER shall release any machinery, equipment, tools, materials, or supplies, which remain on the work, and belong to persons other than the CONTRACTOR or his Surety, to their proper Owners.

47. ABANDONMENT BY OWNER: In case the OWNER shall fail to comply with the terms of this contract and should fail or refuse to comply with said terms within ten (10) days after written notification by the CONTRACTOR, then the CONTRACTOR may suspend or wholly abandon the work, and may remove therefrom all machinery, tools and equipment, and all materials on the ground that have not been included in payments to the CONTRACTOR and have not been wrought into the work. And thereupon the ENGINEER shall make an estimate of the total amount earned by the CONTRACTOR, which estimate shall include the value of all work actually completed by said CONTRACTOR at the prices stated in the attached proposal, the value of all partially completed work at a fair and equitable price, and the amount of all Extra Work performed at the prices agreed upon or provided for by the terms of this contract. The ENGINEER shall then make a final statement of the balance due the CONTRACTOR by deducting from the above estimate all previous payments by the OWNER and all other sums that may be retained by the OWNER under the terms of this Agreement and shall certify same to the OWNER who shall pay to the CONTRACTOR on or before thirty (30) days after the date of the notification by the CONTRACTOR, under the terms of this Agreement.

48. BOND: It is further agreed by the parties to this contract that the CONTRACTOR will execute bonds as provided for in the provisions of the Supplementary General Conditions for the satisfactory performance of the work in accordance with this contract in the form provided for this purpose, and it is agreed that this contract shall not be in effect until such bonds are furnished to and approved by the OWNER.

49. TIME OF FILING CLAIMS: It is further agreed by both parties hereto that all questions of dispute or adjustment presented by the CONTRACTOR shall be in writing and filed with the ENGINEER within a reasonable time after the ENGINEER has given any directions, order or instruction to which the CONTRACTOR desires to take exceptions. The ENGINEER shall reply to such written exceptions by the CONTRACTOR and render his final decision in writing. In case the CONTRACTOR should appeal from the ENGINEER'S decision, such appeal shall be filed with the ENGINEER and the OWNER in writing within ten (10) days after the date of the ENGINEER'S final decision. It is further agreed that final acceptance of the work by the OWNER and the acceptance by the CONTRACTOR of the final payment shall be a bar to any claims by either party, except where noted otherwise in the Contract Documents.

SUPPLEMENTARY CONDITIONS TO THE AGREEMENT

The Supplementary Conditions are in addition to and do not void any portions of the General Conditions of the Agreement or other parts of the Contract Documents; however, wherever there is a direct conflict in meaning, these Supplementary Conditions take precedence.

1. WORK SCOPE: The facilities and services to be provided under this contract include the following:

   a) Clearing and Grading
   b) Flexible base
   c) HMAC
   d) Drainage Improvements
   e) Gravity Wastewater Mains
   f) Wastewater Services
   g) Concrete Manholes
   h) Traffic Controls and other Incidental Work
   i) Concrete work

   It is understood that except as otherwise specifically stated in the Contract Documents, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

2. WORK TO BE PERFORMED BY OTHERS: The OWNER reserves the right to accomplish separate or similar work on the project, in a manner that does not impede the progress or quality of work to be performed by the CONTRACTOR. CONTRACTOR shall cooperate with OWNER's staff or other contractors on the site to produce a completed facility.

3. LAND FOR CONSTRUCTION PURPOSES: The CONTRACTOR is responsible for securing land for construction purposes. The CONTRACTOR will be permitted to use available space belonging to the OWNER, on or near the site of the work, for construction purposes and for the storage of materials and equipment. The location and extent of the areas so used shall be approved by the OWNER. The CONTRACTOR will be responsible for the restoration of any space used for construction purposes.

   It shall be clearly understood that the responsibility for the protection and safekeeping of equipment and materials on the site will be entirely that of the CONTRACTOR and that no claim shall be made against the OWNER by reason of any act of another contractor, an employee or trespasser. It shall be further understood that should any occasion arise necessitating access to the sites occupied by these stored materials and equipment, the CONTRACTOR owning or responsible for the stored materials or equipment shall immediately move same. No materials or equipment shall be placed upon the property of the OWNER until the OWNER has approved the location contemplated by the CONTRACTOR to be used for storage.

4. USE OF PREMISES AND REMOVAL OF DEBRIS: The CONTRACTOR expressly undertakes at his own expense:

   a) To take every precaution against injuries to persons or damage to property;

   b) To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or other contractors;

   c) To clean up frequently and remove all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that at all times the site of the work shall present a neat orderly and

workmanlike appearance;

d) Before final payment to remove all surplus materials, falsework, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and put the site in neat, orderly condition. Spoil disposal must be at an approved site.

5. SAFETY CONDITIONS: Every reasonable and proper precaution shall be taken by the CONTRACTOR to insure the safety of the work and employed personnel, the public and adjacent property whether publicly or privately owned. To protect persons from injury and to avoid property damage, barricades, signs, lanterns or lights and guards, as required, shall be placed and maintained by the CONTRACTOR at the site and site access during the progress of the construction. Rules and Regulations governing "Occupational Safety and Health Standards" as published by the Occupational Safety and Health Administration (OSHA), shall be observed for all operations and all work performed under this contract. If Trench and Excavation Safety requirements apply to this project, those requirements are the responsibility of the CONTRACTOR, with payments scheduled therefore. All costs involved in satisfying these requirements shall be borne by the CONTRACTOR.

6. TRAFFIC CONTROL: The CONTRACTOR shall regulate and route all traffic to, from, through and around the site in accordance with rules of the appropriate jurisdiction when using City streets, County roads, and State or Federal roads and highways. CONTRACTOR shall be responsible for keeping a minimum of one (1) lane of traffic open at all times during construction, and all lanes of traffic at the conclusion of work each day. All costs involved in complying with these requirements shall be borne by the CONTRACTOR. All traffic controls must be in accordance with the Texas Manual for Uniform Traffic Control Devices, latest edition.

7. SCOPE, NATURE, AND INTENT OF SPECIFICATIONS AND PLANS: The specifications and plans are intended to supplement but not necessarily duplicate each other. Any work shown in the one and not in the other shall be executed as if it has been shown in both. Should anything necessary for a clear understanding of the work be omitted from the specifications and plans or should the requirements appear to be in conflict, the CONTRACTOR shall secure written instructions from the Engineer before proceeding with the construction affected thereby. It is understood and agreed that the work shall be performed to the true intent of the contract documents.

   All products specified by manufacturer's name shall be installed in accordance with manufacturer's printed instructions. When equipment or material furnished by the CONTRACTOR cannot be installed as specified or as shown on the plans, the CONTRACTOR shall, without extra cost to the OWNER, make all modifications required to properly install the equipment or material. Such modifications shall be subject to the approval of the Engineer.

   Dimensions and elevations shown on the plans shall be accurately followed even though they differ from scaled measurements. No work shown on the plans, the dimensions of which are not indicated, shall be executed until necessary dimensions have been obtained from the Engineer. The general arrangement of all accessories and appurtenances shall be as indicated on the plans or as later furnished on approved shop drawings. Reference to standard specifications of any technical society, organization or association or to codes of local or state authorities shall mean the latest standard, code, specification or tentative specification adopted and published at the date of taking bids, unless specifically stated otherwise. No attempt has been made in the specification to segregate work to be performed by any trade or subcontract. Any segregation between the trades or crafts will be solely a matter for agreement between the CONTRACTOR and his employees and his subcontractors.

8. QUALITY OF MATERIALS AND EQUIPMENT: Unless specifically provided otherwise in each case, all material and equipment furnished for permanent installation in the work shall conform to applicable standard specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the work. Whenever a material or article is specified or described on the plans by using the name or a proprietary product or by using the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing the type, function and quality desired. Other manufacturer's products, which in the opinion of the Engineer are equivalent to those specified, will be considered. Such items shall be submitted for approval by the procedure set forth herein.

Other manufacturers will be considered provided that the design and details are in conformity with the drawings and specifications, and:

a) The manufacturer is engaged in the manufacture of similar equipment, the manufacture thereof has been a standard product of his for the past five (5) years, and the manufacturer shows at least three (3) operating installations of similar equipment of his manufacture.

b) The submittal for approval together with all details, drawings and other information needed for review and evaluation shall be submitted before bids are submitted. The Engineer's decision shall be final.

9. ENGINEERING DATA AND SHOP DRAWINGS: Engineering data and shop drawings covering equipment and fabricated materials to be furnished shall be submitted to the Engineer for review and comments. This data shall include drawings, and descriptive, detail information to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and materials and equipment. Data submitted shall include drawings showing essential details of any changes. Shop drawings and data submittals shall, after final processing by the Engineer, be used for construction purposes.

10. PERMITS AND FEES: The CONTRACTOR shall make application for, secure and pay all costs for permits, inspection fees, licenses and deposits required for the work to be performed. Each sub-CONTRACTOR shall bear the cost of permits and fees relative to his work.

11. SUNDAY, HOLIDAY, AND NIGHT WORK: No work shall be done between the hours of 6:00 P.M. and 6:00 A.M. nor on Sundays or legal holidays without the written permission of the OWNER in each case, except such work as may be necessary for the proper care, maintenance, and protection of work already done or of equipment or in the case of an emergency. Any work necessary to be performed after or outside regular working hours, on Sundays or legal holidays shall be performed without additional expense to the OWNER.

12. TIME OF COMPLETION: Article 23 of the General Conditions of the Agreement shall be supplemented to read that the CONTRACTOR shall have substantially completed all construction work undertaken by him not later than the following times from the date specified in a written Notice to Proceed from the OWNER.

    Base Bid –NINETY (90) calendar days

13. LIQUIDATED DAMAGES: Article 44 of the General Conditions of the Agreement shall be supplemented as follows. The stipulated liquidated damages for the CONTRACTOR's failure to complete the Project within the specified number of calendar days shall be **Five Hundred Dollars ($500.00)** per calendar day. Weather conditions precluding the proper and safe prosecution of the work shall be documented and extension(s) of time granted for justifiable weather delays.

14. COST BREAKDOWN: Within thirty (30) days after the execution of the Contract and not less than fifteen (15) days prior to the first monthly estimate, the CONTRACTOR shall submit to the Engineer a cost breakdown of the work for his contract. This breakdown is for use by the Engineer in checking the monthly estimates and for Owner's use in cost accounting for the project. If the contract is based on a lump sum bid or contains one or more lump sum items for which partial payments are desired, the CONTRACTOR shall prepare and submit to the Engineer a schedule of values covering each lump sum item. The schedule of values, showing the value of each kind of work, shall be acceptable to the Engineer before any partial payment estimate is prepared. Such items as bond premium, temporary construction facilities, and plant may be listed separately in the schedule of values, provided the costs can be substantiated. The sum of the items listed in the schedule of values shall equal the contract lump sum prices. Overhead and profit shall not be listed as separate items.

    An unbalanced schedule of values providing for overpayment of the CONTRACTOR on items or work that would be performed first will not be accepted. The schedule of values shall be revised and

resubmitted until acceptable to the Engineer.

15. PROGRESS SCHEDULES: Prior to beginning work the CONTRACTOR shall furnish the Engineer with an anticipated progress schedule covering all the work to be performed under this contract. During construction the CONTRACTOR shall revise the schedule periodically or monthly as requested to reflect as nearly as possible the actual construction operations. The CONTRACTOR shall also furnish the Engineer as soon as possible with a schedule showing ordering and delivery dates of all equipment materials to be incorporated in the work, which shall be key to the proposed schedule of work.

16. SUBCONTRACTING:

    a) The CONTRACTOR may utilize the services of specialty Subcontractors on those parts of the work, which, under normal contracting practices, are performed, by specialty Subcontractors.

    b) The CONTRACTOR shall not award any work to any Subcontractors without prior written approval of the OWNER, which approval will not be given until the CONTRACTOR submits to the Engineer a written statement concerning the proposed award to the Subcontractors, which statement shall contain such information as the Engineer may require.

    c) The CONTRACTOR shall be as fully responsible to the OWNER for the acts and omissions of his Subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

    d) The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the CONTRACTOR by the terms of the Instructions to Bidders, General and Supplementary Conditions and other Contract Documents insofar as applicable to the work of Subcontractors and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under provisions of the Contract Documents.

    e) The General CONTRACTOR will be responsible for and make good at his own expense any damage or injury to work done by Subcontractors until final completion and final acceptance of all the work to be done.

    f) Nothing contained in this contract shall create any contractual relation between Subcontractors and the OWNER.

17. INSPECTION AND TESTING: If contract specifications, codes, or OWNER instructions require any work to be specially tested or approved, the CONTRACTOR shall give the Engineer timely notice of its readiness for inspections and make all necessary arrangements therefor. The CONTRACTOR shall furnish at his expense all labor and assistance that may be needed by the Engineer in performing any testing or supervision thereof. The contractor is responsible for the costs of any testing required to establish a level of effort required for work and any costs for retests of failed tests.

18. MEASUREMENT AND PAYMENT: The total bid price of the contract shall cover all work shown on the drawings and required by the specifications and other contract documents. All costs in connection with the work, including furnishing of all materials, equipment, supplies, and appurtenances; providing all construction plant, equipment, and tools; and performing of all necessary labor to fully complete the work, shall be included in the prices named in the Proposal. No item that is required by the Contract Documents for the proper and successful completion of the work will be paid for outside of, or in addition to, the prices submitted in the Proposal. All work not specifically set forth as a pay item in the Proposal shall be considered a subsidiary obligation of the CONTRACTOR, and all costs in connection therewith shall be included in the prices named in the Proposal.

19. PAYMENTS WITHHELD: The OWNER may withhold, or on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect the OWNER from loss on account of:

    a) Defective work not remedied.

    b) Claims filed or reasonable evidence indicating probable filing of claims.

    c) Failure of the CONTRACTOR to make payments due to Subcontractors or for materials or for labor.

    d) A reasonable doubt that the contract can be completed for the balance then unpaid.

20. DEFENSE OF SUITS: In case any action in court is brought against the OWNER or Engineer, or any officer or agent of either of them, for the failure, omission, or neglect of the CONTRACTOR to perform any of the covenants, acts, matters, or things by this contract undertaken; or for injury or damage caused by the alleged negligence of the CONTRACTOR or his Subcontractors or his or their agents, or in connection with any claim based on lawful demands of Subcontractors, workmen, material men or suppliers; the CONTRACTOR shall indemnify and save harmless the OWNER and Engineer and their officers and agents from all losses, damages, costs, expenses, judgments, or decrees arising out of such action.

21. GUARANTEE: The CONTRACTOR guarantees that the equipment, materials, and workmanship furnished under this contract will be as specified and will be free from defects for a period of one year from the date of acceptance.

    Within the guarantee period and upon notification of the CONTRACTOR by the OWNER, the CONTRACTOR shall promptly make all needed adjustments, repairs, or replacements arising out of defects, which, in the judgment of the Engineer or the OWNER, become necessary during such period.

    The cost of all materials, parts, labor, transportation, supervision, special tools, and supplies required for replacement of parts, repair of parts, or correction of abnormalities shall be paid by the CONTRACTOR or by his Surety under the terms of the Performance Bond. The CONTRACTOR also extends the terms of this guarantee to cover repaired parts and all replacement parts furnished under the guarantee provisions for a period of one year from the date of their installation.

    If within ten (10) days after the OWNER gives the CONTRACTOR notice of a defect, failure, or abnormality of the work, the CONTRACTOR neglects to make, or undertake with due diligence to make, the necessary repairs or adjustments, the OWNER is hereby authorized to make the repairs or adjustments himself or order the work to be done by a third party, the cost of the work to be paid by the CONTRACTOR.

    In the event of an emergency where, in the judgment of the OWNER delay would cause serious loss or damage, repairs or adjustments may be made by the OWNER or a third party chosen by the OWNER without giving notice to the CONTRACTOR, and the cost of the work shall be paid by the CONTRACTOR or by his Surety under the terms of the Performance Bond.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION A

GENERAL PROVISIONS

01. GENERAL CONDITIONS: The General Conditions and the Supplementary Conditions of these documents form a part of these technical specifications.

02. NAME & LOCATION OF PROJECT: The PROJECT is the 2020 Wastewater Collection System Improvements. The OWNER is the City of Manor, Texas, and the ENGINEER is Jay Engineering, a Division of GBA. The PROJECT is located within the City of Manor.

03. DESCRIPTION OF WORK: This project consists of replacement of existing wastewater collection lines including services, replacement of wastewater manholes, repair of pavement as needed, traffic control and other appurtenant work. These technical specifications apply to the work as shown, and all work is shown on the drawings as follows:

SHEET 1 - COVER SHEET
SHEET 2 - STANDARD NOTES
SHEET 3 - STANDARD CONSTRUCTION DETAILS
SHEET 4 - STANDARD CONSTRUCTION DETAILS
SHEET 5 - PLAN & PROFILE STA. 0+00 TO 10+40
SHEET 6 - PLAN & PROFILE STA. 10+40 TO 19+40
SHEET 7 - PLAN & PROFILE STA. 19+40 TO END

04. CONSTRUCTION STAKING: Contractor shall be responsible for construction staking and control, in accordance with line and grade provided on the contract drawings or subsequent modifications thereto. Said construction staking and control shall be performed by, and submitted under the seal of, a State of Texas Registered Professional Land Surveyor responsible for the surveying work. Field staking shall not commence until Engineer approval of such work is issued.

05. BYPASS PUMPING: The CONTRACTOR shall provide for the flow of sewage around the section of sewer lines under replacement. Plugging the line at an existing upstream manhole and pumping or directing the flow to a downstream manhole or adjacent sanitary sewer system shall make the bypass. The pump(s) and bypass lines shall be of adequate capacity and size to handle the flow. Contractor is to submit a bypass pumping plan for review. The plan must include redundant pump systems.

06. WORK COMPLETION AND LIQUIDATED DAMAGES: The time specified in the Contractor's Proposal for completion of all work is deemed sufficient for performing the work, weather permitting. Justifiable and documented weather delays will be cause for extension(s) of time to complete the project, but the Contractor must diligently and continuously pursue the work when weather conditions allow. Liquidated damages will be withheld from the Contractor's total payments at the rate of **Five Hundred Dollars ($500.00)** per calendar day beyond the completion date (to be specified in the Notice to Proceed) for failure to substantially complete the work. Substantial completion shall mean completion to the point that the Owner can beneficially utilize the project. Failure to complete minor work items, for which no damages will be incurred by the Owner, will not be cause for withholding of liquidated damage amounts.

07. MEASUREMENT AND BASIS OF PAYMENT: For items bid on a lump sum or per each basis, no extra or customary measurements of any kind will be made, but the actual number of items installed

or completed will be used as basis for payment. For items bid on a unit price basis, payment will be made based on the actual number of units installed. In case of conflict between measurements and payment defined in technical specifications and those defined in the bid schedule, the definitions and enumerations in the bid schedule will take precedence.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION B

SPECIAL CONDITIONS

01. SEQUENCE OF WORK: The sequence of work on this project shall be in the order of Contractor's preference, as approved by the CITY. Work may proceed at CONTRACTOR'S discretion, in a manner to prevent interruption of CITY operations and adequate utility operations and traffic flow.

02. PROTECTION OF WORK BY OTHERS: CONTRACTOR to preserve and protect all coincident work by others, including CITY utilities and contractors. CONTRACTOR will be held responsible for any damage incurred by these facilities due to his activities.

03. WATER FOR CONSTRUCTION: Water for construction purposes will be furnished by the CITY OF MANOR at an approved, metered hydrant and at the CONTRACTOR'S expense. CONTRACTOR shall be responsible for security of his access point and prudent use of such water.

04. BLASTING: Blasting or the use of explosives will not be allowed on this project. Excavation to be completed by mechanical means and unclassified.

05. UTILITY APPURTENANCE ADJUSTMENT: All utility adjustments required for CONTRACTOR'S work will be performed by the utility contractor.

06. EROSION AND SEDIMENTATION CONTROLS: Erosion and sedimentation controls have been shown on the drawings. Any activities on behalf of the Contractor that would make the project subject to additional controls will require the Contractor to comply without additional compensation by the Owner.

07. CONSTRUCTION REVIEW: The CITY shall provide a project representative to review the quality of materials and workmanship.

08. LIMITS OF WORK AND PAYMENT: It shall be the obligation of the CONTRACTOR to complete all work included in this contract, so authorized by the CITY, as shown on the drawings or described in the contract documents and technical specifications. All items of construction not specifically enumerated in the bid schedule shall be incidental to the unit price bids. Any question arising as to the limits of work shall be subject to the interpretation of the ENGINEER.

09. TOTAL OF PAYMENTS: The CITY has budgeted funds in an amount deemed sufficient for the work awarded, and as shown in these documents. In the event the product of unit prices and quantities results in work with an anticipated value in excess of the total amount awarded, the CONTRACTOR shall give notice of such overage prior to performing the work. Any work performed that exceeds the scheduled quantities, without prior authorization, will be performed at the CONTRACTOR'S risk.

010. FINAL PAYMENT: Final payment for work hereunder will be after ENGINEER'S certificate of substantial completion and compliance, which will follow final inspection and approval by the CITY.

DIVISION 2 - SITEWORK

SECTION A

CLEARING AND GRUBBING

01. GENERAL: Furnish all labor and equipment required to complete all clearing and grubbing in and around proposed work areas.

02. CONSTRUCTION METHODS:

a) Clearing: The contractor shall remove all shrubs and debris as shown on the drawings or for distance required for construction. Contractor shall not cut any trees, except as approved by the Engineer.

b) Grubbing: The contractor shall be responsible for the removal of all stumps and roots for a depth of 24" below existing grade in areas to be cleared for work areas. Holes left by grubbing shall be filled with clean soil and compacted.

c) Vegetation Control: In areas where vegetation control is needed, weed killer shall be applied by the Contractor ten (10) days prior to work start. The Contractor will be responsible for subsequent burn-off and removal of dead vegetation prior to work.

d) Disposal of Cleared Materials: Contractor shall remove all cleared vegetation, debris and bladed earthen materials from the construction site and dispose of it at an approved site.

03. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental and paid for at the contract price for the various items included in the work. This price shall be full compensation for furnishing materials, equipment, labor and incidentals necessary to complete the work.

DIVISION 2 - SITEWORK

SECTION B

EARTHWORK

01. GENERAL:

a) Scope: This section includes work required for proper completion of excavation, backfill, trenching, shoring, bracing, dewatering of excavations, grading, compacting, disposal of surplus materials, together with other miscellaneous sitework and earthwork operations necessary to complete project as shown on drawings and specified herein.

b) Protection of Existing Facilities: Prior to beginning any earthwork operations, protect existing facilities and/or permanent objects, including existing utilities, poles, guys, trees and roadways. Contractor shall be responsible for locating all existing underground utilities prior to commencement of excavation operations. Costs resulting from damage to utilities or permanent facilities due to negligence or lack of adequate protection shall be borne by Contractor.

02. MATERIALS:

a) Pipe Bedding Stone: Bedding stone material, as designated on the drawings, shall be clean, granular material composed mainly of mineral matter free of mud, silt, clay lumps, vegetation or debris conforming to ASTM C33 for stone quality. Size gradation shall conform to ASTM C-33 No. 57 or No. 67. Limestone crusher screenings with fines will not be acceptable.

b) Fill or Backfill: Where use of fill or backfill is designated on the drawings, excess excavated materials from locations on the project site may be used, or the Contractor may obtain approved fill material from a source outside the site. Material shall be free from vegetation, debris, large rocks and boulders exceeding 2" in their greatest dimension. Fill material shall be a stable soil approved by the Owner's representative prior to use on project.

c) Select Fill: Select Fill for use where noted shall be sandy soil or other granular material having plasticity index of not greater than six (6) with not more than 30 percent (30%) passing a No. 200 sieve.

03. CONSTRUCTION METHODS:

a) Excavation: Excavation shall be incidental to facilities construction and shall include removal of all types of materials encountered. Make excavations to lines and grades indicated on drawings, with completed excavations within tolerances hereinafter specified.

b) Blasting: No blasting will be allowed on this project.

c) Shoring, Bracing, and Dewatering Excavations: Provide all shoring, bracing and dewatering of excavations required to properly and safely complete the work as shown on the drawings. Construct shoring and bracing as required to prevent excavation from extending beyond specified or indicated limits and to protect workmen. Keep all excavations dewatered by drainage, pumps, or well points as necessary while construction therein is in progress. Remove shoring, bracing and sheeting as excavations are backfilled, in a manner to prevent injurious caving. See Trench Safety Program of this specification.

d) Pipe Trenches: Make and maintain sides of trench as nearly vertical as practical and provide shoring where necessary to maintain sides in a vertical position and to protect workmen.

Complete and shape trenches to provide free working space and to permit thorough tamping of embedment around pipe. Accurately grade bottom of trenches to provide a uniform bearing on firm soil along entire length of each pipe section. Remove rubbish, rock, or debris encountered at grade to a depth of at least six (6) inches below bottom of pipe, place, shape and compact pipe bedding. Working space from outside of pipe to side of trench shall not be less than 6-inches or more than 24-inches. Provide bell holes where required for making proper connections at joints.

e) Backfill at Structures: Place backfill at structures, as far as practicable, as work progresses. Remove forms, shoring, bracing etc. before backfill is started and do not place backfill against concrete until cured. Prevent wedging action of backfill against pipe or structure, and step or serrate slopes bounding excavation to prevent such wedge action.

f) Special Bedding: All piping shall be bedded as shown on the drawings and as described herein.

   i) Stone: Provide pipe bedding stone as specified in section .02 a) above. Provide clean stone, free of clay, loam, rubbish, vegetative matter or other deleterious substance, meeting approval of Owner's representative.

   ii) Compacting: Place bedding material in uniform layers, dried or moistened as required to obtain approximate optimum moisture content, and compact to at least 95% of maximum density as determined by ASTM D-698 or TEX-113 Method. Maximum thickness of uniform layers of loose material shall not exceed eight (8) inches. Compaction shall be such that a uniform density will be obtained over entire area and depth of bedding material.

   iii) Control: Methods used in obtaining the proper moisture content and required degree of compaction shall be Contractor's responsibility.

g) Backfill of Pipe Trenches: Backfilling of pipe trenches shall not be started until pipe joints have been inspected and approved by Owner. Remove shoring and bracing, if used, before backfilling of trench. Backfill shall be free of large lumps, rocks, or debris which might prevent compaction, cause damage to joints, pipe, etc., or result in improper bedding of pipe. Avoid dropping of loose material in any manner that may deflect or damage pipe or fittings.

h) Compaction of Backfill:

   i) General: Place fill and backfill, except as otherwise specified, in uniform layers, dried or moistened as required to obtain approximate optimum moisture content, and compact to a density of at least 95% of maximum density at optimum moisture as determined by ASTM D-698 or TEX-113 methods. Methods used to secure the optimum moisture content and degree of compaction required, will be Contractor's responsibility. Compacting equipment and method of compaction shall be such that a uniform density will be obtained over entire area and depth of material being compacted. Hand tamping shall be done with mechanical hand tampers unless otherwise approved by Owner.

   ii) Backfill Over Pipelines: As shown on the plans, place bedding conforming to requirements of select fill in pipe trenches and bed pipe uniformly therein. Deposit bedding material carefully and uniformly along sides and to a depth of 12 inches over top of pipes in six (6) inch layers and carefully tamp. Fill remainder of trench in uniform layers and water tamp by flooding. In no case shall fill be placed in layers too thick to be soaked thoroughly. Continue water tamping until all cavities are eliminated and backfill is thoroughly consolidated. Backfill last one (1) foot of backfill up to existing or proposed pavement or original ground in layers and compact by use of power equipment, tractors, trucks, etc. to not less than 100% of density of original undisturbed soil.

iii) Mechanical Hand Tampers: Where fill or backfill is to be compacted with mechanical hand tampers, thickness of each uniform layer to be compacted shall not exceed six (6) inches. Methods of compaction shall be such that a uniform density is obtained throughout entire area and depth of each layer.

iv) Protection of Moisture Content: Protect excavations and fills from excessive wetting and drying. Place concrete foundations and select materials immediately after completion of excavation in each area or section.

v) Finish Grading: Before leaving site, Contractor shall hand rake the work area to a uniform and smooth surface.

vi) Pavement Repair: Trenches cut in areas of existing pavement shall be repaired to original condition. These areas shall be brought to the paving surface grade with compacted flexible base, and subsequently patched with Type D HMAC. Replacement of compacted flexible base and HMAC in areas not scheduled for payment is considered incidental to the work, and no separate pay shall be made for pavement repairs. Only the scheduled repairs and quantities will be measured and paid at the price scheduled on the Contractor's Proposal.

i) Disposal of Excess and Unsuitable Materials: All excess materials removed during construction operations shall become property of Contractor. Remove material from site and dispose of same.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 2 - SITEWORK

SECTION C

PVC WASTEWATER SYSTEM PIPE

01. GENERAL: Furnish all equipment, materials and labor, and perform all operations necessary for the construction of gravity sanitary sewer or forced main wastewater lines.

02. MATERIALS:

a. Pipe: PVC pipe for gravity system and force main system shall be of ring gasket type joint, conforming to ASTM Specification D-3034 or D-2241. PVC pipe shall be Class SDR-26, ASTM 3034 for gravity systems and AWWA C-900 (green and marked for sewer) for forced mains.

b. Joints and Fittings: PVC pipe and fittings for gravity system and force mains shall have ring gasketed joints.

03. PROCEDURE:

a. Excavation: Perform pipe trench excavation in accordance with Section 2B of this specification, by open cut method.

b. Preparation of Trench Bottom: Grade trench bottom to afford uniform bearing of pipe in accordance to grade indicated of the drawings. Provide excavation for pipe bells in accordance with manufacturer's recommendations.

c. Pipe laying: Furnish and install necessary grade stakes, batter boards and alignment references. Begin laying pipe at lower end, unless otherwise approved, with bell end pointing upstream. Pipe ends shall be cleaned and gasket carefully installed in accordance with manufacturer's instructions. Pipe shall be laid and joints made to form a smooth continuous conduit.

d. Horizontal Alignment: Pipeline alignment to conform with that shown on the drawings. No joint deflections will be allowed.

e. Pipe Handling: Precautions in pipe handling shall be exercised as described in this specification and in accordance with manufacturer’s instructions.

f. Manholes: The invert shall be built of concrete or half-section of pipe and the invert shall be true and troweled to a smooth hard finish. Pipe connections to manholes shall be made water tight using approved manhole couplings. Manhole couplings shall be grouted into place, using a stiff mix non-shrink grout, via knocked out holes in concrete pipe walls. Steps shall not be provided. Drop manholes shall be constructed where shown on the plans.

g. Connections to Existing Lines: Connect to existing wastewater lines or manholes as shown on the drawing, using materials and methods for new work as specified herein.

h. Backfilling: After approval of line work, backfill as specified in Section 2B of this specification.

i. Leakage Testing: Test all mains in strict accordance with the leakage test given below. Maximum allowable leakage shall be 50 gallons per 24 hours per inch of inside diameter per mile of pipeline. After completing backfill of each section of wastewater line Contractor shall, at his expense, conduct a Line Acceptance Test using low-pressure air. Perform test using equipment and procedures specified below, under supervision of Owner.

1. Equipment - Minimum requirements.

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

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

   c. Air shall pass through a single control panel.

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

      (1) From control panel to pneumatic plugs for inflation.

      (2) From control panel to sealed line for introducing low-pressure air.

      (3) From sealed line to control panel for continually monitoring air pressure rise in sealed line.

2. Procedures -

   a. Pneumatic plug shall be seal-tested before being used in actual test installation. Lay on length of pipe on ground and seal at both ends with pneumatic plugs to be checked. Inflate air plugs to 25 psig. Pressurize sealed pipe to 5 psig. Plugs shall hold against this pressure without bracing and without movement of plugs out of pipe.

   b. After a manhole-to-manhole section of pipe has been backfilled and cleaned, and pneumatic plugs have been checked by above procedures, place plugs in line at each manhole and inflate plugs to 25 psig. Introduce low pressure air into this sealed line until internal air pressure reaches 4 psig greater than average back pressure of ground water that may be over pipe. Allow at least 2 minutes for air pressure to stabilize. After the stabilization period (3.5 psig minimum pressure in the pipe), disconnect air hose from control panel to air supply. Term portion of line being tested "acceptable" if time required for pressure drop from 3.5 to 2.5 psig greater than average back pressure of ground water that may be over pipe is not less than shown in the following table.

PIPE SIZE	MINIMUM TIME	
	MINUTES	SECONDS
4”	2	0
6”	3	0
8”	4	0
10”	5	0
12”	5	30
15”	7	5
18”	8	30
21”	9	50
24”	11	20

c. In areas where ground water is known to exist, install a 1/2” diameter capped pipe nipple, approximately 10” long, through manhole wall on top of one wastewater line entering manhole. Immediately prior to performance of Line Acceptance Test, determine ground water by removing pipe cap, blowing air through pipe nipple to clear it, and connecting a clear plastic tube to pipe nipple. Support hose vertically and measure height (in feet) of water over invert of pipe after water stops rising in plastic tube. Divide this height by 2.3 feet to establish psi to be added to readings.

3. Repair or Replacement - If test determines installation unacceptable, Contractor shall locate source of leakage and repair or replace defective materials and/or workmanship to provide satisfactory installation.

j. Mandrel Testing : All gravity lines utilizing flexible pipe must be tested for deflection by pulling a rigid mandrel through the installed pipe. The test must be conducted at least 30 days after placement and compaction of final backfill. No pipe shall exceed a deflection of 5%. The test must be performed without mechanical pulling devices. The test mandrel must have an outside diameter equal to 95% of the pipe inside diameter; mandrel material must withstand 200 psi without being deformed. Should the mandrel reach an impasse, the line shall be uncovered and repaired. A television test is not an acceptable substitute for the deflection test. Deflectometers may be approved for use on a case by case basis.

04) MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 2 - SITEWORK

SECTION F

DETECTABLE WARNING TAPE

01. GENERAL: Contractor to furnish detectable warning tape for all installations of PVC water and sewer pipe. The tape shall be of the size, type, dimension and color indicated.

02. MATERIALS: The Contractor shall submit descriptive information and evidence that the materials the Contractor proposed for incorporation in to the work is of the kind and quality that satisfies the specified functions and quality.

a) Tape: shall be minimum 5 Mil overall thickness by 12 inches wide, with a solid aluminum foil core. Construction is 2 Mil clear film, with permanent printing. Tape shall conform to ASTM D-2103, D-882, D-2578 and D-671-76. Color coding is as follows:

Color	**Application**
Blue	Water Lines
Brown	Forced Wastewater Lines
Green	Gravity Wastewater Lines
Purple	Reclaimed Water Lines

03. CONSTRUCTION METHODS:

a) Installation: The marking tape shall be buried within 12 – 18 inches from the surface of the ground over the centerline of the pipe. The marking tape shall be installed continuously along the installation of the pipe. Sections of tape shall be joined together to provide a continuous installation.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 2 - SITEWORK

SECTION G

FLEXIBLE BASE

01. GENERAL: This item shall consist of select fill where directed, a foundation course for subsequent pavement, or as a finished course, as indicated on the drawing. It shall be composed of crusher-run broken stone; and shall be constructed as herein specified and in conformity with the typical sections shown on the drawings and to lines and grades specified thereon.

02. MATERIALS: The materials shall be obtained from an approved source, shall be crushed and shall consist of durable particles of stone mixed with approved binding materials. A stock pile may be required, made up layers of processed material and the material shall be loaded for delivery by making successive vertical cuts through the entire depth of the stock pile. Approval of material shall be made upon delivery to the job site. The processed material when properly slaked and tested by standard laboratory methods shall meet the following requirements:

Retained on 1-3/4" sieve	0%
Retained on 7/8" sieve	8% to 30%
Retained on 3/8" sieve	30% to 50%
Retained on No. 4 sieve	45% to 65%
Retained on No. 40 sieve	70% to 80%

Material passing the number 4 sieve shall be known as "Binder"; that portion of the binder material passing the No. 40 sieve shall be known as "Soil Binder" and shall meet the following requirements:

The liquid limit shall not exceed	35
The plasticity index shall not exceed	10
The linear shrinkage shall not exceed	7

(NOTE: The linear shrinkage shall be calculated from volumetric shrinkage at the liquid limit.)

03. CONSTRUCTION METHODS:

a. Preparation of Sub-Grade: The sub-grade shall be excavated and shaped in conformity with typical sections shown on the drawing. The sub-grade shall be thoroughly compacted until a minimum of 95% of maximum density as determined by the standard method of test for moisture-density relation of soils AASHO, designation T 99-57, Method "A", or TEX-113E has been attained for a 6" depth, before the flexible base material is placed.

b. Placement: Flexible base material deposited upon the sub-grade shall be spread, shaped and compacted until a minimum of 95% of moisture-density as determined by the standard method of test for moisture-density relation of soils AASHO, designation T 99-57, Method "A", or TEX-113E has been attained and in conformity with the typical section shown on the drawing.

The completed flexible base shall have a minimum compacted depth as shown on the drawings prior to forming or preparation for pouring concrete or for subsequent asphalt paving operations.

04. MEASUREMENT AND PAYMENT:

a) Foundation Work: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.
b) Road Base: The work performed in accordance with this item shall be paid for at the contract unit price per Square Yard, in place at the specified thickness. This price shall be full compensation for furnishing materials, equipment, labor and incidentals (such as subgrade prep) necessary to complete the work specified herein.

DIVISION 2 - SITEWORK

SECTION H

PRIME COAT

01. Description: This Item shall govern for the application of asphaltic material on the completed base course and/or other approved areas in accordance with these specifications.

02. Materials: The proposed asphaltic material used for the prime coat is slow setting anionic emulsion (TXDOT designation SS-1); however, circumstances may require the use of another material. The prime coat shall meet all applicable TXDOT material specifications. Water shall be furnished by the Contractor and shall be clean and free from industrial wastes and other objectionable matter. Dispersal agent shall be added to water and sprayed on surfaces to be primed in accordance with asphalt manufacturer's recommendations.

03. Submittals: The Contractor shall submit the following items to the Engineer:

    List of proposed materials (i.e. prime material, dispersal agent, etc.).

    Temperature-Viscosity data and proposed temperature of application.

    Characteristics (i.e. manufacturer, rate of application, speed, etc.) of the proposed pressure distributor including calibration documentation.

    List of facilities and equipment proposed for temperature measurements.

    List of facilities and equipment proposed for storage and handling of asphaltic materials.

04. Construction Methods**:** When, in the opinion of the Engineer or designated representative, the base course or other surface is satisfactory to receive the prime coat, the surface shall be prepared by sweeping or other approved methods as directed by the Engineer or designated representative. The surface shall be lightly sprinkled with water just prior to application of the asphaltic material unless this requirement is waived by the Engineer or designated representative. The Contractor shall submit a list of prime material(s) recommended for application on the work to the Engineer or designated representative for approval. When emulsions are approved, a dispersal agent shall be added to the water before sprinkling.

    The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor operated so as to distribute the prime coat at a rate ranging from 0.1 to 0.3 gallons per square yard (0.45 to 1.36 liters per square meter) of surface area. The material shall be evenly and smoothly distributed under pressure sufficient to assure proper distribution. During the application of prime coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures. The Contractor shall be responsible for cleaning all splattered areas.

    Prime Coat may be applied when the temperature of the surface on which the prime coat is to be placed is 60^{o}F (16^{o}C) or above and the air temperature is above 50^{0}F (10^{0}C) and rising; the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer or designated representative, are not suitable.

The Contractor shall provide all necessary facilities and equipment for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two (2) distributor loads.

The distributor shall have been calibrated prior to use on this project. The Engineer or designated representative shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, if the yield on the asphaltic material applied appears in error, the distributor shall be calibrated in a manner satisfactory to the Engineer or designated representative before proceeding with the work.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer or designated representative. No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied prime coat for a minimum of 48 hours or until the prime coat is accepted as dry and cured completely by the Engineer or designated representative.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and they shall be operated in such a manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The manufacturer's recommendations and instructions for agitation of the prime coat during storage and the temperature limits for storage and application of the prime coat shall be followed by the Contractor.

05. Measurement and Payment**:** The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 2 - SITEWORK

SECTION I

HOT MIX ASPHALTIC CONCRETE PAVEMENT

01. GENERAL: This item shall govern for asphalt pavements and shall consist of a surface course to be composed of a compacted mixture material and shall be constructed on a prepared surface, all in accordance with these specifications and in conformity with the typical cross-sections shown on the drawings.

02. MATERIALS: The hot mix asphaltic concrete (HMAC) incorporated into this project shall include Type D aggregate and an asphalt binder grade PG 64-16 and the HMAC shall meet TXDOT material specifications.

03. PAVING MIXTURES: The Contractor shall submit an HMAC mixture design and job mix formula that has been prepared in accordance with TXDOT standards to the Engineer for approval.

04. EQUIPMENT: Production, hauling, placement and compaction equipment shall meet the applicable TXDOT equipment standards.

05. CONSTRUCTION METHODS:

a) Surface Preparation:

i) Previously Paved Surfaces (Overlay): Blade shoulders as directed on plans, add base as required in shoulder areas, knock down any elevated sections of pavement (greater than 2" above average surrounding area). Where the road surface is potted, or where depressions of three-quarter (3/4) inch or greater exist, the potholes or depressions shall be "leveled-up" with a patch course of HMAC, and compacted as specified. Depressions greater than six (6) inches in depth shall be filled with flexible base and compacted per specifications. Any cracks greater that 3/8-inches wide shall be sealed with an approved sealant, unless those cracks are intended to be leveled-up as specified herein. Before the tack coat is placed, the surface on which it is to be placed shall be thoroughly cleaned by power sweeping if any dirt or silt accumulation is evident. Tack coat materials and construction shall meet the Tack Coat specification, or if none is provided, per applicable TXDOT specifications.

ii) Previously Unpaved Surfaces (New Pavement or Street Reconstruction): Blade shoulders to clear any vegetation. Following subgrage preparation, shape crown with flex base, compact and shape per Flex Base specification. Apply prime coat to new compacted base per Prime Coat specification.

b) Weather Limitations: The asphaltic mixture, prime or tack coat shall not be placed when the air temperature is below 50 degrees F and is falling, but may be placed when the air temperature is above 40 degrees F and is rising.

c) Temperatures: The manufacturer's recommendations and instructions for the temperature limits for storage and application of the HMAC shall be followed by the Contractor.

d) Rolling: While still hot and as soon as it will bear the roller without undue displacement or hair cracking, the surface shall first be compressed thoroughly and uniformly with acceptable power-

driven three (3) wheel, or tandem rollers weighing from 8 to 10 tons. Subsequent compression shall be obtained by starting at the sides, and rolling longitudinally toward the center of the pavement, overlapping on successive trips by at least 1/2 of the width of the rear wheels. Alternate trips of the roller shall be slightly different in lengths. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. To prevent adhesion of the surfacing mixture to the roller, the wheels shall be kept properly moistened with water, but excess of water will not be permitted. The final rolling shall be done with a tandem roller. A double coverage with an approved pneumatic roller shall be used on the asphaltic concrete surface after flat wheel and tandem rolling has been completed.

e) Hand Tamping: Along curbs and similar structures, and at all places not accessible to the roller, the mixture shall be compacted thoroughly with a lightly oiled hot tamp. Where a "feathering" of the asphaltic concrete is required, contractor shall hand rake to remove course aggregate from the edge of the asphalt levelup, and compact to a depth not to exceed 3/8".

f) Surface Tests: The completed surface course of HMAC shall have a compacted density of 91% to 96% of theoretical maximum density. The completed surface of leveled areas, when tested with a 12' straight edge laid parallel to the centerline of the roadway, shall have no deviation in excess of 1/4" per foot from the nearest point of contact and the maximum coordinate measured from the face of the straight edge shall not exceed 1/2" at any point. Approved templates shall be furnished by the contractor for checking finished sections of leveled areas. The templates shall be of such strength and rigidity that if the support is transferred to the center there will not be a deflection of more than 1/8".

g) Street Section: The roadway section shall generally conform to the typical roadway section shown on the drawings. To conform to this section, Contractor may increase the nominal thickness of the asphaltic concrete levelup at the crown of the existing pavement.

h) Construction Joints: Placing of the course shall be nearly continuous as possible, and the roller shall pass over the unprotected end of the freshly laid mixture only when the laying of the course is discontinued for such a length of time as to permit the mixture to become chilled. In all such cases when the work is resumed, the material laid shall be cut back so as to produce a slightly beveled edge for the full thickness of the course. The old material, which has been cut away, shall be removed from the work and the new mix laid against the fresh cut.

06. MEASUREMENT AND PAYMENT:

a) General: Densities of 91.0 to 96.0 percent of theoretical maximum will be payable at the contract unit price. Densities of greater than 96.0 or less than 88.1 percent of theoretical maximum will require removal and replacement of HMAC surface course. Densities from 88.1 percent to 90.9 percent will result in a reduction in the unit price paid of 0.5 percent for each 0.1 percent of actual density below 91.0, in accordance with TxDOT Density Acceptance Schedule (TEX-207-F/TEX-227-F), as averaged over the completed project.

b) Paving/Overlays: The work performed in accordance with this item shall be paid for at the contract unit price per Square Yard, in place at the specified thickness. This price shall be full compensation for furnishing materials, equipment, labor and incidentals (such as tack/prime coat) necessary to complete the work specified herein.

c) Levelup: The work performed in accordance with this item shall be paid for at the contract unit price per ton, in place.

d) Pavement Repair: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 2 - SITEWORK

SECTION J

RESTORATION AND REVEGETATION

01. GENERAL: This specification includes:

    a) Restoration: Replacement of existing vegetation in areas disturbed during construction, where vegetation is previously established by planting (yards, lawns or other landscaping).

    b) Revegetation: Re-establishment of native vegetation and/or acceptable erosion controls for areas disturbed during construction.

02. MATERIALS:

    a) Restoration: All areas disturbed outside the limits of residential lots shall be replaced with a minimum of 6” of topsoil and revegetated per sheet 5 of the construction plans except in solid rock.

    b) Revegetation: Revegetation shall be established by hydromulch or SOD.

03. CONSTRUCTION METHODS:

    a) Broadcast Seeding:

        i) From September 15 to March 1, seeding shall be with a combination of one (1) pound per 1,000 square feet of unhulled Bermuda and four (4) pounds of Winter rye with a purity of 95% and 90% germination.

        ii) From March 2 to September 14, seeding shall be with hulled Bermuda at a rate of one (1) pound per 1,000 square feet, with a purity of 95% and 85% germination.

        iii) Fertilizer shall be applied once at planting, at a rate of one (1) pound per 1,000 square feet.

    b) Watering: The restored areas shall be irrigated or sprinkled in a manner that will not erode the top soil, but will sufficiently soak the soil to a depth of six (6) inches. The irrigation shall occur following placement.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item shall be compensated in lump sum amount based on the Contractors estimate of the disturbed area. This price shall be full compensation for furnishing materials, equipment, labor and incidentals necessary to complete the work.

DIVISION 2

SECTION K

TRENCH SAFETY PROGRAM

01. GENERAL

01.01 GENERAL DESCRIPTION OF WORK

A. This work shall consist of shoring, bracing, bank stabilization, bank sloping, providing trench boxes or trench shields or other equivalent means to protect employees from the effects of moving ground or cave-ins for all trenches 5-feet or more in depth.

B. All work shall be done in conformance with OSHA Safety and Health Standards (29 CFR 1926/1010 Chapter XVII Subpart P - Excavations, Trenching and Shoring).

01.02 DEFINITIONS APPLICABLE TO THIS SPECIFICATION

A. "Accepted Engineering Requirements (or Practices)" - Those requirements or practices that are compatible with standards requiring a Registered Professional Engineer, or other duly licensed or recognized authority.

B. "Angle of Repose" - The greatest angle above the horizontal plane at which a material will lie without sliding.

C. "Bank" - A mass of soil rising above a digging level.

D. "Belled Excavation" - A part of shaft or footing excavation, usually near the bottom and bell-shaped; i.e., an enlargement of the cross section above.

E. "Braces (Trench)" - The horizontal members of the shoring system whose ends bear against the uprights or stringers.

F. "Excavation" - Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a trench.

G. "Faces" - See Paragraph K of this section.

H. "Hard Compact Soil" - All earth materials not classified as running or unstable.

I. "Kickouts" - Accidental release or failure of a shore or brace.

J. "Sheet Pile" - A pile, or sheeting, that may form one of the continuous interlocking line, or a row of timber, concrete, or steel piles, driven in close contact to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials.

K. "Sides", "Walls", or "Faces" - The vertical or inclined earth surfaces formed as a result of excavation work.

L. "Slope" - The angle with the horizontal at which a particular earth material will stand indefinitely without movement.

M. "Stringers (Wales)" - The horizontal members of a shoring system whose sides bear against the uprights or earth.

N. "Trench" - A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15-feet.

O. "Trench Shield" - A shoring system composed of steel plates and bracing, welded or bolted together, which support the walls of a trench from the ground level to the trench bottom and which can be moved along as work progresses.

P. "Unstable Soil" - Earth material, other than running, that because of its nature of the influence of related conditions, cannot be depended on to remain in place without extra support, such as would be furnished by a system of shoring.

Q. "Uprights" - The vertical members of a shoring system.

R. "Wales" - See Paragraph M of this section.

S. "Walls" - See Paragraph K of this section.

02. PRODUCTS

Products are to be furnished as required for acceptable trench safety program.

03. EXECUTION

03.01 GENERAL PROTECTION REQUIREMENTS

A. Walkways, runways, and sidewalks shall be kept clear of excavated material or other obstructions and no sidewalks shall be undermined unless shored to carry a minimum live load of one hundred twenty five (125) pounds per square foot.

B. If planks are used for raised walkways, runways or sidewalks, they shall be laid parallel to the length of the walk and fastened together against displacement.

C. Planks shall be uniform in thickness and all exposed ends shall be provided with beveled cleats to prevent tripping.

D. Raised walkways, runways and sidewalks shall be provided with plank steps on strong stringers. Ramps, used in lieu of steps, shall be provided with cleats to insure a safe walking surface.

E. All employees shall be protected with personal protection equipment for the protection of the head, eyes, respiratory organs, hands, feet, and other parts of the body as set forth in OSHA Standards.

F. Employees exposed to vehicular traffic shall be provided with and shall be instructed to wear warning vests marked with or made or reflectorized or high visibility material.

G. Employees subjected to hazardous dusts, gases, fumes, mists, or atmospheres deficient in oxygen, shall be protected with approved respiratory protection as set forth in OSHA Standards.

H. No person shall be permitted under loads handled by power shovels, derricks, or hoists. To avoid any spillage, employees shall be required to stand away from any vehicle being loaded.

I. Daily inspections of excavations shall be made by a competent person. If evidence of possible cave-ins or slides is apparent, all work in the excavation shall cease until the necessary precautions have been taken to safeguard the employees.

03.02 SPECIFIC EXCAVATION REQUIREMENTS

A. Prior to opening an excavation, effort shall be made to determine whether underground installations (i.e., sewer, telephone, water, fuel, electric lines, etc.) will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation.

B. Trees, boulders, and other surface encumbrances, located so as to create a hazard to employees involved in excavation work or in the vicinity thereof at any time during operations, shall be removed or made safe before excavating is begun.

C. The walls and faces of all excavations in which employees are exposed to danger from moving ground shall be guarded by a shoring system, sloping of the ground, or some other equivalent means.

D. Excavations shall be inspected by a competent person after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins shall be increased if necessary.

E. The determination of the angle of repose and design of the supporting system shall be based on careful evaluation of pertinent factors such as: depth of cut; possible variation in water content of the material while the excavation is open; anticipated changes in materials from expose to air, sun, water, or freezing; loading imposed by structures, equipment, overlying materials, or stored material; and vibration from equipment, blasting, traffic, or other sources.

F. Supporting systems (i.e., piling, cribbing, shoring, etc.) shall be designed by a qualified person and meet accepted engineering requirements. When tie rods are used to restrain the top of sheeting or other retaining systems, the rods shall be securely anchored well back of the angle of repose. When tight sheeting or sheet piling is used full loading due to ground water table shall be assumed, unless prevented by weep holes or drains or other means. Additional stringers, ties, and bracing shall be provided to allow for any necessary temporary removal of individual supports.

G. All slopes shall be excavated to at least the angle of repose except for areas where solid rock allows for line drilling or presplitting.

H. The angle of repose shall be flattened when an excavation has water conditions, silty materials, loose boulders, and areas where erosion deep frost action and slide planes appear.

I. Clearances:
   1. In excavations which employees may be required to enter, excavated or other material shall be effectively stored and retained at least 2-feet or more from the edge of excavation.
   2. An as alternative to the clearance prescribed in subparagraph 1. of this paragraph, the Contractor may use effective barriers or other effective retaining devices in lieu thereof in order to prevent excavated or other materials from falling into the excavation.

J. Sides, slopes, and faces of all excavations shall meet accepted engineering requirements by scaling, benching, barricading, rock bolting, wire meshing, or other equally effective means. Special attention shall be given to slopes that may be adversely affected by weather or moisture content.

K. Support systems shall be planned and designed by a qualified person when excavation is in excess of 20-feet in depth, adjacent to structures or improvements, or subject to vibration or ground water.

L. Materials used for sheeting, sheet piling, cribbing, bracing, shoring, and underpinning shall be in good serviceable condition, and timbers shall be sound, free from large or loose knots, and of proper dimensions.

M. Special precautions shall be taken in sloping or shoring the sides of excavations adjacent to previously backfilled excavation for a fill, particularly when the separation is less than the depth of the excavation. Particular attention also shall be paid to joints and seams of material comprising a face and the slope of such seams and joints.

N. Except in hard rock, excavations below the level of the base of footing of any foundation or retaining wall shall not be permitted, unless the wall is underpinned and all other precautions taken to insure the stability of the adjacent walls for the protection of employees involved in excavation work or in the vicinity thereof.

O. If the stability of adjoining building or walls is endangered by excavations, shoring, bracing or underpinning shall be provided as necessary to insure their safety. Such shoring, bracing, or underpinning shall be inspected daily or more often, as conditions warrant, by a competent person to insure protection is effectively maintained.

P. Diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Water shall not be allowed to accumulate in an excavation.

Q. If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above and near an excavation, the side of the excavation shall be sheet-piled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

R. Blasting and the use of explosives are not allowed unless authorized in other portions of the specifications.

S. When mobile equipment is utilized or allowed adjacent to excavations, substantial stop logs or barricades shall be installed. If possible, the grade should be away from the excavation.

T. Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be backfilled.

U. If possible, dust conditions shall be kept to a minimum by the use of water.

V. In locations where oxygen deficiency or gaseous conditions are possible, air in the excavation shall be tested. Controls, as set forth in OSHA Standards shall be established to assure acceptable atmospheric conditions.

When flammable gases are present, adequate ventilation shall be provided or sources of ignition shall be eliminated. Attended emergency rescue equipment, such as breathing apparatus, a safety harness and line, basket stretcher, etc., shall be readily available where adverse atmospheric conditions may exist or develop in an excavation.

W. Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails shall be provided.

X. Where ramps are used for employees or equipment, they shall be designed and constructed by qualified persons in accordance with accepted engineering requirements.

Y. All ladders used on excavation operations shall be in accordance with the requirements of OSHA Standards.

03.03 SPECIFIC TRENCHING REQUIREMENTS

A. Banks more than 5-feet high shall be shored, laid back to a stable slope, or some other equivalent means of protection shall be provided where employees may be exposed to moving ground or cave-ins. Trenches less than 5-feet in depth shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected.

B. Sides of trenches in unstable or soft material, 5-feet or more in depth, shall be shored, sheeted, braced, sloped, or otherwise supported by means of sufficient strength to protect the employees working within them.

C. Sides of trenches in hard or compact soil, including embankments, shall be shored or otherwise supported when the trench is more than 5-feet in depth and 8-feet or more in length. In lieu of shoring, the sides of the trench above the 5-foot level may be sloped to preclude collapse, but shall not be steeper than a 1-foot rise to each ½-foot horizontal. When the outside diameter of a pipe is greater than 6-feet, a bench of 4-foot minimum shall be provided at the toe of the sloped portion.

D. Materials used for sheeting and sheet piling, bracing, shoring, and under-pinning, shall be in good serviceable condition, and timbers used shall be sound and free from large or loose knots, and shall be designed and installed so as to be effective to the bottom of the excavation.

E. Additional precautions by way of shoring and bracing shall be taken to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from railroad or highway traffic, the operation of machinery, or any other source.

F. Employees entering bell-bottom pier holes shall be protected by the installation of a removable-type casing of sufficient strength to resist shifting of the surrounding earth. Such temporary protection shall be provided for the full depth of that part of each pier and securely fastened to shoulder harness, which shall be worm by each employee entering the shafts. This lifeline shall be individually manned and separate from any line used to remove materials excavated from the bell footing.

G. Minimum requirements for trench timbering shall be in accordance with the approved program. Braces and diagonal shores in a wood shoring system shall not be subjected to compressive stress in excess of values given by the following formula:

$$S = 1300 - \frac{20L}{D}$$

$$\text{Maximum Ratio } \frac{L}{D} = 50$$

Where:

L = Length, unsupported, inches.
D = Least side of the timber in inches.
S = Allowable stress in pounds per square inch of cross-section.

H. When employees are required to be in trenches 4-feet deep or more, an adequate means of exit, such as a ladder to steps, shall be provided and located so as to require no more than 25-feet of lateral travel.

I. Bracing or shoring of trenches shall be carried along with the excavation.

J. Cross braces or trench jacks shall be placed in true horizontal position, be spaced vertically, and be secured to prevent sliding, falling or kickouts.

K. Portable trench boxes or sliding trench shields may be used for the protection of personnel in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they shall be designed, constructed, and maintained in a manner that will provide protection equal to or greater than the sheeting or shoring required for the trench. The Contractor shall provide a statement certified by a Registered Professional Engineer of the adequacy of trench boxes or shields.

L. Backfilling and removal of trench supports shall progress together from the bottom of the trench. Jacks or braces shall be released slowly, and in unstable soil, ropes shall be used to pull out the jacks or braces from above after employees have cleared the trench.

03.05 CONSTRUCTION REQUIREMENTS

A. The Contractor, unless provided for in the Plans otherwise, shall provide the minimum shoring for the soil class.

B. Should the soil conditions differ from those specified or should ground water be encountered in the excavation, the Contractor shall notify the Owner's Representative immediately. The Contractor shall refrain from operating in that portion of the trench where changed conditions are noted until such time as an inspection of conditions takes place, and the Contractor is notified of measures necessary for continued operation.

C. The Contractor shall prepare and submit a plan of operation. This plan of operation shall identify material, equipment, methods, and installation, and shall be inspected by a Registered Professional Engineer. The Contractor's Engineer shall certify the adequacy of the trench protection system and its adherence of OSHA Standards.

04. MEASUREMENT AND PAYMENT

The Contractor shall provide trench protection or shoring systems for construction of pipes and other structures 5-feet or greater in depth. There will be no separate unit payment for these individual systems, but they shall be considered incidental to the trench safety program. The lump sum price bid for trench safety shall be full compensation for providing acceptable shoring or other means, and for installing, inspecting, certifying and maintaining the system and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

DIVISION 3 - CONCRETE

SECTION A

FORMWORK FOR CAST-IN-PLACE CONCRETE

01. GENERAL :

a. Scope : Furnish all labor and materials necessary to excavate, prepare subgrade, erect formwork, and backfill cast-in-place concrete as detailed on the drawings and specified herein.

b. Provisions for Utilities : Coordinate concrete work with other trades whose work must be installed within or adjacent to concrete. Furnish necessary grades and dimensions as required for proper installation of all work.

02. MATERIALS:

Use only formwork materials providing proper strength and finish capabilities. Broken or warped forming materials that may negatively affect the concrete pour or finish, in the opinion of the Owner's Representative, must be removed.

03. INSTALLATION :

a. Excavations : All excavations shall be carried to the depths and lines indicated on the drawing.

b. Forming : Forms shall be constructed to conform to the lines, grades, and sizes shown on the plans. Forms shall be constructed so that when removed the concrete shall have a smooth uniform surface. They shall be built mortar-tight to prevent leakage of fines and shall be braced to prevent shifting when concrete is placed.

c. Form Removal : Forms may be removed at the discretion of the contractor after concrete has attained the necessary strength to support its own weight and any construction live loads.

d. Backfill : After removal of forms and after inspection of foundation by Owner's representative, Contractor shall backfill against all surfaces to the elevation shown for finish grade, in accordance with the drawings and in a manner that does not damage the structure(s).

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 3 – CONCRETE

SECTION B

CONCRETE REINFORCING

01. GENERAL:

Furnish all labor, materials and equipment necessary to cut, bend and place all reinforcing steel in accordance with this specification and the applicable drawings.

02. MATERIAL:

a. Reinforcing Steel: Intermediate or hard grade, new billet stock conforming to ASTM A615, Grade 60.

b. Bar Supports, Spacers, Etc.: Shall be constructed of wire properly sized in accordance with ACI 315. Reinforcement in slab-on-fill shall be supported on concrete block especially precast for the purpose.

03. INSTALLATION:

a. Cleaning: Metal Reinforcement at the time concrete is placed shall be free from rust scale or other coatings that will destroy or reduce the bond. Reinforcement left protruding for future bonding shall be cleaned of concrete paste before covering with concrete.

b. Bending: All bars shall be bent cold in accordance with ACI 315. Bars having kinks or bends not shown on approved shop drawings shall not be used.

c. Splicing: Splicing of reinforcing bars shall be minimized as much as possible. Splicing, where necessary, may be accomplished by welding or lapping. The minimum overlap for a lapped splice shall be 24 bar diameters, but not less than 12".

d. Placing: The setting of all reinforcing steel shall conform to the "Standard Practice for Reinforcing Concrete Structures": as published by the American Concrete Institute. (318-83). Reinforcing steel shall be thoroughly wired together and shall be rigidly supported with concrete block bar supports or other methods acceptable to the Owner, so that the steel will be properly located and will not be displaced during pouring operations. Steel for all concrete shall be so placed that it shall be covered with concrete as shown on the drawing.

e. Corner Bars: The Contractor shall provide corner bars for beam steel at all exterior corners and at the intersection of interior and exterior grade beams. Corner bars shall be equal in diameter to beam steel. Joints between beam steel and corner bars shall be lapped or sealed as specified under paragraph c. of this specification.

f. Shop Drawings: Contractor shall submit complete shop drawings and bending diagrams for Engineer's approval, prior to fabrication.

g. Anchor Bolts: Furnish and install anchor bolts in strict accordance with tank manufacturer's instructions.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 3 - CONCRETE

SECTION C

CAST-IN-PLACE-CONCRETE

01. GENERAL :

a). Scope : Furnish materials, labor and equipment required to deposit, finish and cure all cast-in-place concrete as detailed on the plans and as specified herein.

b). Excavation and Formwork : Shall be as specified under Section 3A - Formwork for Cast-In-Place Concrete.

c). Reinforcing : Shall be as shown on the drawings.

d). Coordination with Other Trades : All work required by other trades to be coordinated with the concrete work will be provided and located by that particular trade. This Contractor shall assist other contractors as necessary in locating adjacent work and he shall take precautions to protect the work after completion. He shall replace or repair at his expense all displacement or damage of these items caused by his operation.

e). Inspection : The Contractor shall notify the Owner's Representative a minimum of 48 hours in advance of pouring time to permit ample time for checking of steel position, form sizes, and all other preparations for pouring concrete. In no case shall concrete be poured until the Owner's Representative has authorized the pouring of concrete.

02. MATERIALS :

a). Portland Cement : ASTM C150-69A, Type 1.
b). Fine and Coarse Aggregate : ASTM C33-67; coarse aggregate shall be 1-1/2" maximum in size.
c). Water : Shall be clear, potable and free of all substances that would be harmful to the concrete.

03. INSTALLATION :

a). Proportioning : Proportioning of design mix of concrete shall be in accordance with ACI211.1-77. Quantities of fine aggregate and water shall be selected to produce a mix within the range of workability required in the work. The water-cement ratio for structures to be watertight shall not exceed 0.48. The slump, as determined by ASTM143, is not to exceed 4" if consolidation is to be by vibration, and is not to exceed 5" if consolidation is to be by methods other than vibration. The minimum compressive strength of the concrete shall be 2,000 psi in 7 days and 3,000 psi in 28 days.

b). Mixing of Concrete : Concrete may be transit mixed or job mixed. Mix shall be designed to meet the strength requirements heretofore specified. Concrete shall be mixed until the mass is homogeneous and uniform in color and then deposited as soon as practical. Transit mixed concrete shall be Class A concrete and shall have been tested by an independent laboratory within 90 days prior to delivery to the site. A batch mix certificate shall be furnished for each batch delivered to the site. The certificate shall show date of delivery, date of batch test, and location where concrete is to be placed.

c). Transporting Concrete : Transport concrete from mixer to place of final destination by most direct and rapid means practical and in a manner that will prevent separation of ingredients and displacement of reinforcing. Avoid unnecessary handling. No concrete shall be poured which has been in mixer longer than 50 minutes after water is added.

d). Preparation for Placing : Complete flexible base course and compact as specified elsewhere in this specification. Water shall be removed from excavations before concrete is deposited. Where concrete is poured directly on grade or on earth fills, the subgrade shall be thoroughly moistened, but not made muddy, at the time the concrete is placed. Hardened concrete, debris, and other foreign materials shall be removed from the interior of forms and from the inside of mixing and conveying equipment. The reinforcement shall be made secure in position, and shall be subject to inspection and approval.

e). Placing Concrete : Unless otherwise specified, placing of concrete shall conform to Chapter 4 of American Concrete Institute Standard ACI 318. Concrete having attained initial set or having contained water for more than 50 minutes shall not be used in the work. Unless otherwise approved, concrete shall be mixed and placed only when the temperature is at least 35 deg. F and rising. No concrete shall be placed when the temperature is 40 deg. F and falling.

f). Installation of Anchorage Items : Anchorage items, including dowels, bolts and other similar devices, shall be of sufficient number and size, and so located as to insure anchorage purpose intended.

g). Expansion Joints : Joints between new and existing concrete shall have premolded expansion joint filler strips 1/2" thick the full depth of the slab. Edges of joints shall be finished slightly rounded.

h). Construction Joints : Construction joints will be allowed only where shown as permissible on the drawings.

i). Floating : The poured concrete surface shall be tamped until thoroughly compact and all course aggregate is pushed below the surface. Surface shall be screeded off to levels designated on the drawings. Surface shall then be floated with a darby and/or bull float until fines rise to the surface.

j). Finishing : After the water has left the surface, it shall be troweled with a steel trowel to a smooth surface. After the surface has hardened sufficiently to ring under the trowel, it shall, again, be troweled with a steel trowel to a hard, dense surface free from blemishes. The concrete shall be finished as shown on the drawings and specified herein. Exposed surfaces of concrete shall have all fins removed and any honeycomb pointed. Removal of fins will be applied only to those areas which may be exposed after structure is complete.

k). Corners : Exposed corners of all slabs, approaches, etc. shall be finished with an edging tool to form a rounded corner.

l). Curing of Concrete : Exposed surfaces of concrete shall be kept moist and shall be protected from premature drying for a period of at least 24 hours after being deposited. A curing compound which will provide not less than 85% water retention, and which will not permanently discolor the concrete may be used on concrete which does not receive additional concrete or mortar.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 3 - CONCRETE

SECTION D

CONCRETE MANHOLES AND JUNCTION BOXES

01. GENERAL: Furnish all labor, materials, and equipment to perform operations in connection with construction of manholes and junction boxes, including excavation, installation, backfilling, and surface restoration in strict accordance with this section of the specification and the applicable drawings and schedules.

02. MATERIALS:

a) Concrete and Cement Stabilized Sand: All concrete shall conform to Division 3 of these specifications. Cement stabilized sand for bedding or backfilling, where indicated or required, shall contain two (2) sacks of Portland Cement per cubic yard. Sand shall be “Fine Aggregate” as defined in Division 3 specifications.

b) Mortar: Mortar shall be composed of one part Portland Cement, one part masonry cement (or 1/4 part hydrated lime), and sand equal to 2-1/2 to 3 times the sum of the cement and lime volume used. Sand shall meet the requirements for “Fine Aggregate” as defined in Division 3 specifications.

c) Reinforcement: Shall be as shown on the drawings.

d) Rings and Covers, 32-Inch Inside Diameter: Rings and covers shall be as shown on the drawings. All covers shall have labels in the lid casting, identifying each designated use, such as “WATER”, “ELECTRIC”, “SEWER”, etc. as appropriate and as required by codes, rules, and regulatory authorities. Include labels in submittal information.

e) Precast Base Sections, Riser Sections, and Cones: Precast concrete base sections, riser sections, and cones shall conform to the requirements of ASTM C 478. Joints for wastewater base sections, riser sections, and cones shall conform to the requirements of ASTM C 443. Precast bases for 48-inch inside diameter manholes shall have preformed inverts. Approved inserts shall be embedded in the concrete wall of the manhole sections to facilitate handling: through-wall holes for lifting will not be permitted.

f) Precast Junction Boxes: Precast junction boxes shall be allowed only where indicated on the plans or approved by the Engineer. Joints for wastewater junction boxes shall conform to the requirements of ASTM C 443.

g) Pipe-to-Manhole/Junction Box Assemblies: Precast bases and precast junction boxes shall have flexible, resilient, and non-corrosive, approved boot connectors or ring waterstops conforming to the requirements of ASTM C 923 on all wastewater pipe connections.

h) Precast Flat-Slab Transition/Junction Box Lids: Precast slab transitions and lids shall be designed to safely resist pressures resulting from loads that might result from any combination of forces imposed by an HS-20 loading as defined by the American Association of State Highway and Transportation Officials (AASHTO). The joints of precast slab transitions and lids for wastewater applications shall conform to requirements of ASTM C 443.

i) Precast-Prefabricated Tee Manholes: Tee manholes shall be allowed only where indicated on the plans or approved by the Engineer. The vertical manhole portion (tee) above the main pipe shall conform to the requirements of the precast components.

j) The manhole tee shall have a minimum inside diameter of 48 inches and shall rise vertically centered or tangent to the main pipe, as indicated or approved. An access hole less than 48-inches in diameter shall be cut into the main pipe to allow a ledge for support of access ladders.

k) Precast Grade Rings, 32 Inch Inside Diameter: Rings shall be reinforced Class A or I concrete six (6) inches wide with a thickness of three (3) to six (6) inches.

l) Waterproofing Joint Materials: O-rings and wedge seals for the joints of all wastewater manholes and for stormwater manholes, where indicated, shall conform to the requirements of ASTM C 443. Connections between reinforced concrete wastewater manhole structures and pipes shall meet the requirements of ASTM C 923.

03. CONSTRUCTION METHODS:

a) All manholes shall have a minimum inside diameter of 48 inches. Manhole base dimensions shall be appropriately increased to accommodate all converging pipe. A minimum horizontal clearance of Twelve (12) inches shall be maintained between pipe walls at the springlines of adjacent pipes. Pipe ends within the manhole base walls shall not be relied upon to support overlying manhole dead and live load weights. All wastewater branch connections to new or existing mains shall be made at manholes with the influent pipe crown installed at the effluent pipe crown elevation. Where the springline of an influent pipe is 24 inches or more above the springline of the effluent pipe, a drop manhole shall be used. Construction of extensions to existing systems shall require placement of bulkheads at locations indicated or directed by the Engineer. Unless otherwise indicated, wastewater manholes shall have eccentric cones. Concentric cones may be used only where conflicts with other utilities dictate. Flat-slab tops may be used only where clearance problems exist.

b) Manholes shall be constructed at the established elevations on uniform stable subgrades. Unstable subgrade shall be over-excavated a minimum of 12 inches and replaced with approved material. Precast base units shall be installed and leveled on a 6-inch coarse aggregate bedding. A pipe section with a prefabricated tee manhole and half the length of the adjoining pipe sections on each side shall be set on a minimum of 6-inch non-reinforced Class A concrete. The cast in place concrete cradle shall be poured against undisturbed trench walls to the pipe's springline.

c) Cast in place foundations shall have a minimum depth of 12 inches at the invert flowline. The lowermost riser section may be set in the concrete while still green, after which the foundation shall be cured a minimum of 24 hours prior to proceeding with construction of the manhole up to 12 feet in depth. The foundation shall be cured an additional 24 hours prior to continuing construction above the 12-foot level. Manhole depth shall be measured from the invert flowline to the finish surface elevation.

d) Wastewater pipes, except polyvinyl chloride (PVC), may be laid through the manholes and the top half of the pipes removed to facilitate invert construction. The manhole bottom shall rise from the springline elevation of the pipe approximately one (1) inch for each 12 inches of run (8%). Wastewater manholes with lines larger than 18 inches shall require precast bases. Manholes constructed over in-service mains may be built on cast in place foundations if the flow cannot be interrupted. Precast and cast in place wastewater junction boxes shall be allowed only where indicated on the plans or approved by the Engineer.

e) All wastewater lines, except reinforced concrete pipe set in cast in place foundations, shall require an approved waterstop seal or gasket around the outside perimeter of the pipe. The seal or gasket shall be centered under the manhole section wall.

f) Manhole construction in roadways may be staged to facilitate base construction. Manholes constructed to interim elevations shall be covered with steel plates of sufficient thickness to support vehicular traffic. Steel plates on wastewater manholes shall be set in mortar to minimize

inflow. Manholes shall be completed to finish elevation prior to placement of the roadway's finish surface. The excavation for completion of manhole construction shall be backfilled with cement stabilized sand (2 sacks per cubic yard) up to the bottom of concrete pavement or to within two (2) inches of finish elevation of asphalt pavement. The cement-stabilized sand shall be a minimum of 12 inches thick.

g) Acceptance Testing: Manholes shall be tested separately and independently of the wastewater lines.

i) Exfiltration Method:

a) All backfilling and compaction are to be completed prior to the commencement of testing.

b) Manhole section interiors shall be carefully inspected. Units found to have through-wall lift holes or any penetration of the interior surface by inserts provided to facilitate handling will not be accepted.

c) After cleaning the interior surface of the manhole, the Contractor shall place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole. The sealing pressure within the plugs shall be as recommended by the plug manufacturer.

d) Concrete manholes shall be filled with water or otherwise thoroughly wetted for a period of 24 hours prior to testing.

e) At the start of the test, the manhole shall be filled to the top with water. The test time shall be 1 hour. The Construction Inspector must be present for observation during the entire time of the test. Permissible loss of water in the 1-hour test is 0.0025 gallons per diameter foot, per foot of manhole depth. For a 4-foot diameter manhole, this quantity converts to a maximum permissible drop in water level (from the top of a 24" diameter manhole cone) of 0.05 inches per foot of manhole depth (0.5 inches for a 10 foot deep manhole).

ii) Vacuum Test Method: With the approval of the Owner's Representative, the Contractor may substitute the Vacuum Method of testing for the Exfiltration test described above. The vacuum method may be used by the Contractor prior to backfilling, but only for his convenience so that defects may be located and repaired. Final acceptance testing shall be done after all backfilling and compaction are complete.

a) Manhole vacuum tester by P.A. Glazier, Inc., Cherne Industries, or other approved manufacturer.

b) Pipe sealing plugs having a load resisting capacity equal to or greater than that required for the size of the connected pipe to be sealed.

c) Manhole section interiors shall be carefully inspected. Units found to have through wall lift holes or any penetration of the interior surface by inserts provided to facilitate handling will not be accepted.

d) After cleaning the interior surfaces of the manhole, the Contractor shall place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole. The sealing pressure within the plugs shall be as recommended by the plug manufacturer. Plugs and ends of pipes connected by flexible boots shall be blocked to prevent movement during the vacuum test.

e) The vacuum test head shall be placed at the inside of the top of the manhole cone section and the compression seal band inflated to the pressure recommended by its manufacturer. The vacuum pump shall be connected to the outlet port with the valve

open. When a vacuum of 10 inches of mercury (-5 psig) has been attained, the valve shall be closed and the time noted.

f) Permissible vacuum loss for a successful test is one (1) inch vacuum drop within three (3) minutes of valve closure. The actual vacuum shall be recorded at the end of the three (3) minutes following valve closure.

h) Test Failure: If the manhole does not pass either the exfiltration or the vacuum test as described above, or if visible groundwater leakage into the manhole is observed, the Contractor shall locate leak and make repairs acceptable to the Owner's Representative, and retest the manhole. Records of all manhole testing shall be made available to the Owner's Representative at the close of each working day or as otherwise directed.

i) Inspection: The Owner's Representative shall make a visual inspection of each manhole after it has passed the testing requirements and is considered to be in final condition. The inspection shall determine the completeness of the manhole. Any defects shall be corrected to the Engineer's satisfaction.

04. MEASUREMENT AND PAYMENT:

The work performed in accordance with this item is considered incidental to the work in other bid items. No separate consideration or payment will be made for work hereunder.

DIVISION 3 - CONCRETE

SECTION E

CONSTRUCTION JOINTS AND WATERSTOPS

01. GENERAL:

This section covers construction joints, expansion joints and the placing of waterstops where such are indicated on the Plans.

Construction joints shall be of the type indicated on the Drawings and shall be located as shown on the Plans, unless otherwise approved by the Engineer.

02. MATERIALS:

a.) Water stops

i. Provide hydrophilic rubber waterstop as supplied by Greenstreak, HYDROTITE or approved equal. Waterstop profile number to be per manufacturer recommendations for application.

ii. The waterstop shall be a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.

iii. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.

iv. Performance Requirements as follows:

Chloroprene Rubber

Property	**Test Method**	**Required Limits**
Tensile Strength	ASTM D 412	1300 PSI min.
Ultimate Elongation	ASTM D 412	400% min.
Hardness (Shore A)	ASTM D 2240	50 +/- 5
Tear Resistance	ASTM D 624	100 lb/inch min.

Modified Chloroprene (Hydrophilic) Rubber

Property	**Test Method**	**Required Limits**
Tensile Strength	ASTM D 412	350 PSI min.
Ultimate Elongation	ASTM D 412	600% min.
Hardness (Shore A)	ASTM D 2240	52 +/- 5
Tear Resistance	ASTM D 624	50 lb/inch
Expansion Ratio	Volumetric Change - Distilled Water @ 70^{o} F	3 to 1 min.

v. Provide Greenstreak , or approval equal, Rubber Adhesive to secure waterstop to smooth, dry concrete.

vi. Provide Greenstreak 7300 , or approved equal, two component epoxy gel to secure waterstop to rough, wet (or dry) concrete.

vii. Provide LEAKMASTER, or approved equal, single component hydrophilic sealant to secure waterstop to rough, dry concrete.

viii. Provide cyanacrylate adhesive (super glue) for all splices.

ix. Provide single component hydrophilic sealant, as addition to cyanacrylate adhesive at all splices for added insurance.

b.) Preformed Asphalt Fiber Joint Material for Expansion Joints:

Asphalt fiber sheet filler shall consist of preformed strips of inert material impregnated with asphalt. It shall be of the thickness shown on the Plans or indicated in these Specifications.

The sheet filler shall conform to the requirements of AASHO Specification M-59 with the following provisions:

i. The asphalt content shall be 35% to 50% by weight of the joint filler after drying at 325-degrees F for one (1) hour.

ii. The sheet filler shall be of such character that it will not be deformed by ordinary handling during hot weather, nor become hard and brittle in cold weather. It shall be of a tough, resilient, durable material not affected by weathering.

03. INSTALLATION :

a.) Water Stops

Follow approved manufacturer recommendations.

i. Cut coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps.

ii. Splices shall be sealed using cyanacrylate adhesive (super glue) and single component hydrophilic sealant.

iii. Seal watertight any exposed cells of waterstop using single component hydrophilic sealant.

iv. Forming Requirements

Waterstop construction joint profiles are installed after the form is stripped from the first pour and before the second concrete pour is made. Waterstop is to be installed in a groove angle at the joint face to accept the construction joint profile as per plans. Installing the construction joint profile in a formed groove will reduce the risk of the profile shifting during the placement of concrete. Due to the hydrophilic nature of the hydrophilic rubber waterstop product, installation of the profile should be timed as close as possible to the second placement of concrete. This will reduce the chance for premature expansion of hydrophilic rubber waterstop due to rainwater or ground water exposure. When extended periods are expected between pours along a common joint line, install hydrophilic rubber waterstop to a point slightly beyond the end of the first expected pour. Protect exposed length of hydrophilic rubber waterstop from moisture. In the event the exposed hydrophilic rubber waterstop exhibits expansion before the next placement of concrete, remove swelled material before splicing to a new length of hydrophilic rubber waterstop. Follow splicing instructions listed below.

v. Splicing

Hydrophilic rubber waterstop construction joint profiles are designed with a cellular cross section. The cellular cross section allows the profile to compress slightly when concrete is placed and rebound as the concrete shrinks during curing. The cellular cross section also acts to control the expansive force placed on the surrounding concrete. Straight lengths of construction joint profiles should be cut square with a sharp knife or good pair of shears. Place several drops of a cyanoacrylate type adhesive (super-glue) on the cut ends of hydrophilic rubber waterstop and immediately join the ends together. Hold in position for approximately 30 seconds to allow the adhesive to set. Proper alignment and bonding of the cut ends will prevent water entering the cells of the profile. Future hydration of the waterstop will further seal the bond area.

Flat 900 corners should be spliced by miter cutting the two ends at 450 and proceeding in a manner similar to the above. Where space permits and for certain product profiles, hydrophilic rubber waterstop can be bent to an inside radius of approximately 2 inches about its long axis, thus eliminating a spliced joint. Flat “T’s” and “X’s” should be made by butt splicing the legs with the use of Cyanoacrylate adhesive. Vertical 900 corners, vertical “T’s” and vertical “X’s” should be butted and bonded with the Cyanoacrylate adhesive. All splices shall be further enhanced by placing a bead of single component hydrophilic sealant at the splice.

vi. Bonding to Concrete

Remove all dust, oil, laitance, etc. from concrete surface prior to adhering hydrophilic rubber waterstop. Depending on concrete surface conditions, one of several adhesives can be used. Normal forming practice leaves a sufficiently smooth surface for direct bonding of hydrophilic rubber waterstop to the concrete by one of several methods. Some profiles are available with an adhesive backing. Simply remove the release paper and press the profile firmly against the concrete in the desired location. Hydrophilic rubber waterstop profiles can also be secured with a chloroprene rubber compatible adhesive. The adhesive should be applied to both the hydrophilic rubber waterstop profile and the concrete surface and allowed to dry to a tacky condition. Once this condition is met, place the hydrophilic rubber waterstop profile into position. These methods work well when concrete surfaces are smooth and dry.

Concrete surfaces left rough due to jack hammering, extensive weathering, etc. should be brought to a smooth level condition. A single component swellable sealant can be used for this purpose when the concrete surface is dry. Apply a sufficient bead of single component hydrophilic sealant to the rough concrete to insure that a smooth level surface will result. The hydrophilic rubber waterstop profile should be placed in position within 4 hours. Concrete nails may be used on vertical or overhead surfaces to hold the profile in position while the single component hydrophilic sealant cures. A 2-part epoxy may also be used to level rough, wet concrete surfaces to bond hydrophilic rubber waterstop profiles in position. The hydrophilic rubber waterstop profile should be applied to the bed of epoxy prior to final cure, approximately 30 minutes. Again, concrete nails may be used on vertical or overhead applications.

vii. Important Precautions

Hydrophilic rubber waterstop construction joint type profiles should be used primarily in site formed concrete joints where limited movement is expected. Hydrophilic rubber waterstop protects a joint from water migration by creating a compressive seal within the joint. Joints with excessive movement will diminish this compressive seal and compromise the seals’ effectiveness. While hydrophilic rubber waterstop CJ profiles can be wet-dry cycled many times, a constantly damp and/or wet environment is preferred. Cracking of the concrete,

caused by the expansion pressure of hydrophilic rubber waterstop, can be avoided by maintaining a 2” minimum concrete coverage. Increase this coverage if lightweight or low strength concrete (<3000 PSI compressive strength) is used. Hydrophilic rubber waterstop should be stored in a cool, dark, dry place. Exposure to moisture prior to installation may expand the hydrophilic rubber waterstop prematurely. If hydrophilic rubber waterstop is installed in an expanded condition, the effectiveness of the seal may be severely reduced. Once installed, adequate measures should be taken to prevent exposure to rain water, ground water, etc. before the joint is covered with concrete.

b.) Expansion Joints:

Expansion joints of the size and type shown on the Plans, or specified herein, shall be placed in concrete pavement or structures as shown on the Plans.

04. MEASUREMENT AND PAYMENT:

No separate payment will be made for work covered under this section of the Specifications, and all costs in connection therewith shall be included in the Contract Price for the items to which the work is incident.

DIVISION 3 - CONCRETE

SECTION F

PRECAST CONCRETE

01. GENERAL:

A. Scope: Furnish materials, labor and equipment required for fabrication and erection of pre-cast concrete. Contractor shall submit shop drawings showing sizes, openings, fabrication, anchorage, reinforcement, finishes, and other pertinent information to Engineer for approval prior to precasting.

B. Coordination with Other Trades: All plumbing, electrical, concrete inserts, hangers, anchors, and similar items of work required by other trades to be built into the concrete work will be provided and located by that particular trade. This Contractor shall assist other contractors as necessary in setting these items and he shall take precautions to protect them after they have been set. He shall replace or repair at his expense all displacement or damage of these items caused by his operation.

02. MATERIAL:

A. General: Pre-cast concrete sections shall have dimensions as shown on the drawings. All concrete and related appurtenances shall be in conformance with all provisions of Division 3 Cast-in-Place concrete. Lifting attachments shall be as required for contractor's handling without breaking or damage.

B. Roof Slabs: Precast concrete roof slabs shall be hollow core slabs with pretensioned, prestressed strands. Slabs shall be cast in 48-inch widths, unless otherwise noted.

C. Fabrication and Design:
1. Design of precast concrete slabs shall be in accordance with the latest edition of ACI 318.
2. Concrete shall have a minimum compressive strength of 5,000 psi at 28 days.
3. Precast concrete slabs shall be designed and reinforced for all superimposed dead and live loads.
4. Prestressing strands shall be pretensioned by either a dead weight system or a single strand jacking system. Strands shall be marked for slippage, and if slippage occurs, strand shall be detensioned and restressed. Tension of strand shall be checked to insure accurate results.
5. Prestressing strands will be released when concrete reaches a strength of 3,000 psi or greater.
6. Precast concrete slabs shall be wet or steam cured and shall be clean, smooth, and straight without fins, broken edges, or structural defects prior to delivery.

D. Allowable Tolerances:
1. Length of precast units shall be ± ½ inch of the length indicated on the approved shop drawings.
2. Width of precast concrete units: ± ¼ inch
3. Thickness of precast concrete units ± 1/8 inch.
4. Location of inserts within units: ± 1 inch.
5. Differential camber between adjacent units of the same design: ± ¼ inch per 10 ft.

E. Source Quality Control: Cylinder tests of concrete quality shall be made by manufacturer in accordance with ASTM C 192, for each mix design, for each day of production, or for each 10 cubic yards of concrete.

F. Submittals: Submit 5 copies of shop drawings for approval prior to fabrication. Drawings shall show position, span, dimensions, reinforcement, location of anchor plates or clips as required, openings, hanger spacing and anchoring details.

G. Concrete: Portland cement shall conform to ASTM C 150.

H. Aggregate: Normal weight aggregate shall conform to ASTM C33, for fine to course gradation. Lightweight aggregate shall conform to ASTM C 330, for fine to course gradation.

I. Admixtures: Chemical admixtures shall conform to ASTM C 494. Calcium chloride shall not be used. Water shall be free from foreign materials in amounts harmful to concrete.

J. Prestressing Strands: shall be uncoated 7 wire strands conforming to ASTM A 416, Grade 250 or 270.

K. Bearing Pads: Bearing pads shall be non-staining pressed or tempered wood, or multipolymer plastic.

L. Inserts: Weld inserts, anchor plates, etc. shall be as shown on drawings as required for anchoring slabs to supports.

M. Headers: Headers required to safely carry design loads shall be fabricated of steel and be painted with one coat of red primer.

N. Inspection: Each individual precast unit shall be checked at the fabrication site just prior to loading for transportation to the project site. No broken, cracked, spalled, warped or otherwise defective units shall be erected.

O. Storage: Store precast concrete slabs to protect units from contact with soil or ground. Store units on firm surfaces to avoid warping and cracking.

03. INSTALLATION:

A. Transporting Pre-Cast Concrete: Transport pre-cast concrete sections from fabricator to place of final destination by most direct and rapid means practical and in a manner that will prevent damage to castings. Avoid unnecessary handling.

B. Preparation for Placing : Water shall be removed from excavations or seating surfaces before pre-cast concrete is erected. Where castings are placed directly on grade or on earth fills, the subgrade shall be thoroughly moistened, but not made muddy, at the time the concrete is placed.

C. Placing Pre-cast Concrete: Erect pre-cast concrete sections in accordance with fabricator or manufacturer's specifications. Align and place each section in accordance with specifications and grout as required. Caulk or weld all joints and seams to insure waterproof structure.

D. Installation of Roof Slabs:
1. Precast concrete slabs shall be installed according to approved shop drawings and details by mechanics experienced in precast concrete slab erection.

2. Cooperate with other trades to permit inserting of anchors, hangers, etc. Hangers shall be placed before units are grouted.

3. Where indicated on plans precast slab manufacturer shall feather joints with skim coat of latex.

4. Units shall be affected tight and at right angles to bearing surfaces unless shown otherwise. Minimum bearing shall be 2-1/2 inches on steel, 3 inches on concrete and 3-1/2 inches on masonry. Align and level precast concrete slabs using shims.

5. Where weld inserts are shown, precast concrete slab contractor shall weld inserts in slabs to bearing surfaces.

6. Grouting Joints:
    a) Clean joints before grouting.
    b) Grout for joints shall be 1 part Portland cement, 3 parts sand, and water.
    c) Fill joints between units with grout.
    d) Remove grout that seeped through to ceiling below before grout hardens.

7. All openings required in the precast slabs shall be indicated on the structural plans.

8. Weld angles, anchor inserts in bearing surfaces and supporting structures shall be installed plumb to line and grade prior to erection of slabs. Contractor shall verify that structure and anchorage inserts are within allowable tolerances.

9. All bearing surfaces including lintels to be installed prior to slab erection.

10. Where masonry walls are used as bearing surfaces, the top course shall be solid.

E. Adjust And Clean: Remove rubbish and debris resulting from precast concrete slab work from premises upon completion. After erection and grouting is completed the general contractor will be responsible for the protection of the slabs.

04. MEASUREMENT AND PAYMENT: The work performed in accordance with this item is considered incidental to the work in lump sum bid items. No separate consideration or payment will be made for work hereunder